Commonwealth of Massachusetts
2010 Air Quality Report

Department of Environmental Protection
Bureau of Waste Prevention
Division of Planning and Evaluation

Air Assessment Branch
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This 2010 Air Quality Report was prepared by the Massachusetts Department of Environmental Protection (MassDEP), Air Assessment Branch (AAB), which collects representative samples of ambient air for a number of pollutants at monitoring stations located throughout the Commonwealth. All samples are collected in a precise and scientifically sound manner in order to properly characterize the quality of the air in the state and to accurately assess the exposure of its citizens to airborne pollutants.

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This report is available on MassDEP's web site at www.mass.gov/dep/air/priorities/aqreports.htm

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List of Abbreviations

AAB ..... Air Assessment Branch
AQS ..... Air Quality System
AQI…… ... Air Quality Index
BAM ..... Beta Attenuation Monitor
BC ..... Black Carbon
BP..... Barometric Pressure
CAA ..... Clean Air Act
CFR..... Code of Federal Regulations
CO ..... Carbon Monoxide
CO_2..... Carbon Dioxide
FEM ..... Federal Equivalent Method
FRM ..... Federal Reference Method
IMPROVE .... Interagency Monitoring of Protected Visual Environments
MassDEP ..... Massachusetts Department of Environmental Protection
NAAQS..... National Ambient Air Quality Standards (for criteria pollutants)
NADP..... National Atmospheric Deposition Program
NAMS..... National Air Monitoring Stations
NATTS..... National Air Toxics Trends Station
NCore……..National Core Monitoring Network
NESCAUM .... Northeast States for Coordinated Air Use Management
NOAA..... National Oceanic and Atmospheric Administration
NO..... Nitric Oxide
NO_x ..... Nitrogen Oxides
NO_y ..... Total Reactive Oxidized Nitrogen
NO_2 ..... Nitrogen Dioxide
NO_3 ..... Nitrate
NPN ..... NOAA Profiler Network
O_3 ..... Ozone
PAH ..... Polycyclic Aromatic Hydrocarbon
PAMS..... Photochemical Assessment Monitoring Stations
Pb ..... Lead
pH..... Concentration of hydrogen cations (H^+) in solution (an indicator of acidity)
ppb ..... parts per billion by volume
ppm ..... parts per million by volume
$PM_{2.5}$ ..... Particulate matter ≤ 2.5 microns aerodynamic diameter
PM_{10} ..... Particulate matter ≤ 10 microns aerodynamic diameter
PQAO..... Primary Quality Assurance Organization
PSI..... Pollutant Standards Index
QA/QC ..... Quality Assurance and Quality Control
RASS ..... Radio Acoustic Sounding System
RH..... Relative Humidity
SIP..... State Implementation Plan
SLAMS ..... State and Local Air Monitoring Stations
SO_2 ..... Sulfur Dioxide
SO_4 ..... Sulfate
Solar Rad…... Solar Radiation
SVOC…….Semi-Volatile Organic Compounds
TSP..... Total Suspended Particulates
ug/m^3 ..... micrograms per cubic meter
EPA..... United States Environmental Protection Agency
VOCs ..... Volatile Organic Compounds
WS/WD..... Wind Speed/Wind Direction

Section I
Ambient Air Monitoring Program

Program Overview

Introduction

The Massachusetts Department of Environmental Protection (MassDEP) is the state agency responsible for monitoring outdoor air quality in Massachusetts and developing regulatory programs to reduce emissions of pollutants that adversely affect public health, welfare, and the environment.

MassDEP's Air Assessment Branch (AAB) operates an extensive network of air monitoring stations throughout the Commonwealth. During 2010, MassDEP operated a network of 29 monitoring stations located in 21 cities and towns, and oversaw the operation of a four-station source-oriented industrial network in the Boston area that is privately funded. MassDEP also received data from the Wampanoag Tribe of Gay Head (Aquinnah), which operates an air monitoring station on Martha's Vineyard, and from the U.S. Environmental Protection Agency, Region I Laboratory, which operates an air monitoring station in Chelmsford.

MassDEP submits all ambient air quality data to the national Air Quality System (AQS) database that is administered by the U.S. Environmental Protection Agency (EPA). In addition, MassDEP *MassAir Online* website allows users to point and click on a map of the state to find current, near real-time air quality data for any location in the MassDEP air monitoring network that has a continuous air monitor. MassAir Online is found at www.mass.gov/dep/air/index.htm

Why is Air Quality Data Collected?

Ambient air quality data is used for a number of purposes, including to:

- Provide information about air quality to the public;
- Provide short-term and long-term information regarding air pollution and public health;
- Verify compliance with National Ambient Air Quality Standards;
- Assess the effectiveness of current air pollution control regulations and initiatives;
- Support development of policies and regulations aimed at reducing air pollution;
- Support long-term trend analysis and special research; and
- Fulfill requirements to report ambient air quality data to EPA

What is Monitored?

MassDEP monitors parameters in the following categories:

Criteria pollutants are subject to National Ambient Air Quality Standards (NAAQS). The criteria pollutants monitored are:

- sulfur dioxide (SO_2)
- ozone (O_3)
- carbon monoxide (CO)
- nitrogen dioxide (NO_2)
- lead (Pb)
- particulate matter ≤10 microns (PM_{10})
- particulate matter ≤ 2.5 microns ($PM_{2.5}$)

Non-criteria pollutants do not have National Ambient Air Quality Standards, but can contribute to the formation of ozone and particulate matter and/or be toxic. The non-criteria pollutants monitored inlcude:

- nitric oxide (NO)
- total nitrogen oxides (NO_x)
- total reactive oxidized nitrogen (NO_y)
- total suspended particulates (TSP)
- volatile organic compounds (VOCs) – ozone precursors and reaction product chemicals
- black carbon (i.e., soot)
- acid deposition – measured as pH and conductivity of precipitation
- toxics – health-relevant VOCs, SVOCs, carbonyls and metals

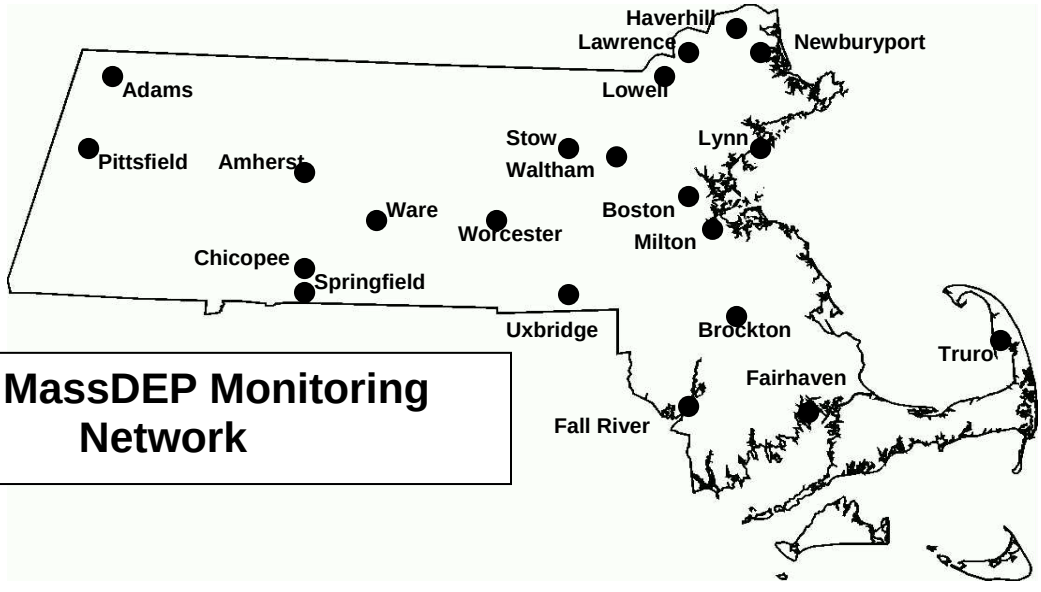
Meteorological parameters monitored include:

- wind speed/wind direction (WS/WD)
- relative humidity (RH)
- temperature (TEMP)
- barometric pressure (BP)
- solar radiation (Solar Rad)
- upper air wind and temperature (Wind Profiler and RASS)
- total B band ultraviolet radiation (UVB)
- precipitation (PRECIP)

Monitoring Station Locations

Monitoring stations are sited to provide data for various purposes. Some are located where maximum pollutant concentrations are expected, while others are located in areas that will provide data that is representative of larger geographical areas. Local topography and the location of pollutant sources are factors that determine how well a particular monitor's location will represent an area.

Networks of monitors are located throughout the state. These networks are designed to reflect pollutant concentrations for all of Massachusetts. Section III of this report contains data summaries for each pollutant measured and maps showing the monitor locations for each network. Appendix A contains a list of monitor locations. The map below shows Massachusetts cities and towns where MassDEP air monitors were located during 2010. Please note that the Waltham precipitation (acid rain) monitoring station was closed in October 2010 due to budget contraints.



2010 MassDEP Monitoring Network

For Further Information

For further information about this report, please contact MassDEP's Air Assessment Branch. For information about general air quality topics, please contact MassDEP's Bureau of Waste Prevention or visit MassDEP's website at www.mass.gov/dep/air. You can also contact one of MassDEP's Regional Offices. To find out your region, go to www.mass.gov/dep/about/regional.htm. To view online air quality data for Massachusetts and other states, go to EPA's website at www.epa.gov/air/data.

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National Ambient Air Quality Standards

Below are the most current National Ambient Air Quality Standards for criteria pollutants set by EPA. **Primary Standards** are designed to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. **Secondary Standards** are designed to protect public welfare, including protection against decreased visisbility, damage to crops, vegetation, and buildings.

National Ambient Air Quality Standards				
	Primary Standards		**Secondary Standards**	
Pollutant	**Level**	**Averaging Time**	**Level**	**Averaging Time**
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour (1)	None	
	35 ppm (40 mg/m^3)	1-hour (1)		
Lead	0.15 $\mu g/m^3$	Rolling 3-Month Average	Same as Primary	
Nitrogen Dioxide	0.053 ppm	Annual (Arithmetic Average)	Same as Primary	
	100 ppb	1-hour (2)	None	
Particulate Matter (PM_{10})	150 $\mu g/m^3$	24-hour (3)	Same as Primary	
Particulate Matter ($PM_{2.5}$)	15.0 $\mu g/m^3$	Annual (4) (Arithmetic Average)	Same as Primary	
	35 $\mu g/m^3$	24-hour (5)	Same as Primary	
Ozone	0.075 ppm	8-hour (6)	Same as Primary	
	0.08 ppm (1997 std)	8-hour (6)	Same as Primary	
Sulfur Dioxide	0.03 ppm	Annual (Arithmetic Average)	0.5 ppm	3-hour (1)
	0.14 ppm	24-hour (1)		
	75 ppb (7)	1-hour	None	

$\mu g/m^3$ = micrograms per cubic meter; ppm = parts per million; ppb = parts per billion; mg/m^3 = milligrams per cubic meter

(1) Not to be exceeded more than once per year.

(2) To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb (0.100 ppm).

(3) Not to be exceeded more than once per year on average over 3 years.

(4) To attain this standard, the 3-year average of the weighted annual mean PM2.5 concentrations from single or multiple community-oriented monitors must not exceed 15.0 $\mu g/m^3$.

(5) To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 $\mu g/m^3$.

(6) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm; or 0.08 ppm for the 1997 standard.

(7) To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb (0.075 ppm).

Pollutant Health Effects and Sources

Ozone (O_3)

- Ground-level, or Tropospheric O_3 and Stratospheric O3 in the upper atmosphere are the same chemical compound, just found at different places in the atmosphere. Stratospheric O_3 found at greater than 30,000 feet above the surface of the earth is beneficial to all life because it filters out the sun's harmful UV radiation before it reaches the earth's surface. Ground-Level O3 on the other hand is a health and environmental problem. This report pertains exclusively to ground-level O3.
- O3 is a respiratory irritant and can reduce lung function and cause asthma attacks, nasal congestion, and throat irritation, and reduce resistance to infection. It can inflame and damage (possibly permanently) cells that line the lungs, and aggravate chronic lung diseases. In addition, a number of studies have found a strong link between increases in ground-level O_3 and increased risk of premature death.
- O_3 is toxic to vegetation, inhibiting growth and causing leaf damage.
- O_3 deteriorates materials such as rubber and fabrics.
- Ground-level O_3 is unique in that it is formed by the reactions that occur between certain pollutants in the presence of intense, high-energy sunlight during the hot summer months. The complexity of the reactions and the amount of time needed to complete these reactions can result in the buildup of ground-level ozone concentrations far downwind from the original source of the precursors.
- Sources of ground-level O_3 precursors, i.e., nitrogen oxides and hydrocarbons, include motor vehicles, lawn and garden equipment, power plants and other industrial sources.

Carbon Monoxide (CO)

- CO binds with hemoglobin in the blood, reducing the amount of oxygen carried to organs and tissues.
- Symptoms of high CO exposure include shortness of breath, chest pain, headaches, confusion, and loss of coordination. The health threat is most severe for those with cardiovascular disease.
- Motor vehicle emissions are the largest source of CO, which is produced from incomplete combustion of carbon in fuels.
- Industrial processes and non-transportation fuel combustion (e.g., boilers, lawn and garden equipment) also are sources of CO.

Sulfur Dioxide (SO_2)

- SO_2 combines with water vapor to form acidic aerosols harmful to the respiratory tract, aggravating symptoms associated with lung diseases such as asthma and bronchitis.
- SO_2 is a primary contributor to acid deposition. Impacts of acid deposition include: acidification of lakes and streams, damage to vegetation, damage to materials, and diminution of visibility.
- SO_2 is a product of fuel combustion (e.g., the burning of coal and oil that contains sulfur). Sources include power plants and business and residential sources burning heating oil.

Nitrogen Dioxide (NO_2)

- NO_2 lowers resistance to respiratory infections and aggravates symptoms associated with asthma and bronchitis.
- NO_2 contributes to acid deposition. Impacts of acid deposition include: acidification of lakes and streams, damage to vegetation, damage to materials, and diminution of visibility.
- NO_2 and NO contribute to the formation of ozone.
- NO_2 is formed from the oxidation of nitric oxide (NO). Major sources of NO are fuel combustion, space heating, power plants and motor vehicles.

Particulate Matter (PM_{10} and $PM_{2.5}$)

- Particulate matter is tiny airborne particles or aerosols, which include dust, dirt, soot, smoke, and liquid droplets. Fine particulate matter (mostly below 2.5 microns in size) are not only the result of direct emissions, but can be formed in the atmosphere by chemical reactions involving gaseous pollutants.
- The numbers 2.5 and 10 refer to the particle size (actually the particles equal or less than that size), measured in microns, collected by the monitors. Several thousand $PM_{2.5}$ particles could fit on the period at the end of this sentence.
- The small size of these particles allows easy entry into the human respiratory system. Long-term exposure causes the particles to accumulate in the lungs and affects breathing and produces respiratory symptoms. The small particles can migrate through the lungs and into the circulatory system and potentially produce cardio-vascular symptoms, as well as impacts from toxic components contained in the particulate matter.
- Particulate matter causes soiling and corrosion of materials.
- Particulate matter contributes to atmospheric haze that degrades visibility.
- Sources of particulates include industrial process emissions, motor vehicles, incinerators, power plants, and other fuel combustion sources.

Lead (Pb)

- Lead is an elemental metal that is found in nature.
- Exposure to lead can occur by inhalation or ingestion with food, water, soil or dust particles.
- Children, infants, and fetuses are the most susceptible to the effects of lead exposure.
- Lead causes mental retardation, brain damage, and liver disease. It may be a factor in high blood pressure and damages the nervous system.
- Lead enters the atmosphere from the incineration of lead containing materials and from the manufacture and processing of lead containing products or materials like storage batteries, smelting and removal of paint that contained lead.

Public and Industrial Network Descriptions

2010 Public Monitoring Network

MassDEP operates a public ambient air monitoring network.

Network Size

- 29 monitoring stations
- 21 cities and towns with monitoring stations

Number of Continuous Monitors

Continuous monitors measure air quality 24 hours per day. The data are reported as hourly means.

- Criteria pollutant monitors measure pollutants for which National Ambient Air Quality Standards (NAAQS) have been set.
  - 7 – CO (carbon monoxide), which includes 3 trace-level CO monitors
  - 11 – NO_2 (nitrogen dioxide). NO (nitric oxide) and NO_x (total nitrogen oxides) also are measured by these monitors.
  - 15 – O_3 (ozone)
  - 6 – SO_2 (sulfur dioxide), which includes 2 trace-level SO_2 monitors

- Meteorological monitors track weather conditions.
  - 13 – BP (barometric pressure)
  - 13 – RH (relative humidity)
  - 13 – Solar Rad (solar radiation)
  - 13 – TEMP (temperature)
  - 13– WS/WD (wind speed/wind direction)
  - 1 – Profiler (this monitor measures WS/WD and TEMP at various altitudes, which aids in the analysis of pollutant transport)
  - 1 – UVB (B Band Ultra-violet Radiation)
  - 2 – Precipitation

- Other Monitors
  - 2 – NO_y (Total Reactive Oxidized Nitrogen)
  - 4 – PAMS (photochemical assessment monitoring station). These monitors measure VOCs (volatile organic compounds) using automated gas chromatographs (GCs) on an hourly basis during the summer.
  - 10 – $PM_{2.5}$ BAMs (particulate matter – 2.5 microns beta attenuation monitors)
  - 3 – Black Carbon

Number of Intermittent Monitors

Intermittent monitors take discrete samples for a specific time period. The samples are taken every day, every third day, or every sixth day. The data is averaged in 3-hour or 24-hour intervals.

- Criteria pollutant monitors measure pollutants that have National Ambient Air Quality Standards (NAAQS).
  - 1 – Pb (Lead)
  - 7 – PM_{10} (particulate matter – 10 microns)
  - 18 – $PM_{2.5}$ FRM (particulate matter – 2.5 microns Federal Reference Method)

- Non-criteria pollutant monitors measure pollutants that do not have NAAQS.
  - 4 – PAMS (photochemical assessment monitoring station). These monitors measure VOCs (volatile organic compounds) on a less intensive schedule than during the summer months.
  - 2 – Toxics. These monitors measure health-relevant VOCs.
  - 2 – Speciation. These monitors measure for $PM_{2.5}$, nitrates, and organics.
  - 1 – PM_{10} (particles for toxic metals)
  - 1 – Acid Deposition - Precipitation is collected and analyzed for conductivity and acidic compounds that are harmful to the environment as part of the National Atmospheric Deposition Program (NADP). The Waltham acid deposition site was closed in October 2010. Two other monitors located in Truro and Ware are part of the NADP but are operated by the National Park Service and the University of Massachusetts, respectively.

2010 Industrial Monitoring Network

There is one industrial monitoring network that submits data to MassDEP. The data must be collected using quality assurance requirements established by MassDEP and EPA.

Network Size

- 4 monitoring stations
- All are located in the Boston area

Number of Continuous Monitors

Continuous monitors measure the air quality 24 hours per day. The data is reported as 1-hour averages.

- Criteria pollutant monitors measure pollutants that have National Ambient Air Quality Standards (NAAQS).
  - 1 – NO_2 (nitrogen dioxide). NO (nitrogen oxide) and NO_x (total nitrogen oxides) also are measured by this monitor.
  - 4 – SO_2 (sulfur dioxide)

- Meteorological monitors
  - 4– WS/WD (wind speed/wind direction)

Number of Intermittent Monitors

Intermittent monitors take discrete samples for a specific time period. These monitors sample every sixth day, and the data is averaged for a 24-hour interval.

- Other Monitors
  - 4 – TSP (total suspended particulates)
  - 4 – SO_4 (sulfate)

Section II
Attainment and Exceedances of Air Quality Standards

Attainment Status Summary

The Clean Air Act (CAA) contains timeframes and milestones for states to meet and maintain National Ambient Air Quality Standards (NAAQS) for criteria pollutants. EPA sets NAAQS at levels to protect public health and the environment. EPA must review each NAAQS every five years and may update the standards based on new scientific information as well as establish new monitoring requirements. Each state is required to monitor the ambient air to determine whether it meets each standard.[1] If monitoring shows that the air quality does not meet a standard, the state must develop and implement pollution control strategies to attain that standard. Once air quality meets a standard, a state must develop a plan to maintain that standard while accounting for future economic and emissions growth. Taken together, these plans and control strategies constitute the State Implementation Plan (SIP).

Massachusetts is designated as nonattainment of the 1997 8-hour ozone standard of 0.08 parts per million (ppm). Massachusetts is designated as attainment or unclassifiable for the other criteria pollutants, including carbon monoxide, lead, nitrogen dioxide, particulate matter (including PM_{10} and $PM_{2.5}$), and sulfur dioxide.

Carbon Monoxide

Prior to the mid-1980s, Massachusetts was in violation of the CO standards. However, with the adoption of numerous control programs, CO emissions have significantly decreased. The last violation in the state of the CO standards occurred in 1986. In 2000, MassDEP formally requested that the EPA re-designate the cities of Lowell, Springfield, Waltham, and Worcester as attainment for CO since the CO monitoring data for those cities had been below the standard for many years. Those cites were the re-designated to CO attainment in April 2002, and the entire state is in attainment.

EPA initially established the primary carbon monoxide (CO) standards in 1971. EPA has reviewed the CO standards several times but has not changed them. Most recently, in January 2011, EPA proposed to retain the current CO standards and to establish new near-road monitoring requirements beginning in January 2013.

Lead

In October 2008, EPA lowered the lead standard from 1.5 ug/m³ to 0.15 ug/m³ averaged over a rolling 3-month period and established new monitoring requirements. In October 2009, Massachusetts recommended to EPA that Suffolk County be designated attainment of the 2008 lead standard based on historic lead monitoring in Boston showing levels below the new standard, and that the remainder of the state be designated unclassifiable (since there were no lead monitors outside of Boston). In June 2010, EPA deferred designations for Massachusetts to no later than October 2011. In January 2011, MassDEP began monitoring lead at the Boston (Harrison Avenue) NCore site in accordance with the new monitoring requirements, and additionally in Springfield

[1] MassDEP develops an annual Ambient Air Monitoring Network Plan that describes recent and planned changes to the statewide monitoring network, available at www.mass.gov/dep/public/netplan.htm.

(Liberty Street). MassDEP also is planning to monitor lead for one year at Nantucket Memorial Airport beginning in December 2011 in accordance with the new monitoring requirements.

Nitrogen Dioxide

In January 2010, EPA established a new 1-hour NO_2 standard of 100 parts per billion (ppb) and new near-road monitoring requirements begin in January 2013. While all eleven existing NO_2 monitors show levels that meet the new standard, in January 2011, Massachusetts recommended to EPA that the state be designated as unclassifiable with the new standard since near-road NO_2 monitors are not yet in place.

Sulfur Dioxide

In June 2010, EPA established a new 1-hour SO_2 standard of 75 ppb and new monitoring requirements beginning January 2013, as well as requirements to model SO_2 emissions from significant sources. While all six SO_2 monitors show levels that meet the new standard, in June 2011, Massachusetts recommended to EPA that the state be designated as unclassifiable with the new standard since modeling of SO_2 emissions from significant sources has not yet been undertaken.

Particulate Matter

There are currently two NAAQS particulate matter standards: PM_{10} and $PM_{2.5}$. Massachusetts has been in attainment of the PM_{10} standard for several years. The $PM_{2.5}$ standards went into effect in 1997 and were revised in 2006. Massachusetts is designated as attainment/ unclassifiable for $PM_{2.5}$ standards statewide.

Ozone

For decades, the NAAQS for ozone was based on the maximum 1-hour ozone concentration that occurred each day during the ozone monitoring season. 1-hour ozone concentrations are still tracked as an indicator but are no longer used for determining attainment.

In 1997, EPA promulgated a new 8-hour ozone standard that was designed to be more representative of exposure over time, rather than just the maximum concentration. Massachusetts is designated as nonattainment of this standard. However, ozone monitors currently show that Massachusetts is meeting the 1997 0.08 ppm standard.

The 8-hour standard was revised in 2008 to 0.075 ppm. In March 2009, Massachusetts recommended to EPA that the entire state be designated as nonattainment with the 2008 standard. The 2008 standard was challenged in Court and remanded to EPA. In January 2010, EPA proposed to revise the primary 8-hour ozone standard to a level with the range of 0.060 to 0.070 ppm and proposed a distinct cumulative, seasonal secondary standard with the range of 7-15 ppm-hours. EPA is expected to finalize the new ozone standards by the end of July 2011.

Ozone Exceedances

What Determines an Exceedance?

An ozone exceedance occurs when monitored ozone concentrations exceed the National Ambient Air Quality Standards (NAAQS). Ozone is collected as an hourly average of continuous data which is then used to determine the highest 8-hour average value for the day. An exceedance of the 8-hour standard is an 8-hour averaged value that is greater than 0.075 ppm.

The Difference Between an Exceedance and a Violation

An ozone exceedance occurs when a monitor records ambient levels of ozone above the standard. A violation of an ozone standard (as opposed to an exceedance) is based on 3-year averages of data at each monitor, so monitoring an exceedance does not necessarily mean that a violation of the standard has occurred.

Violations of the 8-hour standard are determined using the annual 4^{th}-highest daily maximum 8-hour ozone value at each monitor. A violation requires a 3-year average of the annual 4^{th}-highest daily maximum 8-hour value that is greater than 0.075 ppm. In other words, the 8-hour values for each day during a year for a specific monitor are ranked from highest to lowest. Then, the 4^{th}-highest value for 3 consecutive years is averaged. If the 3-year average is greater than 0.075 ppm, a violation of the 8-hour standard has occurred at that specific monitoring site.

Ozone Exceedances and Violations During 2010

Exceedances

The Table below shows the 2010 ozone exceedances. There were 14 days when the 8-hour ozone standard of 0.075 ppm was exceeded at at least one monitoring station. There were 36 exceedances during those 14 days (i.e., multiple monitors exceeded the standard on the same day).

Violations

Violations of the ozone standard are based on 3-year averages. Using data from 2008–2010, 4 sites out of 15 violated the 8-hour standard of 0.075 ppm. These sites were located in Chicopee, Ware, Worcester and the Martha's Vineyard Tribal Site.

2010 Ozone Exceedances (ppm)

DATE	2010 SITE	8-HOUR >.075 ppm	START HOUR	1-HOUR MAX (ppm) for the day
May 1, 2010	Ware	.077	16	.082
May 2, 2010	Ware	.076	12	.086
June 24, 2010	Fairhaven	.078	10	.087
June 24, 2010	Truro	.086	11	.103
June 24, 2010	Martha's Vineyard Tribal Site	.077	14	.083
July 4, 2010	Martha's Vineyard Tribal Site	.100	15	.131
July 5, 2010	Fairhaven	.081	12	.088
July 5, 2010	Milton	.083	12	.092
July 5, 2010	Martha's Vineyard Tribal Site	.076	11	.081
July 6, 2010	Fairhaven	.078	13	.084
July 17, 2010	Fairhaven	.079	17	.100
July 17, 2010	Truro	.079	15	.096
July 18, 2010	Martha's Vineyard Tribal Site	.086	13	.100
July 28, 2010	Chicopee	.078	11	.094
July 28, 2010	Ware	.084	11	.095
July 28, 2010	Worcester	.077	11	.085
August 9, 2010	Worcester	.078	13	.096
August 31, 2010	Truro	.079	11	.097
August 31, 2010	Martha's Vineyard Tribal Site	.081	15	.084
September 1, 2010	Fairhaven	.077	13	.083
September 1, 2010	Newburyport	.079	10	.102
September 1, 2010	Martha's Vineyard Tribal Site	.080	18	.084
September 2, 2010	Adams	.080	19	.093
September 2, 2010	Amherst	.077	12	.094
September 2, 2010	Chicopee	.091	11	.118
September 2, 2010	Haverhill	.076	12	.083
September 2, 2010	Long Island	.079	10	.086
September 2, 2010	Lynn	.083	10	.091
September 2, 2010	Milton	.081	9	.087
September 2, 2010	Stow	.077	11	.084
September 2, 2010	Truro	.078	9	.082
September 2, 2010	Uxbridge	.077	10	.084
September 2, 2010	Ware	.089	11	.115
September 2, 2010	Worcester	.083	11	.093
September 2, 2010	EPA Region I Chelmsford	.079	11	.087
September 7, 2010	Ware	.076	11	.094

Exceedance Days and Total Exceedance Trends

Figures 1 and 2 show the trend in the number of 1-hour and 8-hour exceedance days and the total number of exceedances for each year.

Figure 1 shows a decline in the number of days in which ozone concentrations exceeded the former 1-hour standard of 0.12 ppm. Figure 2 shows that, under the 0.075 ppm 8-hour standard, there were a greater number of exceedances and exceedance days when compared to the former 1-hour standard. The 8-hour standard is designed to be more protective of public health by being more representative of exposure over time rather than a maximum concentration.

Figure 1
1-hr Ozone Exceedance Days and Total Exceedances 1987-2010
1-hour standard = 0.12 ppm (revoked June 15, 2005)

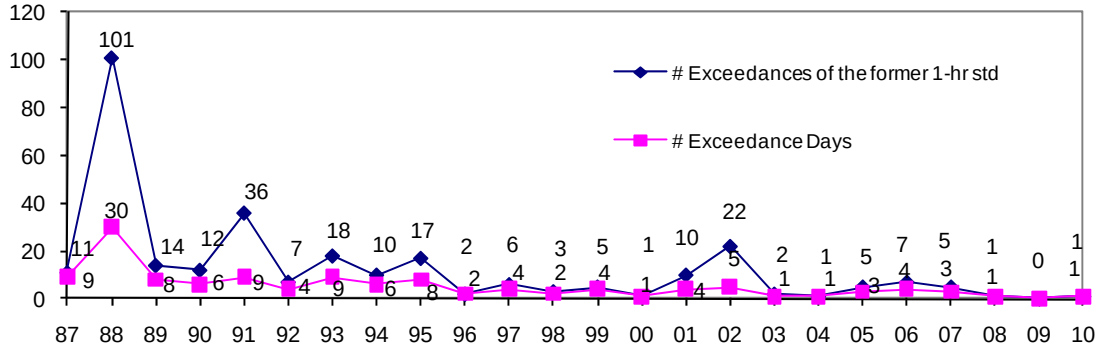
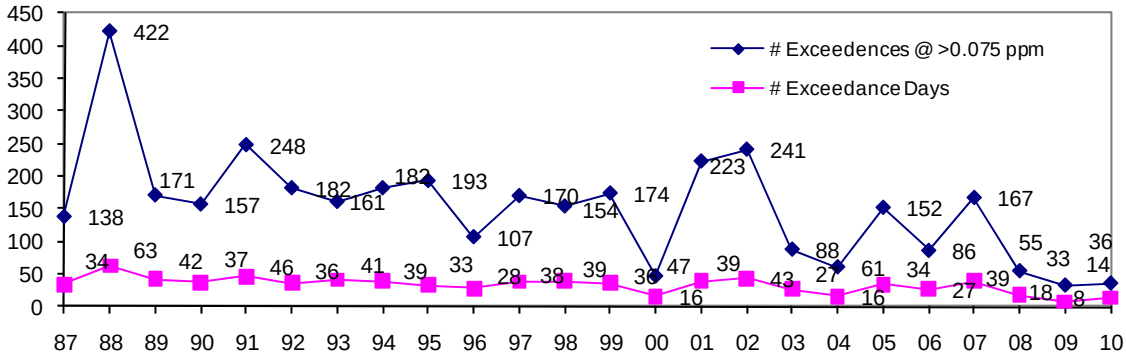


Figure 2
8-hr Ozone Exceedance Days and Total Exceedances 1987-2010
8-hour standard = 0.075 ppm
Years 1987-2007 show what exceedances
would have been with a 0.075 ppm 8-hour standard



Daily Ozone and PM Forecasts

MassDEP provides the public with daily air quality forecasts for ozone from April through September and for fine particles all year round using weather maps and meteorological factors to predict whether or not conditions will result in elevated pollution levels. The daily air quality forecasts are available from www.mass.gov/air or by calling the Air Quality Hotline (1-800-882-1497). EPA web sites that contain regional and national pollution forecasts using data that is provided by participating states are located at www.epa.gov/region01/airquality/forecast.html and http://airnow.gov/. The table below describes the ratings used in the daily air quality forecasts.

Air Quality Index (AQI): Ozone

Index Values	Levels of Health Concern	Cautionary Statements
0-50	Good	None
51-100*	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion outdoors.
101-150	Unhealthy for Sensitive Groups	Active children and adults, and people with lung disease, such as asthma, should reduce prolonged or heavy exertion outdoors.
151-200	Unhealthy	Active children and adults, and people with lung disease, such as asthma, should avoid prolonged or heavy exertion outdoors. Everyone else, especially children, should reduce prolonged or heavy exertion outdoors.
201-300	Very Unhealthy	Active children and adults, and people with lung disease, such as asthma, should avoid all outdoor exertion. Everyone else, especially children, should avoid prolonged or heavy exertion outdoors.

* An AQI of 100 for ozone corresponds to an ozone level of 0.075 parts per million (averaged over 8 hours).

Air Quality Index (AQI): Particle Pollution

Index Values	Levels of Health Concern	Cautionary Statements
0-50	Good	None
51-100*	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion.
101-150	Unhealthy for Sensitive Groups	People with heart or lung disease, older adults, and children should reduce prolonged or heavy exertion.
151-200	Unhealthy	People with heart or lung disease, older adults, and children should avoid prolonged or heavy exertion. Everyone else should reduce prolonged or heavy exertion.
201-300	Very Unhealthy	People with heart or lung disease, older adults, and children should avoid all physical activity outdoors. Everyone else should avoid prolonged or heavy exertion.

*An AQI of 100 for particles up to 2.5 micrometers in diameter corresponds to a level of 35 micrograms per cubic meter (averaged over 24 hours). An AQI of 100 for particles up to 10 micrometers in diameter corresponds to a level of 150 micrograms per cubic meter (averaged over 24 hours).

Section III
Massachusetts Air Quality Data Summaries

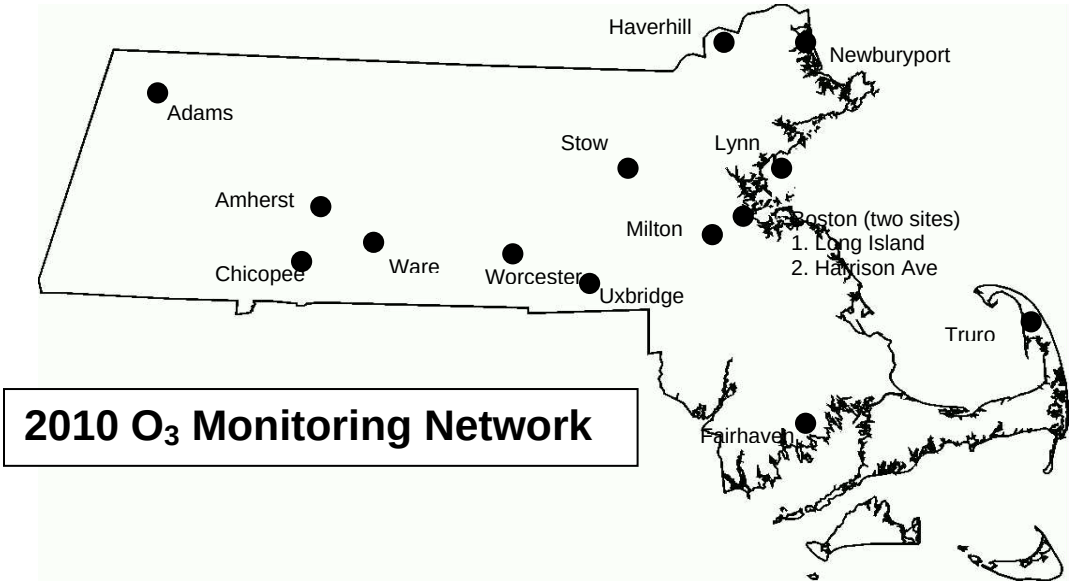
Ozone Summary

2010 Ozone Data Summary

A summary of the data collected during the 2010 ozone season (April 1 – Sept. 30) is shown below (in parts per million). There were 15 ozone sites in operation during 2010 in the state-operated monitoring network plus the Wampanoag Tribal Site on Martha's Vineyard and the EPA Region I site in Chelmsford. All sites achieved the requirement of 75% or greater data capture for the year except Newburyport. In July 2010, the Newburyport site replaced the closed Newbury site.

SITE ID	CITY	COUNTY	ADDRESS	% OBS	1ST MAX 1-HR	2ND MAX 1-HR	DAY MAX>/= 0.125	1ST MAX 8-HR	2ND MAX 8-HR	3RD MAX 8-HR	4TH MAX 8-HR	DAY MAX > 0.075
25-003-4002	Adams	Berkshire	MT GREYLOCK SUMMIT	75	0.093	0.078	0	0.08	0.074	0.074	0.073	1
25-025-0041	Boston	Suffolk	LONG ISLAND	97	0.087	0.087	0	0.079	0.074	0.071	0.07	1
25-025-0042	Boston	Suffolk	HARRISON AVE	98	0.079	0.076	0	0.07	0.065	0.063	0.063	0
25-013-0008	Chicopee	Hampden	ANDERSON RD AFB	98	0.118	0.105	0	0.091	0.078	0.075	0.074	2
25-005-1002	Fairhaven	Bristol	LEROY WOOD SCHOOL	98	0.1	0.088	0	0.081	0.079	0.078	0.077	5
25-009-5005	Haverhill	Essex	CONSENTINO SCHOOL	82	0.086	0.085	0	0.076	0.074	0.072	0.071	1
25-009-2006	Lynn	Essex	390 PARKLAND	99	0.091	0.09	0	0.083	0.075	0.075	0.072	1
25-021-3003	Milton	Norfolk	BLUE HILL OBS	99	0.092	0.087	0	0.083	0.081	0.075	0.073	2
25-009-4005	Newburyport	Essex	HARBOR STREET	46	0.102	0.082	0	0.079	0.074	0.067	0.066	1
25-015-0103	North Amherst	Hampshire	N PLEASANT ST	96	0.094	0.088	0	0.077	0.074	0.07	0.069	1
25-007-0001	Martha's Vineyard Tribal Site	Dukes	HERRING CREEK RD	95	0.131	0.1	1	0.1	0.086	0.081	0.08	6
25-017-1102	Stow	Middlesex	US MILITARY RES	97	0.085	0.085	0	0.077	0.07	0.07	0.069	1
25-001-0002	Truro	Barnstable	FOX BOTTOM AREA	99	0.102	0.097	0	0.086	0.079	0.079	0.078	4
25-027-0024	Uxbridge	Worcester	366 E HARTFORD AVE	97	0.084	0.083	0	0.077	0.074	0.074	0.071	1
25-015-4002	Ware	Hampshire	QUABBIN SUMMIT	95	0.115	0.102	0	0.089	0.084	0.077	0.076	5
25-027-0015	Worcester	Worcester	WORC AIRPORT	99	0.096	0.093	0	0.083	0.078	0.077	0.07	3

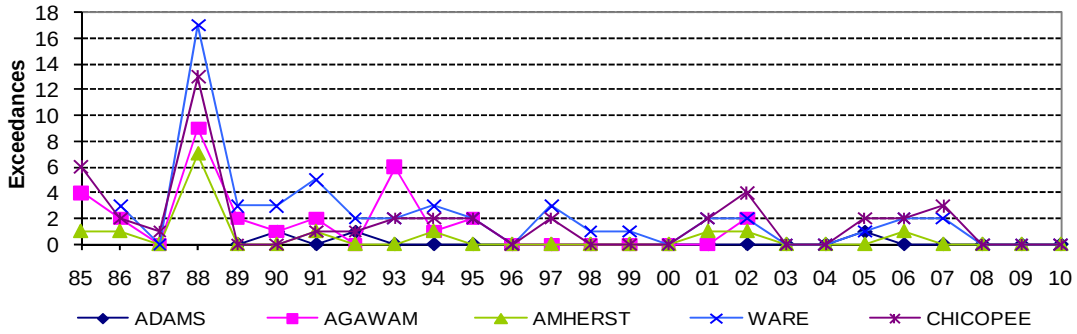
ABBREVIATIONS AND SYMBOLS USED IN TABLE
SITE ID = AIRS SITE IDENTIFICATION NUMBER **% OBS** = PERCENTAGE OF VALID DAYS MONITORED DURING O3 SEASON **1ST, 2ND MAX 1-HR** = MAXIMUM 1-HR VALUE FOR THE 1ST & 2ND HIGHEST DAY **DAY MAX > 0.125** = NUMBER OF MEASURED DAILY 1-HOUR MAXIMUM VALUES GREATER THAN 0.12 PPM (1-HR STANDARD) **1ST, 2ND, 3RD & 4TH MAX 8-HR** = MAXIMUM 8-HR VALUE FOR THE 1ST, 2ND, 3RD & 4TH HIGHEST DAY **DAY MAX > 0.075** = NUMBER OF MEASURED DAILY 8-HOUR MAXIMUM VALUES GREATER THAN 0.075 PPM (8-HR STANDARD)

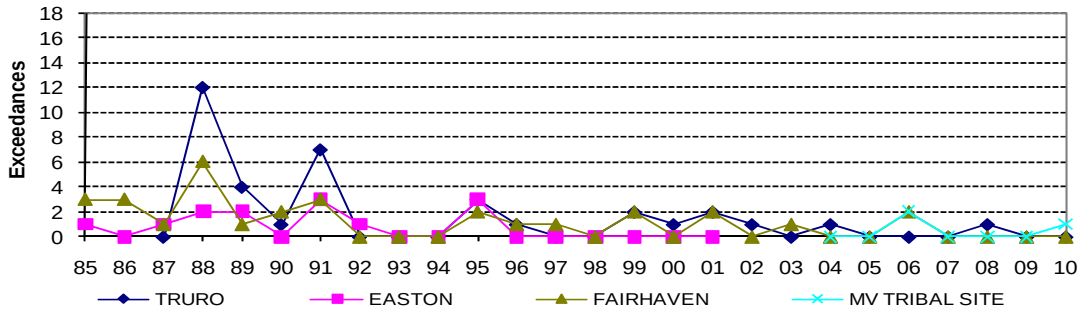


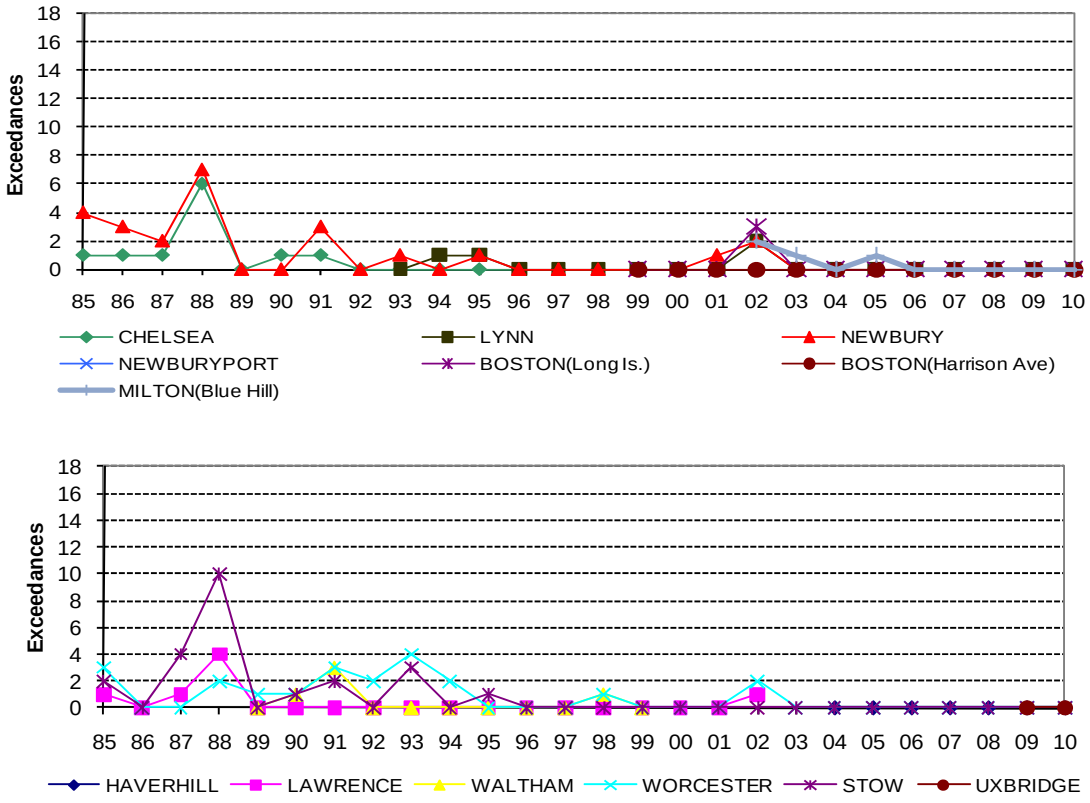
1-hour Ozone Exceedance Trends

Shown below are ozone trends using exceedances of the former 1-hour standard for each site.

Figure 3
1-hour Ozone Exceedance Trends 1985 – 2010
Standard = 0.12 ppm (revoked June 15, 2005)



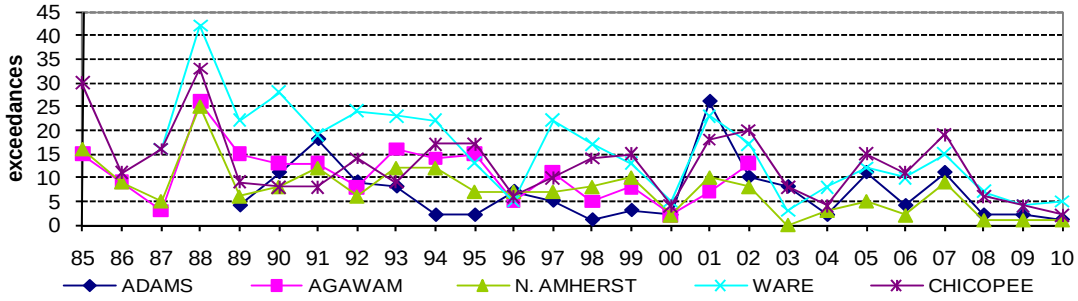


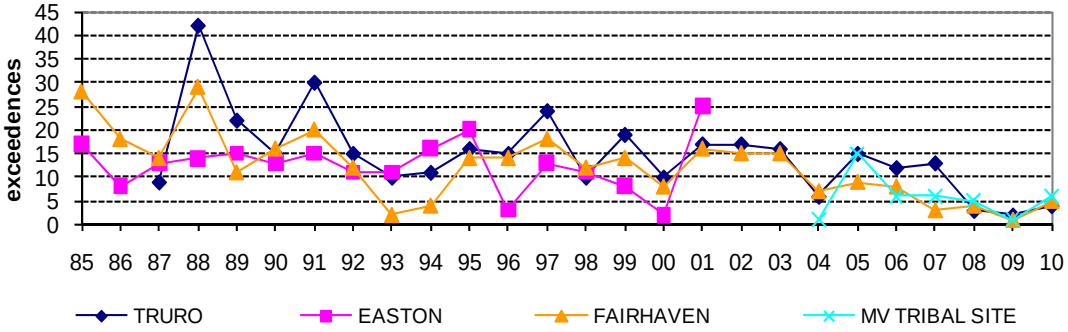


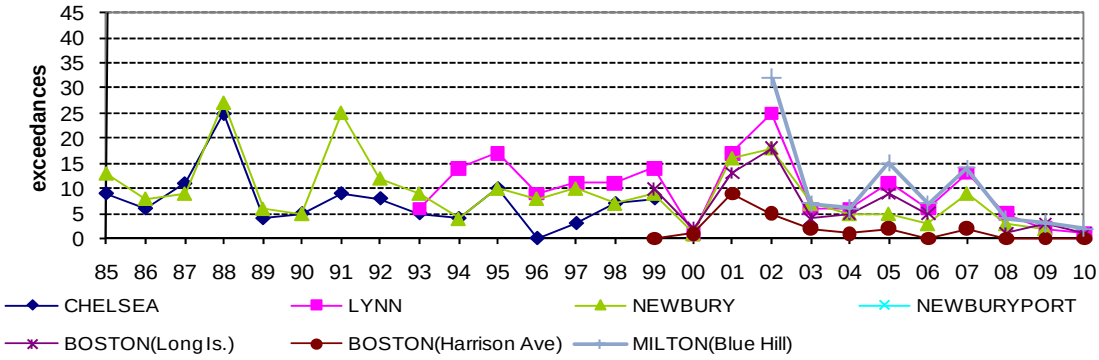
8-hour Ozone Exceedance Trends

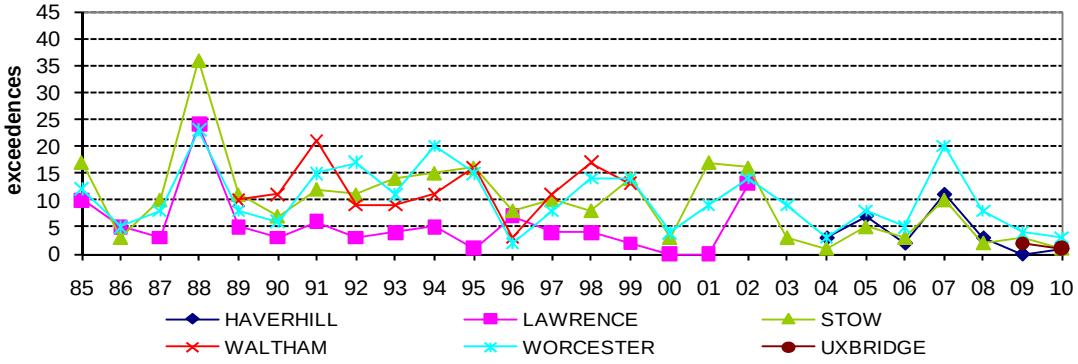
Shown below are the long-term trends of 8-hour ozone exceedances for each site based on the 0.075 ppm 8-hour standard that went into effect in 2008.

Figure 4
8-hour Ozone Exceedance Trends 1985 – 2010
Standard = 0.075 ppm









Sulfur Dioxide (SO_2) Summary

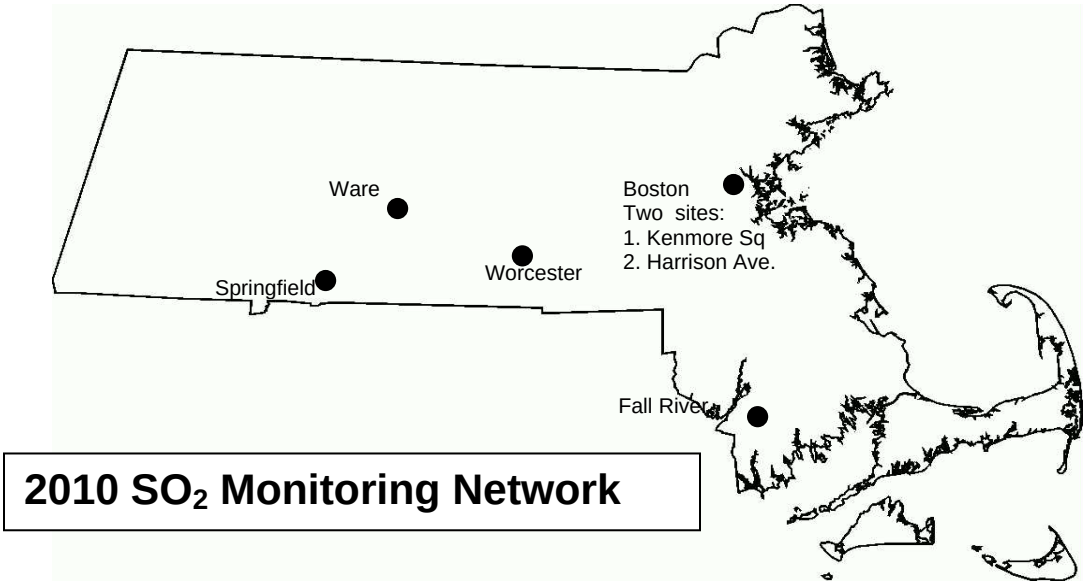
2010 SO_2 Data Summary

A summary of the 2010 SO_2 data is shown below (in parts per billion). There were six SO_2 sites in operation during 2010 in the state-operated monitoring network. All of the sites achieved the requirement of 75% or greater data capture for the year. SO_2 monitors at Boston (Harrison Avenue), and Ware are trace-level instruments that are specifically configured to measure at a lower concentration range than the standard instrument in order to obtain better ongoing concentration resolution and to more precisely track trends in SO_2 concentrations.

SITE ID	CITY	COUNTY	ADDRESS	% OBS	COMP QTRS	1ST MAX 1-HR	2ND MAX 1-HR	99TH PCTL 1-HR	1ST MAX 24-HR	2ND MAX 24-HR	Days >24HR STD	ARITH MEAN
25-025-0002	Boston	Suffolk	KENMORE SQ	97	4	26.9	25	21.1	8.4	7.9	0	2.24
25-025-0042	Boston	Suffolk	HARRISON AVE	95	4	24.3	22.2	19.3	8.8	7.9	0	1.6
25-005-1004	Fall River	Bristol	659 GLOBE ST	97	4	118.7	112.2	84.3	36.7	33.1	0	3.08
25-013-0016	Springfield	Hampden	LIBERTY P-LOT	95	4	17	15	13	8.1	7.4	0	2.05
25-015-4002	Ware	Hampshire	QUABBIN SUMMIT	97	4	11	10.1	5.8	7.4	5.7	0	0.84
25-027-0023	Worcester	Worcester	SUMMER ST	94	4	22	12	12	8.8	6.8	0	2.06

All data in parts per billion (ppb)
Standards: Annual Mean = 0.03 ppm 24-hour = 0.14 ppm 1-hour = 75 ppb 3-hour = 0.5 ppm

ABBREVIATIONS AND SYMBOLS USED IN TABLE
SITE ID = AIRS SITE IDENTIFICATION NUMBER, **% OBS** = PERCENT OBSERVATIONS, **COMP QTRS** = COMPLETE QUARTERS, **1ST, 2ND MAX 1-HOUR ad 24-HR,** FIRST AND SECOND HIGHEST VALUE FOR TIME PERIOD INDICATED, **99TH PCTL 1-HR** = 99th PERCENTILE OF THE 1-HOUR MAX**, DAYS >24HR** = NUMBER OF DAYS >24-HOUR STANDARD**, ARITH MEAN** = ANNUAL ARITHMETIC MEAN

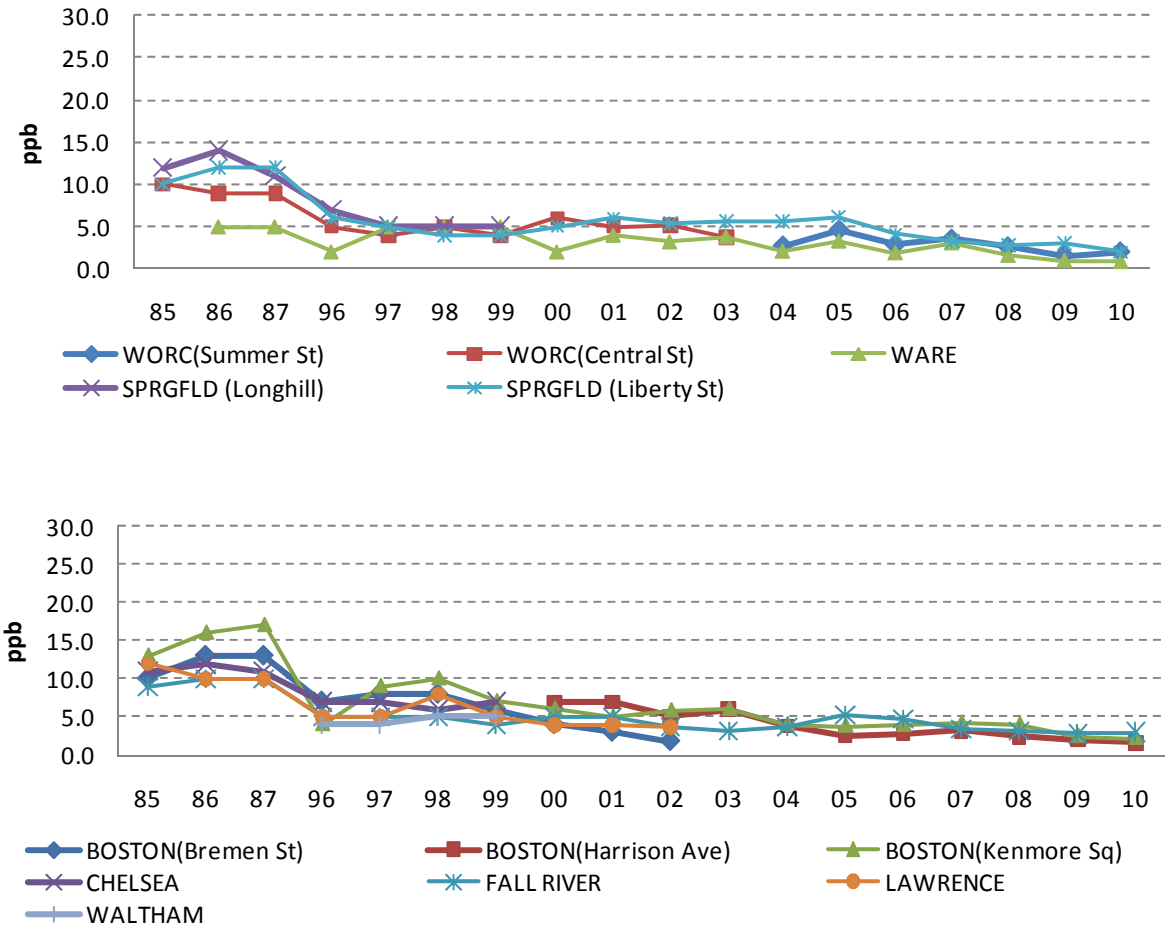


2010 SO_2 Monitoring Network

SO_2 Trends

The long-term trends of the annual arithmetic mean for each SO_2 site are shown below. The trend has been stable for the last few years and downward for the entire period. Massachusetts has been well below the standard.

Figure 5
SO_2 Trends 1985 –2010
Annual Arithmetic Means
Standard = 0.03 ppm (30 ppb)



Nitrogen Dioxide (NO_2) Summary

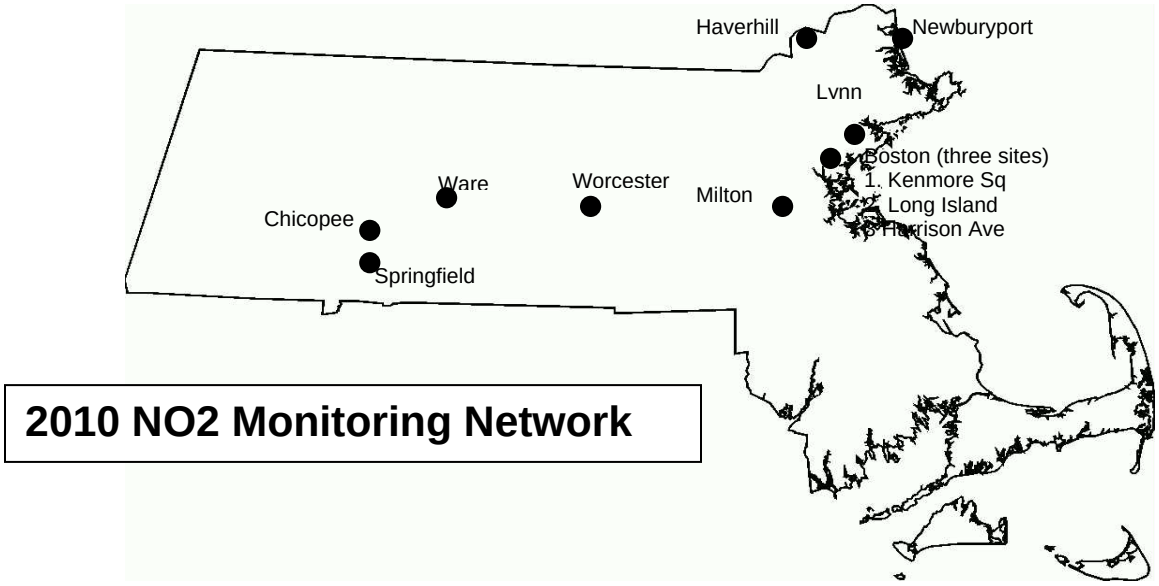
2010 NO_2 Data Summary

A summary of the 2010 NO_2 data is shown below (in parts per billion). There were 11 NO_2 sites in operation during 2010 in the state-operated monitoring network. All sites met the requirement of 75% data capture for the year with the exception of Newburyport, which started monitoring in July 2010, and the two other seasonal sites at Milton and Long Island.

SITE ID	CITY	COUNTY	ADDRESS	COMP QTRS	1ST MAX 1-HR	2ND MAX 1-HR	98TH PCTL	% COMP	ARITH MEAN
25-025-0002	Boston	Suffolk	KENMORE SQ	4	63.5	53.4	51.5	94	19.1
25-025-0041	Boston	Suffolk	LONG ISLAND	2	48.8	47.9	44.4	seasonal	7.21*
25-025-0042	Boston	Suffolk	HARRISON AVE	4	62	62	53	94	17.05
25-013-0008	Chicopee	Hampden	ANDERSON RD AFB	4	42	40	35	95	6.19
25-009-5005	Haverhill	Essex	CONSENTINO SCHOOL	4	44.7	42.8	40.1	91	6.99
25-009-2006	Lynn	Essex	390 PARKLAND	4	50.3	48.1	42.4	95	7.3
25-021-3003	Milton	Norfolk	BLUE HILL OBS	2	33.5	26.8	21	seasonal	4.40*
25-009-4005	Newburyport	Essex	HARBOR STREET	1	40.2	26.3	26.3	seasonal	3.58*
25-013-0016	Springfield	Hampden	LIBERTY P-LOT	4	51	51	48	94	14.54
25-015-4002	Ware	Hampshire	QUABBIN SUMMIT	4	44	39	26	95	2.67
25-027-0023	Worcester	Worcester	SUMMER ST	4	59	59	48.4	93	13.99

Note: The * indicates that the mean does not satisfy summary criteria.
Standards: Annual Arithmetic Mean = 53 ppb 1-hour = 100 ppb

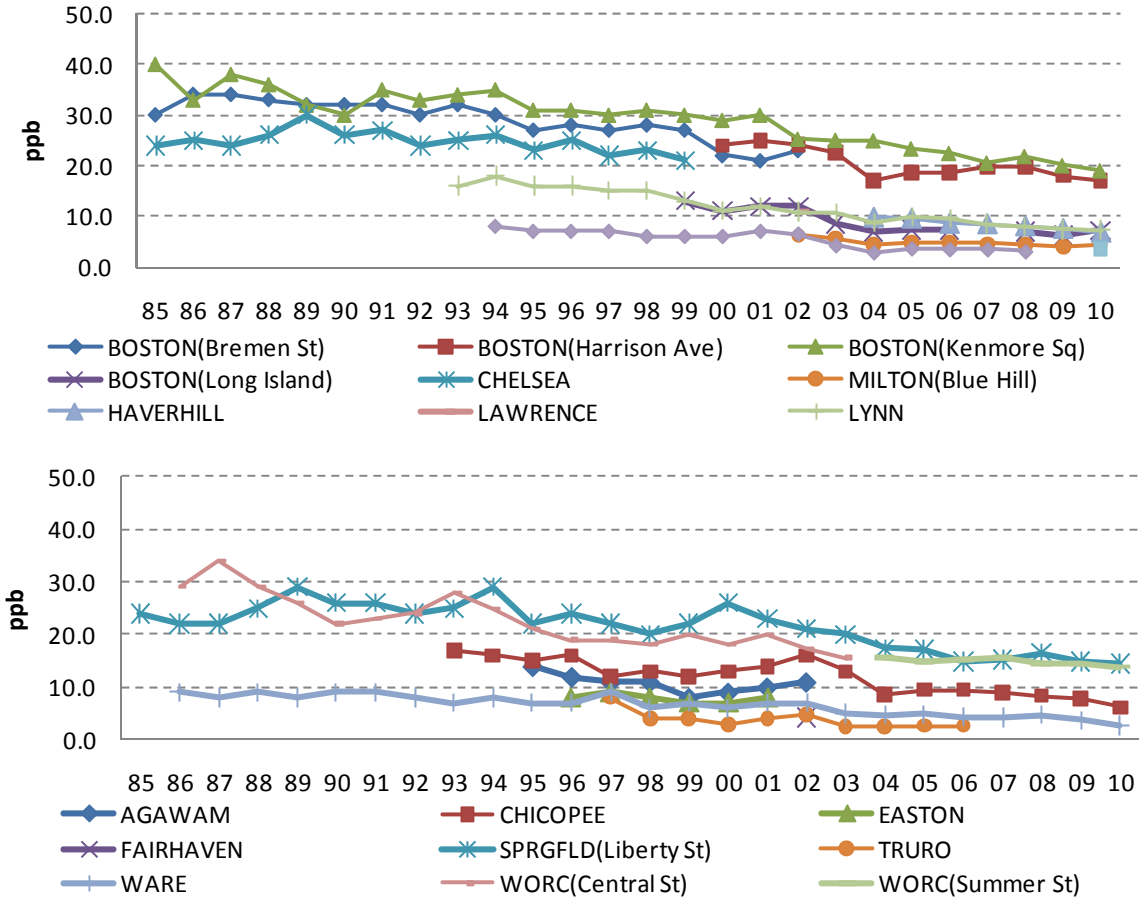
ABBREVIATIONS AND SYMBOLS USED IN TABLE
SITE ID = AIRS SITE IDENTIFICATION NUMBER **COMP QTRS** = COMPLETE QUARTERS, **1ST, 2ND MAX 1-HR** = FIRST AND SECOND HIGHEST VALUE FOR TIME PERIOD INDICATED, **98TH PCTL** = 98TH PERCENTILE, **% COMP** = PERCENT COMPLETE, **ARITH MEAN** = ANNUAL ARITHMETIC MEAN



NO_2 Trends

The long-term trends of the annual arithmetic means for each NO_2 site are shown below. The trend has been stable the last few years and downward for the entire period. Massachusetts is below the standard.

Figure 6
NO_2 Trends 1985 – 2010
Annual Arithmetic Mean
Standard = 0.053 ppm (53 ppb)



Carbon Monoxide (CO) Summary

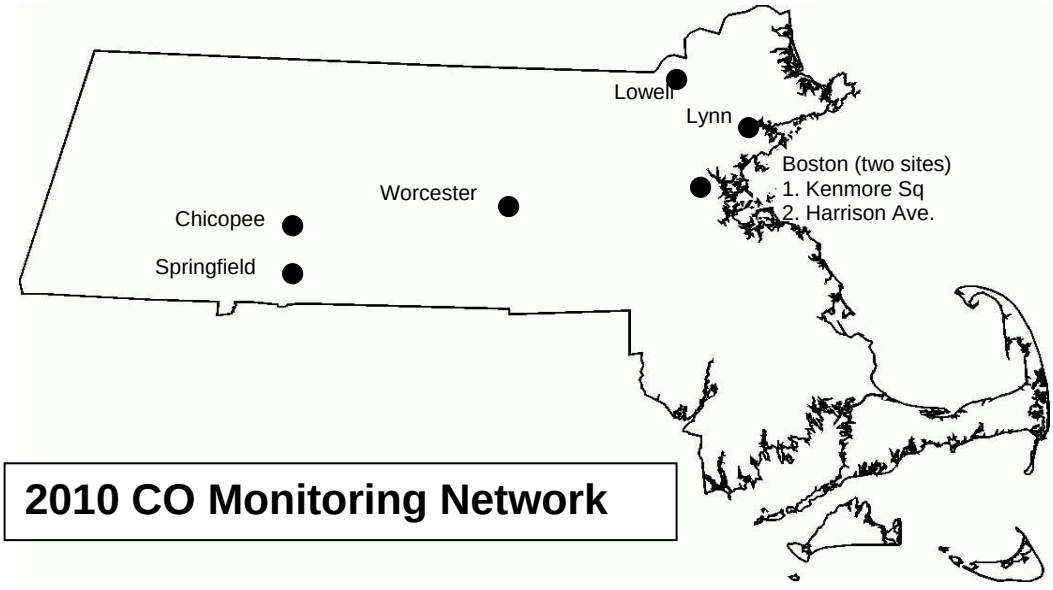
2010 CO Data Summary

A summary of the 2010 CO data is shown below (in parts per million). There were seven sites in operation during 2010 in the state-operated monitoring network. All of the sites achieved the requirement of 75% or greater data capture for the year except Chicopee, which started operation in May 2010. The CO monitors at Boston (Harrison Avenue), Lynn and Chicopee are trace-level instruments that are specifically configured to measure at a lower concentration range than the standard instrument in order to obtain better ongoing concentration resolution and to more precisely track trends in CO concentrations.

SITE ID	CITY	COUNTY	ADDRESS	% OBS	1ST MAX 1-HR	2ND MAX 1-HR	OBS >35	1ST MAX 8-HR	2ND MAX 8-HR	OBS >9
25-025-0002	Boston	Suffolk	KENMORE SQ	93	1.9	1.8	0	1.5	0.9	0
25-025-0042	Boston	Suffolk	HARRISON AVE	97	2.9	2.5	0	2.1	1.8	0
25-013-0008	Chicopee	Hampden	ANDERSON RD AFB	85	0.9	0.9	0	0.7	0.7	0
25-017-0007	Lowell	Middlesex	MERRIMACK ST	93	1.6	1.6	0	1.3	1.1	0
25-009-2006	Lynn	Essex	390 PARKLAND	91	1.0	0.9	0	0.7	0.6	0
25-013-0016	Springfield	Hampden	LIBERTY P-LOT	93	2.2	2.0	0	1.8	1.7	0
25-027-0023	Worcester	Worcester	SUMMER ST	90	1.8	1.8	0	1.7	1.4	0

Standards: 1-hour = 35 ppm 8-hour = 9 ppm

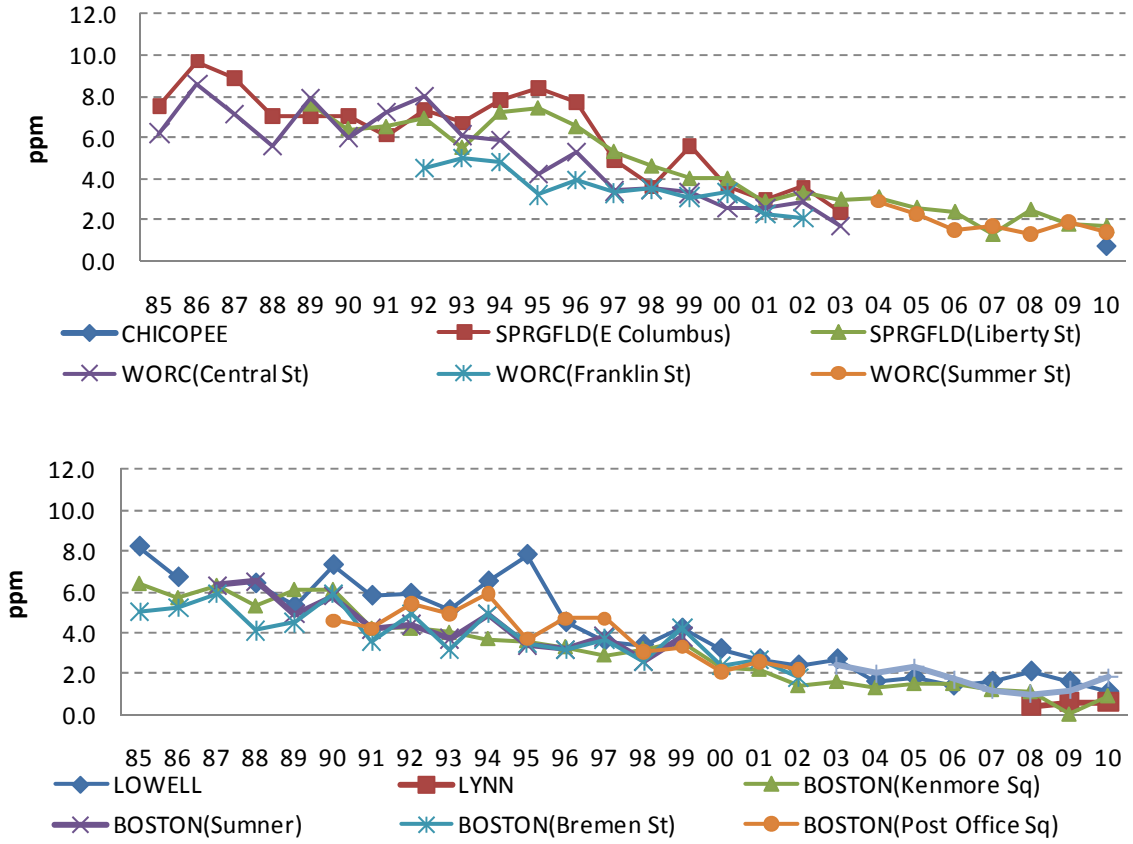
ABBREVIATIONS AND SYMBOLS USED IN TABLE
SITE ID = AIRS SITE IDENTIFICATION NUMBER **% OBS** = PERCENT OBSERVATIONS, **1ST, 2ND MAX 1-HR** = FIRST AND SECOND HIGHEST VALUE FOR TIME PERIOD INDICATED, **OBS > 35** = NUMBER OF 1-HR AVERAGES GREATER THAN 35 PPM (1-HR STANDARD), **1ST, 2ND MAX 8-HR** = FIRST AND SECOND HIGHEST VALUE FOR TIME PERIOD INDICATED, **OBS > 9** = NUMBER OF 8-HR AVERAGES GREATER THAN 9 PPM (8-HR STANDARD)



CO Trends

The long-term trends for each CO site are shown below. The 2nd maximum value is displayed because it is the value to which the standard applies. Massachusetts is well below the 1-hour and 8-hour standards.

Figure 7
CO Trends 1985-2010
2nd Maximum 8-hour Values
Standard = 9 ppm



Particulate Matter 10 Microns (PM_{10}) Summary

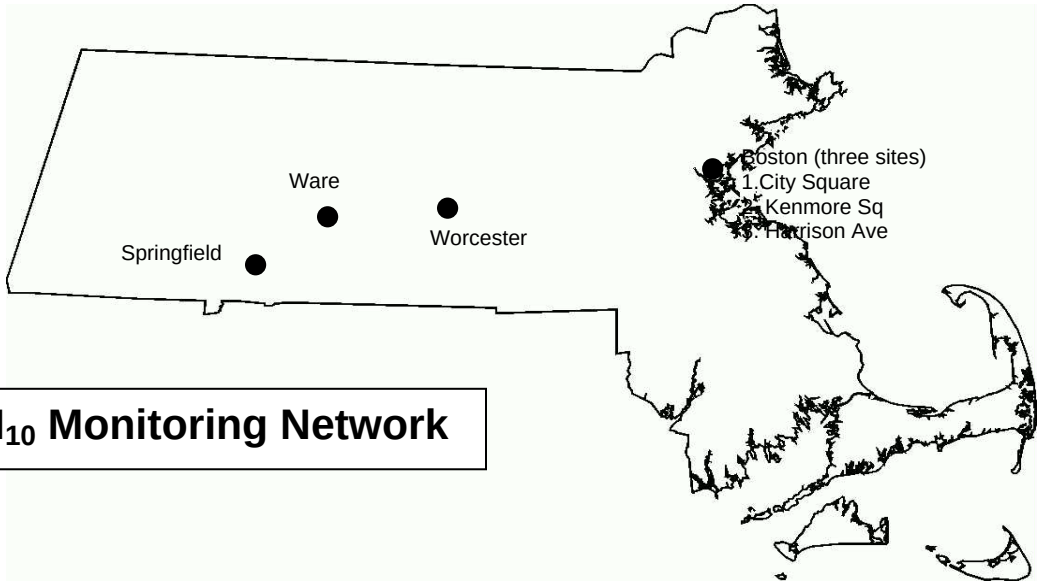
2010 PM_{10} Data Summary

A summary of the 2010 PM_{10} data is shown below (in $\mu g/m^3$). There were six PM_{10} sites operated by MassDEP in 2010. All of the sites achieved data capture requirements for the year.

SITE ID	CITY	COUNTY	ADDRESS	% OBS	1ST MAX	2ND MAX	3RD MAX	4TH MAX	DAY MAX >150	ARITH MEAN
25-025-0002	Boston	Suffolk	KENMORE SQ	93	40	37	32	28	0	15.5
25-025-0027	Boston	Suffolk	ONE CITY SQ	97	32	31	30	30	0	15.1
25-025-0042	Boston	Suffolk	HARRISON AVE	98	43	25	25	23	0	11.9
25-025-0042	Boston	Suffolk	HARRISON AVE	98	48	41	26	25	0	12.5
25-025-0042	Boston	Suffolk	HARRISON AVE	98	50	30	30	29	0	14.1
25-025-0042	Boston	Suffolk	HARRISON AVE	95	47	30	29	29	0	13.8
25-013-2009	Springfield	Hampden	1860 MAIN ST	98	35	33	33	31	0	14.7
25-015-4002	Ware	Hampshire	QUABBIN SUMMIT	98	30	28	24	18	0	8.9
25-027-0023	Worcester	Worcester	SUMMER ST	98	48	42	32	31	0	15.5

PM_{10} Standards: 24-hour = 150 $\mu g/m^3$

ABBREVIATIONS AND SYMBOLS USED IN TABLE
SITE ID = AIRS SITE IDENTIFICATION NUMBER, **% OBS** = PERCENT OBSERVATIONS, **1^{ST}, 2^{ND}, 3^{RD}, 4^{TH} MAX** = 1^{ST}, 2^{ND}, 3^{RD}, AND 4^{TH} HIGHEST 24-HOUR VALUES FOR THE YEAR, **DAY MAX > 150** = DAILY MAXIMUM VALUE GREATER THAN STANDARD OF 150 $\mu g/m^3$, **ARITH MEAN** = ANNUAL ARITHMETIC MEAN

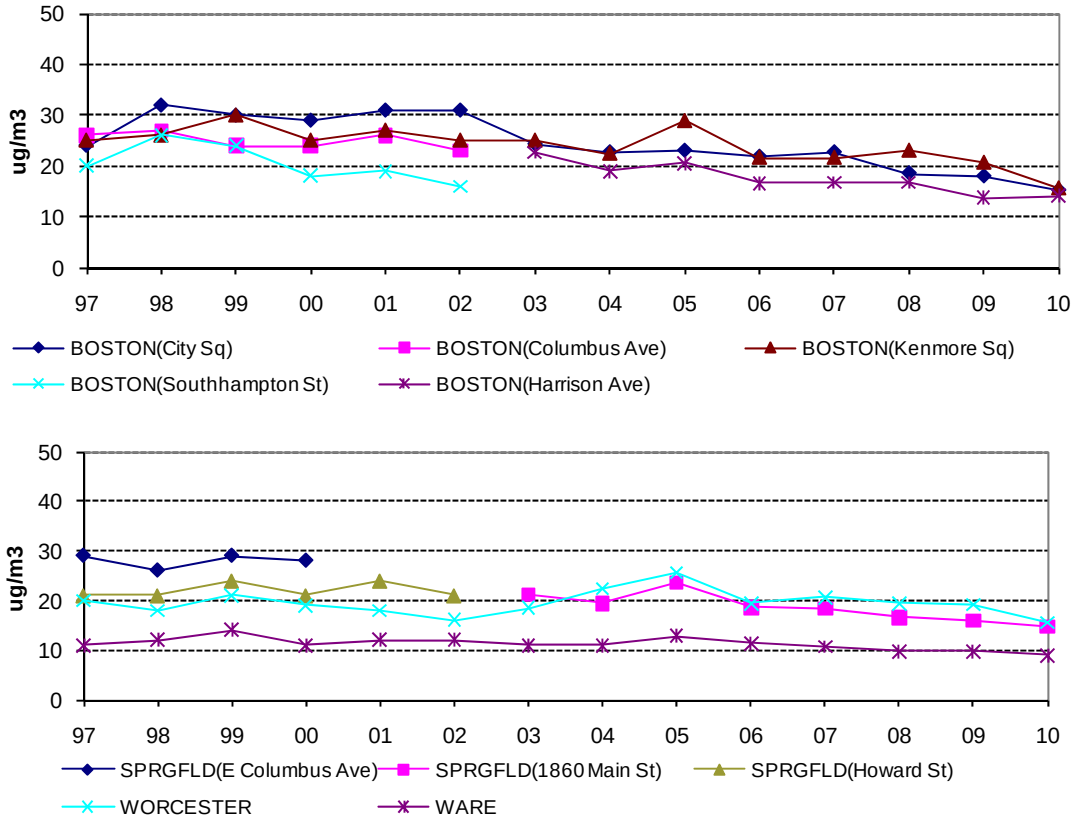


2010 PM_{10} Monitoring Network

PM_{10} Trends

Long-term trends for each PM_{10} site are shown below using the annual arithmetic mean as an indicator. The data shows an overall downward trend.

Figure 8
PM_{10} Trends 1989-2010
Annual Arithmetic Mean



Particulate Matter 2.5 Microns ($PM_{2.5}$) Summary

MassDEP operates 15 Federal Reference Method (FRM) filter-based $PM_{2.5}$ samplers, used for comparison to the NAAQS, and 10 Beta Attenuation Monitors (BAMs) $PM_{2.5}$ samplers, used to provide near real-time data available on MassDEP's MassAir Online website (www.mass.gov/dep/air) and on EPA's AirNOW website (www.epa.gov/airnow/).

2010 $PM_{2.5}$ FRM Data Summary

A summary of the 2010 FRM $PM_{2.5}$ data is shown below (in $\mu g/m^3$).

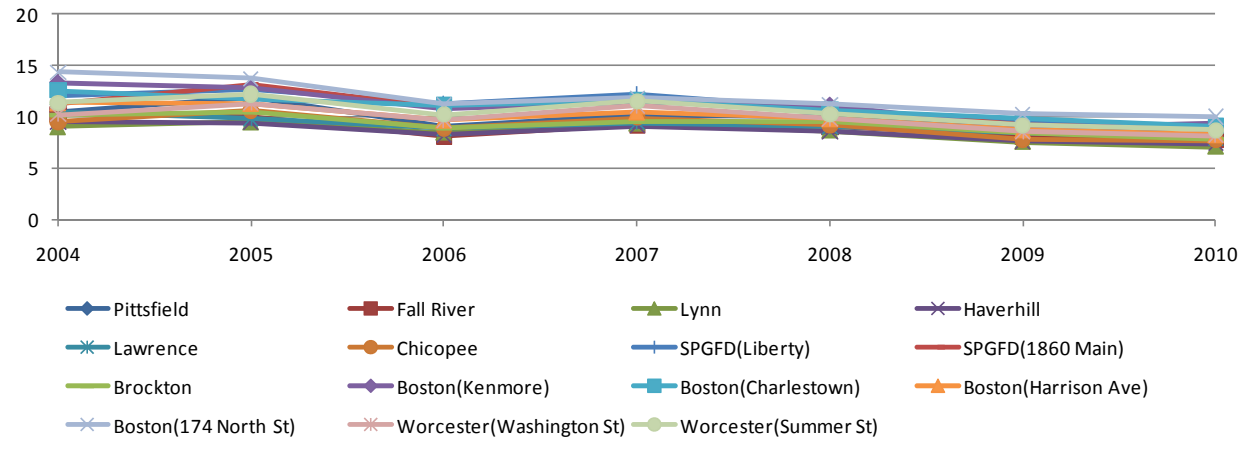
SITE ID	TYPE	CITY	COUNTY	ADDRESS	% OBS	1ST MAX	2ND MAX	3RD MAX	4TH MAX	98TH PERCENTILE VALUE	ARITH MEAN
25-025-0002	FRM	Boston	Suffolk	KENMORE SQ	84	29.5	24.5	21.9	20.7	21.9	9.31*
25-025-0027	FRM	Boston	Suffolk	ONE CITY SQ	96	28.9	24.9	24.5	23.3	24.5	9.14
25-025-0042	FRM	Boston	Suffolk	HARRISON AVE	100	26.8	26	22.5	21.4	22.5	8.25
25-025-0043	FRM	Boston	Suffolk	174 NORTH ST	100	60.5	28.7	27.4	24.1	23.5	10.03
25-025-0043	Co-Loc	Boston	Suffolk	174 NORTH ST	95	60.2	29.6	27.5	26.3	24.8	10
25-023-0004	FRM	Brockton	Plymouth	COMMERCIAL ST	100	27.8	27.5	22.6	20.5	22.6	7.84
25-023-0004	Co-Loc	Brockton	Plymouth	COMMERCIAL ST	92	28.2	27.5	23	20.4	23	7.87
25-013-0008	FRM	Chicopee	Hampden	ANDERSON RD AFB	100	37.3	29.1	24.5	23.5	24.5	7.72
25-013-0008	Co-Loc	Chicopee	Hampden	ANDERSON RD AFB	89	36.2	29.1	23.2	23.1	23.2	8.02
25-005-1004	FRM	Fall River	Bristol	659 GLOBE ST	100	27.5	25.8	24.4	24.2	24.4	7.73
25-009-5005	FRM	Haverhill	Essex	CONSENTINO SCHOOL	97	26.2	20.9	19.7	19.3	19.7	7.41
25-009-6001	FRM	Lawrence	Essex	SHATTUCK ST	92	31.8	21	20.1	20	20.1	7.94
25-009-2006	FRM	Lynn	Essex	390 PARKLAND	94	25.4	23	18.9	17.2	18.9	7.06
25-003-5001	FRM	Pittsfield	Berkshire	78 CENTER ST	97	45.4	26.4	25.4	25	25.4	8.93
25-013-0016	FRM	Springfield	Hampden	LIBERTY P-LOT	98	44.5	32	25.8	25.5	25.8	9.24
25-013-2009	FRM	Springfield	Hampden	1860 MAIN ST	99	42.5	28.5	23.5	23	23.5	8.73
25-027-0016	FRM	Worcester	Worcester	WASHINGTON ST	97	28.2	22.5	21.2	20.1	21.2	8.18
25-027-0023	FRM	Worcester	Worcester	SUMMER ST	97	28.3	22.4	21.2	20.9	21.2	8.7

* Indicates that the MEAN does not satisfy the summary criteria (i.e., data capture requirements)
Standards: Annual = 15.0 $\mu g/m^3$ 24-hour = 35 $\mu g/m^3$

$PM_{2.5}$ Trends

Long-term trends for each $PM_{2.5}$ site are shown below using the annual arithmetic mean as an indicator. The data shows an overall downward trend.

Figure 9
$PM_{2.5}$ Annual Arithmetic Mean
Standard = 15 $\mu g/m^3$

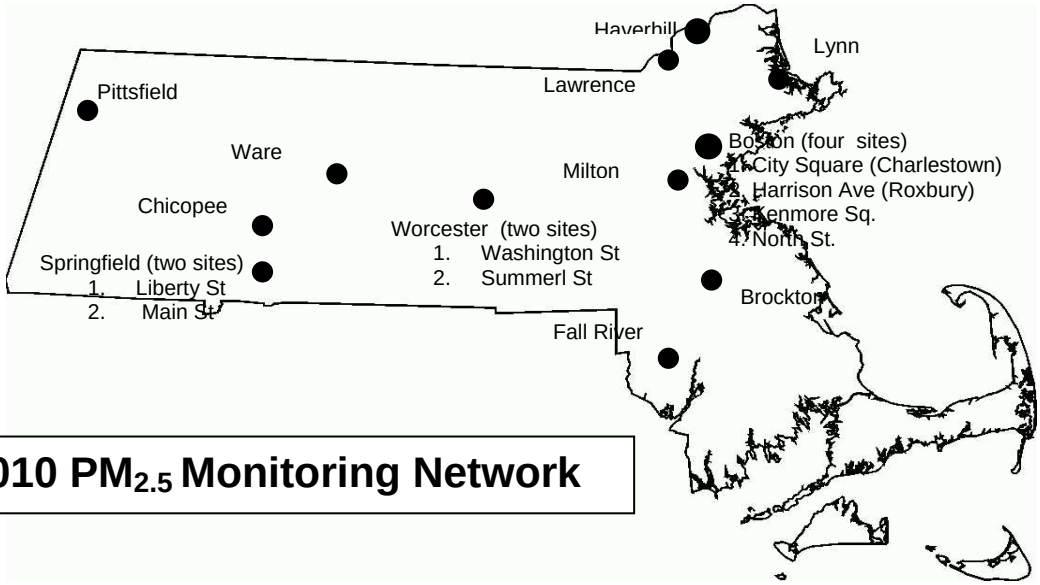


2010 $PM_{2.5}$ BAM Data Summary

A summary of the 2010 BAM $PM_{2.5}$ data is shown below (in $\mu g/m^3$).

SITE ID	CITY	COUNTY	ADDRESS	% OBS	1ST MAX	2ND MAX	3RD MAX	4TH MAX	ARITH MEAN	DURATION
25-025-0042	Boston	Suffolk	HARRISON AVE	95	166.3	124.7	119.6	118.9	8.33	1 HOUR
25-025-0043	Boston	Suffolk	174 NORTH ST	98	160.3	135.8	129.1	127.9	11.7	1 HOUR
25-005-1004	Fall River	Bristol	659 GLOBE ST	99	185.9	164.9	131	75.9	9.02	1 HOUR
25-009-5005	Haverhill	Essex	CONSENTINO SCHOOL	98	139.8	129.9	118.2	110.7	8.83	1 HOUR
25-009-2006	Lynn	Essex	390 PARKLAND	97	146.7	140.4	138.5	129	7.33	1 HOUR
25-021-3003	Milton	Norfolk	BLUE HILL OBS	99	153.5	152.3	102.5	83.6	6.44	1 HOUR
25-003-0006	Pittsfield	Berkshire	BERKSHIRE COMMONS	93	77.5	66	62	59.8	7.79	1 HOUR
25-013-0016	Springfield	Hampden	LIBERTY P-LOT	98	115.3	113.6	83.8	73.5	10.19	1 HOUR
25-015-4002	Ware	Hampshire	QUABBIN SUMMIT	94	47.9	47.9	46.7	45.3	5.54	1 HOUR
25-027-0023	Worcester	Worcester	SUMMER ST	98	101.8	101.7	92.7	60.6	9.83	1 HOUR

ABBREVIATIONS AND SYMBOLS USED IN TABLE
SITE ID = AIRS SITE IDENTIFICATION **TYPE** = TYPE OF INSTRUMENT **FRM** = FEDERAL REFERENCE METHOD; **COLOC** = FED. REF. METH. COLOCATED **1ST, 2ND, 3RD, 4TH MAX** = 1ST, 2ND, 3RD, AND 4TH HIGHEST 24-HOUR VALUES FOR THE YEAR **ARITH MEAN** = ANNUAL ARITHMETIC MEAN (STANDARD = 15.0 $\mu g/m^3$)



2010 $PM_{2.5}$ Monitoring Network

Speciation

MassDEP collects $PM_{2.5}$ samples for speciation at the air monitoring station in Boston (Harrison Avenue) and in Chicopee. Speciation involves analysis of particulate matter to determine its chemical composition and to identity air pollution sources that affect the area around the monitoring station. Pollutants analyzed include elements (e.g., metals), sulfates, nitrates, and carbon (total and organic).

IMPROVE (Interagency Monitoring of Protected Visual Environments)

IMPROVE is a nationwide program designed to assess air quality at rural locations where air pollution may affect visibility over long distances (e.g., mountain ranges or scenic vistas). Massachusetts currently has IMPROVE samplers at the Ware and Truro sites. The Wampanoag Tribe operates a third IMPROVE sampler at its Martha's Vineyard monitoring site. These samplers acquire $PM_{2.5}$ filter samples for speciation analysis to determine effects on visibility. Data can be viewed at the IMPROVE web site at http://vista.cira.colostate.edu/improve/Data/data.htm.

Lead (Pb) Summary

2010 Pb Data Summary

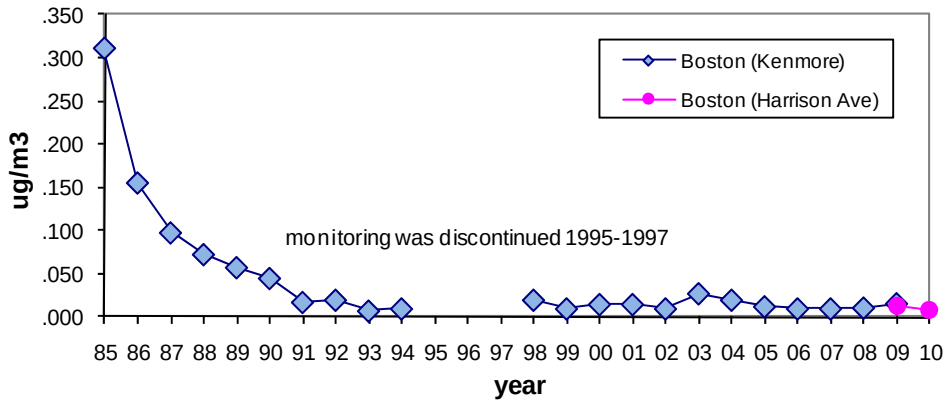
A summary of the 2010 Pb data is shown below (in μg/m^3). MassDEP operated a total suspended particulates (TSP) lead sampler at Boston-Harrison Avenue during 2010, after a reconfiguration of the Kenmore Square site in 2009 would no longer allow the placement of that sampler there. In 2010, MassDEP used the new PM_{10}-based lead monitoring methodology to conduct a special study that compared the ambient lead concentrations at the historical Kenmore Square lead monitoring site to the new Harrison Avenue NCore monitoring site. MassDEP will continue to measure PM_{10}-based lead at Harrison Avenue and at an additional site in Springfield. The data from the Kenmore Square/Harrison Avenue study showed that lead concentrations to be at or below method detection limits and well below the new lead standard. As shown in Figure 10, ambient lead concentrations have decreased significantly in Massachusetts over the last twenty-five years since lead was removed from gasoline beginning in 1975.

SITE ID	CITY	COUNTY	ADDRESS	% OBS	QTR1 ARITH MEAN	QTR2 ARITH MEAN	QTR3 ARITH MEAN	QTR4 ARITH MEAN	# MEANS > STD	1ST MAX 24-HR	2ND MAX 24-HR	DURATION
25-025-0042	Boston	Suffolk	HARRISON AVE	97	0.0073	0.0095	0.0083	0.0056	0	0.025	0.023	24-HOUR

Standard: 0.15 μg/m³ (Rolling 3-month Average)

ABBREVIATIONS AND SYMBOLS USED IN TABLE
SITE ID = AIRS SITE IDENTIFICATION **% OBS** = PERCENT OBSERVATIONS **QTR1,QTR2, QTR3, QTR4 ARITH MEAN** = THE MEANS FOR THE 1ST, 2ND, 3RD AND 4TH CALENDAR QUARTERS, **# MEANS > STD** = THE NUMBER OF CALENDAR QUARTER MEANS GREATER THAN THE STANDARD, **1ST, 2ND MAX 24-HR** = THE 1ST AND 2ND MAXIMUM 24-HOUR VALUES

Figure 10
Pb Concentrations 1985 – 2010
Annual Arithmetic Mean
Standard = 1.5 ug/m^3



Industrial Network Summary

Introduction

The industrial ambient air quality network is comprised of four monitoring stations operated by power generation companies that were sited to measure ambient air impacts from specific power plants in the Boston area. The data from the industrial network is submitted to MassDEP's Air Assessment Branch, which in turn submits the data to the EPA AQS database after completing the quality assurance process.

Sulfur Dioxide (SO_2) summary

There were four SO_2 sites in operation during 2010 in the industrial network. All of the sites achieved the requirement of 75% or greater data capture for the year. There were no measured violations of the SO_2 air quality standards during the year in the reported data. A summary of the 2010 SO_2 data is shown below.

SITE ID	CITY	COUNTY	ADDRESS	% OBS	COMP QTRS	1ST MAX 1-HR	2ND MAX 1-HR	99TH PCTL 1-HR	1ST MAX 24-HR	2ND MAX 24-HR	Days >24HR STD	ARITH MEAN
25-025-0019	Boston	Suffolk	LONG ISLAND, BOSTON	96	4	13	12	11	4.7	4.7	0	1.79
25-025-0020	Boston	Suffolk	DEWAR STREET	99	4	24	23	19	9.2	7.9	0	2.93
25-025-0021	Boston	Suffolk	340 BREMEN ST	98	4	27	26	25	10	9.4	0	2.93
25-025-0040	Boston	Suffolk	531A EAST FIRST ST	96	4	16	14	9	4.9	4.7	0	2.32

STANDARD = 75 PPB (1-HOUR)

ABBREVIATIONS AND SYMBOLS USED IN TABLE
SITE ID = AIRS SITE IDENTIFICATION NUMBER **% OBS =** PERCENT OBSERVATIONS, **COMP QTRS** = COMPLETED QUARTERS, **1ST & 2ND MAX 1-HR and MAX 24-HR** = FIRST AND SECOND HIGHEST VALUE FOR TIME PERIOD INDICATED, **99th PCTL** = 99th PERCENTILE OF THE 1-HOUR MAX, **DAYS >24 HR STD** = NUMBER OF DAYS ABOVE THE 24-HOUR STANDARD, **ARITH MEAN** = ARITHMETIC MEAN

Nitrogen Dioxide (NO_2) summary

There was one NO_2 monitor that operated during 2010 in the industrial network. The site met the requirement of 75% or greater data capture in 2010. There were no reported violations of the NO_2 air quality standard during the year.

A summary of the 2010 NO_2 data is shown below.

SITE ID	CITY	COUNTY	ADDRESS	# COMP QTRS	1ST MAX 1-HR	2ND MAX 1-HR	98TH PCTL	# OBS	% COMP	ARITH MEAN
25-025-0040	Boston	Suffolk	531A EAST FIRST ST	4	64	52	47	8526	97	12.72

STANDARD = 100 PPB (1-HOUR)

ABBREVIATIONS AND SYMBOLS USED IN TABLE
SITE ID = AIRS SITE IDENTIFICATION NUMBER, **# COMP QTRS** = NUMBER OF COMPLETED QUARTERS, **1ST AND 2ND MAX 1-HR** = FIRST AND SECOND HIGHEST VALUE FOR TIME PERIOD INDICATED, **98th PCTL** = 98th PERCENTILE OF 1 HOUR MAXIMUM, **#OBS** = OBSERVATIONS COMPLETED, **% COMP** = PERCENT COMPLETE, **ARITH MEAN** = ARITHMETIC MEAN (STANDARD = 0.053 PPM)

Total Suspended Particulates (TSP) summary

There were four TSP sites that operated during 2010 in the industrial network. All of the sites met the requirement of 75% or greater data capture. TSP is no longer a criteria pollutant (PM_{10} replaced it as the course particulate standard in 1987), so there is no longer a standard for it. A summary of the 2010 TSP data is shown below.

SITE ID	TYPE	CITY	COUNTY	ADDRESS	% OBS	1ST MAX	2ND MAX	3RD MAX	4TH MAX	ARITH MEAN	DURATION
25-025-0019	TSP	Boston	Suffolk	LONG ISLAND	100	66	39	37	34	17	24 HOUR
25-025-0020	TSP	Boston	Suffolk	DEWAR STREET	100	127	114	108	106	48.8	24 HOUR
25-025-0021	TSP	Boston	Suffolk	340 BREMEN ST	100	84	67	61	61	28.7	24 HOUR
25-025-0040	TSP	Boston	Suffolk	531A E. FIRST ST	100	76	69	60	43	24.4	24 HOUR
25-025-0040	Co-Loc	Boston	Suffolk	531A E. FIRST ST	100	65	59	46	42	23.1	24 HOUR

ABBREVIATIONS AND SYMBOLS USED IN TABLE
SITE ID = AIRS SITE IDENTIFICATION NUMBER, **TYPE** = TYPE OF MONITOR, **CO-LOC** = COLOCATED MONITOR, % **OBS** = PERCENT OBSERVATIONS, **1^{ST}, 2^{ND}, 3^{RD}, 4^{TH} MAX** = 1^{ST}, 2^{ND}, 3^{RD} AND 4^{TH} HIGHEST 24-HOUR VALUES FOR THE YEAR, **ARITH MEAN** = ARITHMETIC MEAN, **DURATION** = 24-HOUR SAMPLING PERIOD

Sulfate (SO_4) summary

There were four SO_4 sites that operated during 2010 in the industrial network. All of the sites met the requirement of 75% or greater data capture. SO_4 is not a criteria pollutant so there are no ambient air quality standards for SO_4. A summary of the 2010 SO_4 data is shown below.

SITE ID	TYPE	CITY	COUNTY	ADDRESS	% OBS	1ST MAX	2ND MAX	3RD MAX	4TH MAX	ARITH MEAN	DURATION
25-025-0019	SO4	Boston	Suffolk	LONG ISLAND	100	8.6	7	5.7	5.6	3.21	24 HOUR
25-025-0020	SO4	Boston	Suffolk	DEWAR STREET	100	10.2	10.1	9.2	8.3	4.78	24 HOUR
25-025-0021	SO4	Boston	Suffolk	340 BREMEN ST	100	13.8	10.7	9.5	9.4	5.49	24 HOUR
25-025-0040	SO4	Boston	Suffolk	531A E. FIRST ST	100	15.6	12.7	10.6	10.3	5.52	24 HOUR
25-025-0040	Co-loc	Boston	Suffolk	531A E. FIRST ST	100	14.1	12	11.9	11.2	5.4	24 HOUR

ABBREVIATIONS AND SYMBOLS USED IN TABLE
SITE ID = AIRS SITE IDENTIFICATION NUMBER , **TYPE** = TYPE OF MONITOR, **CO-LOC** = COLOCATED MONITOR, % **OBS = % OBSERVATIONS, 1^{ST}, 2^{ND}, 3^{RD}, 4^{TH} MAX** = 1^{ST}, 2^{ND}, 3^{RD} AND 4^{TH} HIGHEST 24-HOUR VALUES FOR THE YEAR, **ARITH MEAN** = ARITHMETIC MEAN, **DURATION** = 24-HOUR SAMPLING PERIOD

QUALITY CONTROL AND QUALITY ASSURANCE

Introduction

In order to ensure that all air quality data is of acceptable and consistent quality, MassDEP has developed standard operating procedures (SOPs) based on federal requirements that include quality control and quality assurance techniques that systematically assess the entire sample collection and data handling system on an ongoing basis. Each year MassDEP certifies that it is in compliance with the federal requirements.

A few of the considerations that affect data quality on the sample collection end are:

- Site Placement
- Intake Probe Material
- Intake Probe Height
- Spacing from roadways and trees

On the data processing end there are quantitative statistics and qualitative descriptors used to interpret the degree of acceptability or utility of data to the end user. Examples of these data quality indicators are:

- Representativeness
- Precision
- Bias
- Detectability
- Completeness
- Comparability

MassDEP's Air Assessment Branch in Lawrence maintains an independent Quality Assurance/ Data Management Group that reviews the monitoring data for quality, ensures that samples are collected correctly and conducts performance audits throughout the air monitoring network to verify data validity. Another function of the Data Group is to process and report all of the Massachusetts air quality data to the EPA database in a timely manner. Computer software tools, report queries and "eyes on" data reviews are all used to detect and correct problems in the data before it is submitted to EPA.

Quality Assurance requirements for ambient air monitoring are contained in the federal regulations at 40 CFR Part 58, Appendix A – E.

Section IV
PAMS/Air Toxics Monitoring

PAMS Monitoring

Unlike other pollutants, ground-level ozone is unique because it is a secondary pollutant and is not discharged directly to the atmosphere from a stack or tailpipe, but rather forms in the atmosphere from the photochemical reactions of other pollutants such as volatile organic compounds (VOCs) and NO_x. Ozone formation can occur many miles downwind from the source of the original emissions. These reactions occur in the presence of strong sunlight and are most pronounced during the hottest days of the summer. The PAMS (Photochemical Assessment Monitoring Stations) program was conceived as part of the 1990 Clean Air Act Amendments as an accurate way to collect data for assessing NAAQS attainment progress independent of the meteorological variation that occurs between years and for identifying appropriate pollution control strategies.

PAMS is a special designation for enhanced monitoring stations that are designed to gather information on the ozone formation process. Instrumentation at these sites measures pollutants and meteorological parameters that are specific to the photochemical processes by which ozone is created in the atmosphere at ground level. In addition to the standard NAAQS pollutants (ozone, NO_2, etc.) that are measured at other sites, non-criteria pollutants, including VOCs, are measured at PAMS stations on either an hourly basis or at regular intervals during the hottest part of the summer in June, July and August. Meteorology is a critical component of ozone formation and each PAMS site has a full compliment of meteorological sensors including wind speed, wind direction, temperature, relative humidity, barometric pressure, solar radiation and at some sites, total ultraviolet light and precipitation. MassDEP also operates a sophisticated PAMS associated Doppler Radar atmospheric profiler at a non-PAMS site in Stow, Massachusetts. This instrument measures temperature and wind profiles at different levels of the atmosphere that provides valuable information on upper level conditions that contribute to ozone formation.

Since the PAMS project started in 1993, Massachusetts has conducted enhanced ozone precursor measurements in the Boston and Springfield Metropolitan Areas and to assist Rhode Island in the measurement of ozone precursors and reactants at locations down wind of Providence, RI.

PAMS Monitoring Areas

Boston	Springfield	Providence
Blue Hill (Milton)	Chicopee	Blue Hill (Milton)
Lynn	Ware	
Newburyport		
Long Island		

Note: Blue Hill provides data for Boston and Providence networks.

PAMS Site Descriptions:

Type 1 – Upwind Site. VOC samples are taken every third day, and eight 3-hour samples are taken per day during the summer season (June, July and August). Blue Hill is the current Type 1 site for Boston and Type 3 site (downwind) for Providence. There is no current Type 1 site for Springfield.

Type 2 - Urban (Downwind Edge site). Type 2 sites are the most intensive measurement sites in the PAMS program. VOCs are measured hourly by automated gas chromatographs during the summer season. Carbonyls (e.g., acetaldehyde and formaldehyde) samples are taken every third day, and eight 3-hour samples are taken per day during the summer season. 24-hour VOC samples are taken every sixth day throughout the year. Lynn is Boston's Type 2 site and Chicopee is Springfield's Type 2 site. Larger metropolitan areas were originally required to have Type 2 sites in the two most prevalent wind directions. Long Island (Boston) was designated as a second Boston Type 2 site in the late 1990s, but was subsequently scaled back and now is sampled on a Type 1 site schedule.

Type 3 – Downwind where highest ozone measurements are expected. Newburyport is Boston's Type 3 site and Ware is Springfield's Type 3 site. The required sampling schedule is the same as Type 1, but MassDEP has chosen to operate automated gas chromatographs for VOCs at these sites. No carbonyl measurements are taken at either Type 1 or Type 3 sites.

Air Toxics Monitoring

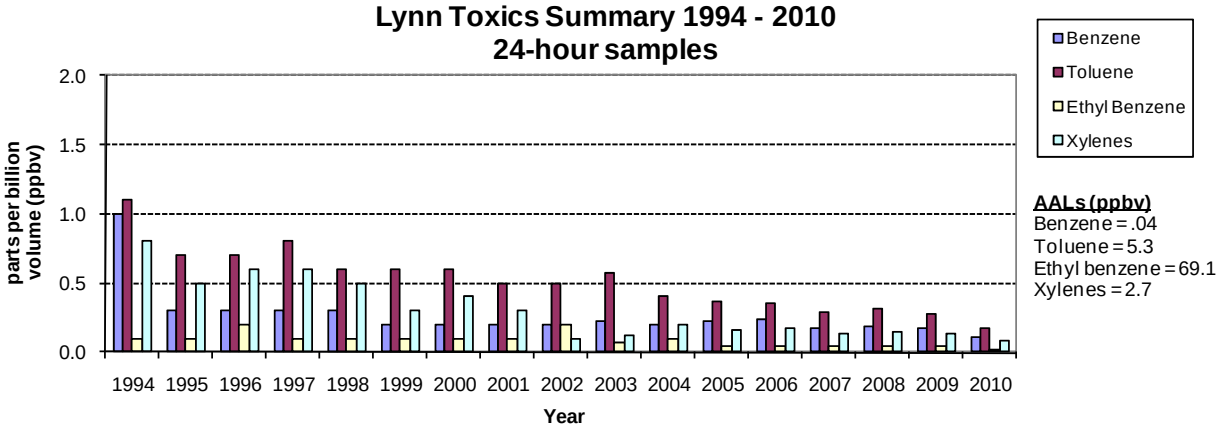
Toxic air pollutants are distinct from criteria air pollutants such as ozone and CO and are known or suspected to cause cancer or other serious health effects. Air toxics include volatile organic compounds (VOCs) and toxic metals (e.g., mercury).

MassDEP monitors VOCs as part of the PAMS monitoring program, some of which are classified as air toxics. MassDEP obtains health-relevant VOC concentration data throughout the year at the PAMS Type 2 sites.

The Boston (Harrison Avenue) monitoring site is designated as a National Air Toxics Trends Station (NATTS) designed to collect and quantify a number of toxic air pollutants, including VOCs, metals, carbonyls, black carbon and polycyclic aromatic hydrocarbons (PAHs). Data from this site is compared with data from a network of similar sites across the country to identify transport, trends and site-specific characteristics of these pollutants.

Figure 11 summarizes concentrations of 24-hour health-relevant target compounds for samples taken at the Lynn PAMS site from 1994 to 2010. Significant mean concentration decreases seen between 1994 and 1995 are likely due to the introduction of reformulated gasoline at the beginning of 1995. Allowable Ambient Limit (AAL) values are presented next to Figure 11 for reference. AALs are health-based air toxics guidelines developed by MassDEP based on known or suspected carcinogenic and toxic health properties of individual compounds. AAL concentrations were developed for a 70-year lifetime exposure, but are used for comparison with annual averages.

Figure 11



Below is a table that summarizes results from the analysis of 24-hour samples for selected target VOCs from the Boston (Harrison Ave) and Lynn sites for 2010. Harrison Avenue serves as the central city sampling location and Lynn serves as the area background site.

Compound	BOSTON (Harrison Ave)		LYNN	
	Max Value ppb	Mean ppb	Max Value ppb	Mean ppb
1,3-butadiene	.076	.027	.074	.011
1,1,1-trichloroethane	.011	.007	.010	.007
trichloroethylene	.007	.004	.014	.004
tetrachloroethylene	.048	.017	.042	.013
Benzene	.355	.173	.310	.111
Toluene	1.296	.405	1.296	.177
Xylenes	.561	.174	.494	.080
Ethylbenzene	.139	.048	.107	.024

Samples collected at the Harrison Avenue site are analyzed for a suite of metals that are known to be toxic in the environment. The table below summarizes the 2010 metals data.

BOSTON (Harrison Ave)			
Metal	# of Samples	Max Value $\mu g/m^3$	Mean $\mu g/m^3$
Chromium	60	.00292	.00139
Antimony	60	.00188	.00080
Arsenic	60	.00124	.00036
Beryllium	60	.00003	.00000
Cadmium	60	.00042	.00190
Cobalt	60	.00024	.00008
Lead	60	.00880	.00250
Manganese	60	.01230	.00320
Nickel	60	.00281	.00104
Mercury	60	.00002	.00001
Selenium	60	.00125	.00028

Appendix A

2010 State Monitoring Station Locations

SITE ID	CITY	COUNTY	ADDRESS	DATE SITE ESTABLISHED	MONITORED
25-003-4002	ADAMS	BERKSHIRE	MT. GREYLOCK	5/1/1989	O3
25-015-0103	AMHERST	HAMPSHIRE	NORTH PLEASANT	4/1/1988	O3
25-025-0002	BOSTON	SUFFOLK	KENMORE SQUARE	1/1/1965	SO2, NO, NO2, NOx, CO, Lead, PM2.5 FRM, PM10
25-025-0027	BOSTON	SUFFOLK	ONE CITY SQUARE	1/1/1985	PM2.5 FRM, PM10
25-025-0041	BOSTON	SUFFOLK	LONG ISLAND	12/1/1998	O3, NO, NO2, NOx, VOCs, WS/WD, TEMP, Solar Rad, RH, BP
25-025-0042	BOSTON	SUFFOLK	HARRISON AVENUE	12/15/1998	O3, SO2 trace, NO, NO2, NOx, CO trace, PM2.5 FRM, PM2.5 BAM, PM2.5 Speciation, PM10, Toxics, Black Carbon, WS/WD, TEMP, Solar Rad, RH, BP, Lead
25-025-0043	BOSTON	SUFFOLK	174 NORTH ST	1/1/2000	PM2.5 FRM, PM2.5 BAM, Black Carbon
25-023-0004	BROCKTON	PLYMOUTH	120 COMMERCIAL ST	12/15/1998	PM2.5 FRM
25-013-0008	CHICOPEE	HAMPDEN	ANDERSON RD	1/1/1983	O3, NO, NO2, NOx, PM2.5 FRM, PM2.5 speciation, VOCs, TEMP, WS/WD, Solar Rad, RH, BP
25-005-1002	FAIRHAVEN	BRISTOL	LEROY WOOD	1/1/1982	O3, WS/WD, TEMP, Solar Rad, RH, BP
25-005-1004	FALL RIVER	BRISTOL	GLOBE ST	2/1/1975	PM2.5 FRM, PM2.5 BAM, SO2
25-009-5005	HAVERHILL	ESSEX	WASHINGTON ST	7/19/1994	O3, NO, NO2, NOx, PM2.5 FRM, PM2.5 BAM, WS/WD, TEMP, Solar Rad, RH, BP
25-009-6001	LAWRENCE	ESSEX	WALL EXP. STATION	4/3/1999	PM2.5 FRM
25-017-0007	LOWELL	MIDDLESEX	OLD CITY HALL	7/17/1981	CO
25-009-2006	LYNN	ESSEX	390 PARKLAND	1/1/1992	O3, NO, NO2, NOx, PM2.5 FRM, PM2.5 BAM, CO trace, VOCs, Toxics, WS/WD, TEMP, Solar Rad, RH, BP, UVB, PRECIP
25-021-3003	MILTON	NORFOLK	BLUE HILL	4/2/2002	O3, NO, NO2, NOx, PM2.5 BAM, VOCs, WS/WD, TEMP, Solar Rad, RH, BP
25-009-4005	NEWBURYPORT	ESSEX	HARBOR STREET	7/6/2010	O3, NO, NO2, NOx, NOy, VOCs, WS/WD, TEMP, Solar Rad, RH, BP
25-003-5001	PITTSFIELD	BERKSHIRE	78 CENTER STREET	11/6//98	PM2.5 FRM
25-003-0006	PITTSFIELD	BERKSHIRE	BERKSHIRE COMMONS	1/1/79	PM2.5 BAM
25-013-0016	SPRINGFIELD	HAMPDEN	LIBERTY STREET	4/1/1988	SO2, NO, NO2, NOx, CO, Black Carbon, PM2.5 FRM, PM2.5 BAM
25-013-2009	SPRINGFIELD	HAMPDEN	1860 MAIN STREET	1/1/2002	PM2.5 FRM, PM10
25-017-1102	STOW	MIDDLESEX	US MILITARY	4/1/1998	O3, Profiler, WS/WD, TEMP, Solar Rad, RH, BP
25-001-0002	TRURO	BARNSTABLE	FOX BOTTOM AREA	4/1/1987	O3, IMPROVE, WS/WD, TEMP, Solar Rad, RH, BP
25-027-0024	UXBRIDGE	WORCESTER	366 E HARTFORD AVE	11/13/2008	O3, WS/WD, TEMP, Solar Rad, RH, BP
25-017-4003	WALTHAM	MIDDLESEX	BEAVER STREET	1/1/1982	Acid Deposition
25-015-4002	WARE	HAMPSHIRE	QUABBIN SUMMIT	6/1/1985	O3, SO2 trace, NO, NO2, NOx, NOy, PM10, VOCs, PM2.5 BAM, IMPROVE, WS/WD, TEMP, Solar Rad, RH, BP, PRECIP
25-027-0015	WORCESTER	WORCESTER	WORC. AIRPORT	5/7/1979	O3, WS/WD, TEMP, Solar Rad, RH, BP,
25-027-0016	WORCESTER	WORCESTER	2 WASHINGTON ST	12/31/2002	PM2.5 FRM
25-027-0023	WORCESTER	WORCESTER	SUMMER STREET	1/1/2004	SO2, NO, NO2, NOx, CO, PM2.5 FRM, PM2.5 BAM, PM10

2010 Industrial Monitoring Station Locations

SITE ID	CITY	COUNTY	ADDRESS	DATE SITE ESTABLISHED	MONITORED
25-025-0019	BOSTON	SUFFOLK	LONG ISLAND	1/1/1978	SO2, TSP, SO4, WS/WD
25-025-0020	BOSTON	SUFFOLK	DEWAR STREET	1/1/1978	SO2, TSP, SO4, WS/WD
25-025-0021	BOSTON	SUFFOLK	BREMEN STREET	1/1/1979	SO2, TSP, SO4, WS/WD
25-025-0040	BOSTON	SUFFOLK	531A EAST FIRST ST	1/1/1993	SO2, TSP, SO4, NO2, WS/WD