Commonwealth of Massachusetts
2008 Air Quality Report

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

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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
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
TSP..... Total Suspended Particulates
ug/m^3 ..... micrograms per cubic meter
USEPA..... 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 2008, 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 and run by an environmental consultant. MassDEP also received data from the Wampanoag Tribe of Gay Head (Aquinnah), which began operating an ozone monitor in 2003 on Martha's Vineyard. The tribal air quality data can be found at www.epa.gov/ne/aqi/

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 (USEPA). In addition, in April 2009 MassDEP launched a new 'MassAir Online' website that 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. 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:

- 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 USEPA

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 $\leq$10 microns (PM_{10})
- particulate matter $\leq$ 2.5 microns ($PM_{2.5}$)

Non-criteria pollutants have no established National Ambient Air Quality Standards; however, some of these pollutants are subject to emissions limits in facility permits issued by MassDEP. The non-criteria pollutants monitored are:

- 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, aldehydes and metals

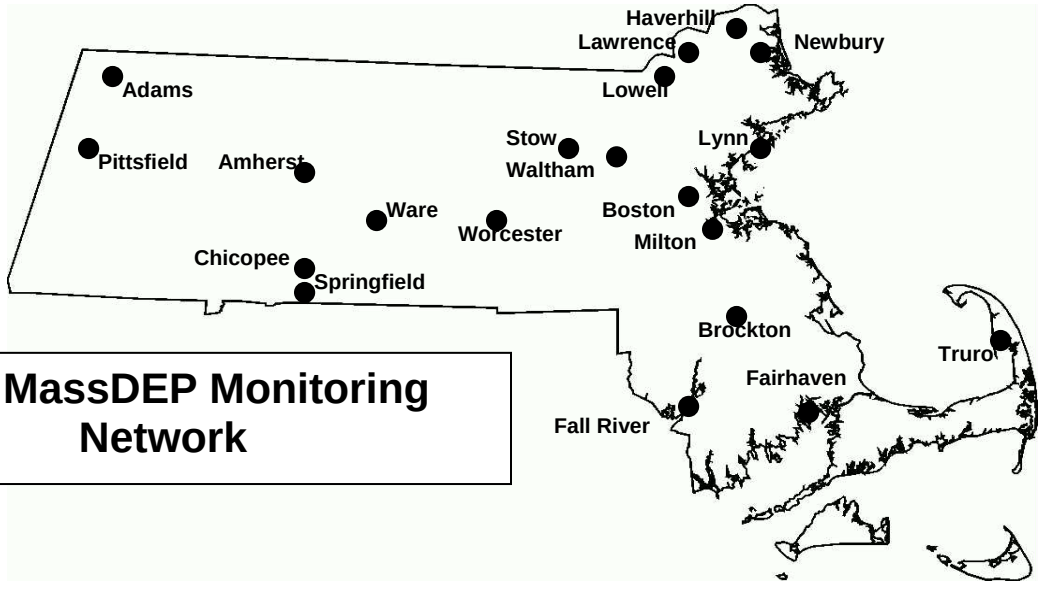
Meteorological parameters monitored are:

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

Monitoring Station Locations

Monitoring stations are sited to provide data for various purposes. Some are located in "hot spots" 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 both 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 air monitors were located during 2008.



2008 MassDEP Monitoring Network

National Core Monitoring Network (NCore)

In 2008, Massachusetts began monitoring trace level sulfur dioxide and carbon monoxide at two sites in the Boston area. Additional monitors are scheduled to be deployed in 2009. NCore is a multi-pollutant network that integrates several advanced measurement systems for particles, pollutant gases and meteorology. The goals of the NCore network are to improve the scientific and technical competency of the nation's air monitoring networks and add increased value in protecting public health and the environment. Ambient air quality has substantially improved over the last two decades so that concentrations of several of the criteria air pollutants [e.g., carbon monoxide (CO), sulfur dioxide (SO_2), and nitrogen dioxide (NO_2)] are well below the applicable National Ambient Air Quality Standards (NAAQS). While the obvious problems of widespread elevated concentrations of a number of the criteria pollutants have largely been solved, problems related to particulate matter (PM), ozone (O_3), and toxic air contaminants remain. The precursor gases CO, SO_2 and NOy play important roles in the formation of atmospheric ozone, PM, and air toxics both on the local and regional levels. It is now clear that even very low levels of air pollution can be associated with adverse environmental and human health effects. As a result, new approaches to air monitoring are being developed to measure these low levels and to incorporate these measurements with other, more conventional data, into comprehensive assessments of human and environmental health. The NCore network will play a key role by measuring air pollutants in lower concentration ranges than in the past. Designated sites that will be part of the NCore network must be fully implemented by January 1, 2011.

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 what region you are in, go to www.mass.gov/dep/about/regional.htm. To view online air quality data for Massachusetts and other states, go to USEPA's website at www.epa.gov/air/data.

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National Ambient Air Quality Standards

Primary Standards – designed to protect public health against the adverse health effects of air pollutants with a margin of safety.

Secondary Standards – designed to protect against damage to crops, vegetation, and buildings.

POLLUTANT	AVERAGING TIME*	PRIMARY	SECONDARY
SO_2	Annual Arithmetic Mean	0.03 ppm (80 ug/m³)	None
	24-Hour	0.14 ppm (365 ug/m³)	None
	3-Hour	None	0.50 ppm (1300 ug/m³)
CO	8-Hour	9 ppm (10 mg/m³)	Same as Primary Standard
	1-Hour	35 ppm (40 mg/m³)	Same as Primary Standard
O_3	8-Hour	0.075 ppm (147 ug/m³)	Same as Primary Standard
• The 8-hour standard is met when the 3-year average of the 4th-highest daily maximum 8-hour average does not exceed 0.075 ppm at any one monitor.			
Pb**	Calendar Quarter Arithmetic Mean	1.5 ug/m³	Same as Primary Standard
NO_2	Annual Arithmetic Mean	0.053 ppm (100 g/m³)	Same as Primary Standard
$PM_{2.5}$ Particulates up to 2.5 microns in size	Annual Arithmetic Mean	15.0 ug/m³	Same as Primary Standard
	24-Hour	35 ug/m³	Same as Primary Standard
• The annual standard is met when the annual average of the quarterly mean $PM_{2.5}$ concentrations is less than or equal to 15 ug/m³ (3-year average). If spatial averaging is used, the annual average from all monitors within the area may be averaged in the calculation of the 3-year mean. • The 24-hour standard is met when the 98th percentile value is less than or equal to 35 ug/m³ (3-year average).			
PM_{10} Particulates up to 10 microns in size	24-Hour	150 ug/m³	Same as Primary Standard
• The PM_{10} standard is based upon estimated exceedance calculations described in 40 CFR Part 50, Appendix K. • The 24-hour standard is attained if the estimated number of days per calendar year above 150 ug/m³ does not exceed one per year on average over 3 years.			

μg/m³ = micrograms per cubic meter ppm = parts per million mg/m³ = milligrams per cubic meter

* Standards based on averaging times other than the annual arithmetic mean must not be exceeded more than once per year.

** On October 15, 2008, USEPA lowered the lead standard from 1.5 ug/m³ to 0.15 ug/m³ averaged over a 'rolling' 3-month period and set the secondary standard identical to the primary standard. USEPA will retain the 1.5 ug/m³ standard until one year after designations for the new standards.

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 results 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, 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 are also 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 coal and oil that contains sulfur). Sources include heat and power generation facilities, and petroleum refineries.

Nitrogen Dioxide (NO_2)

- 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.
- 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.

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, 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, and power plants.

Lead (Pb)

- Lead is an elemental metal that is found in nature.
- 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 paint removal.
- 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.

Public and Industrial Network Descriptions

2008 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.
  - 6 – CO (carbon monoxide)
  - 11 – NO_2 (nitrogen dioxide). NO (nitric oxide) and NO_x (total nitrogen oxides) also are measured by these monitors.
  - 14 – O_3 (ozone)
  - 6 – SO_2 (sulfur dioxide)

- Meteorological monitors track weather conditions.
  - 13 – BP (barometric pressure)
  - 13 – RH (relative humidity)
  - 13 – Solar Rad (solar radiation)
  - 14 – 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)
  - 2 – 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).
  - 10 – $PM_{2.5}$ BAM (particulate matter – 2.5 microns)
  - 3 – Black Carbon
  - 1 – Acid Deposition. Precipitation is collected and analyzed for conductivity and acidic compounds that are harmful to the environment. This monitor, located in Waltham, is part of the National Atmospheric Deposition Program (NADP). Two other monitors in Massachusetts are also part of the NADP. They are located in Truro and Ware and are not operated by MassDEP.

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)
  - 6 – PM_{10} (particulate matter – 10 microns)
  - 15 – $PM_{2.5}$ FRM (particulate matter – 2.5 microns)
- Non-criteria pollutant monitors measure pollutants that do not have NAAQS.
  - 4 – PAMS (photochemical assessment monitoring station). These monitors measure VOCs (volatile organic compounds).
  - 1 – TSP (total suspended particulates) used for lead analysis
  - 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)

2008 Industrial Monitoring Network

Industries monitor air quality and submit data under agreement with MassDEP. The data must be collected using quality assurance requirements established by MassDEP and USEPA.

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 condensed into provide 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) established timeframes and milestones for states to meet and maintain National Ambient Air Quality Standards (NAAQS) for criteria pollutants. USEPA sets the NAAQS levels to protect public health and the environment. USEPA must review the NAAQS every five years and may update the standards based on new scientific information. Each state is required to monitor the ambient air to determine whether it meets each standard. If 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).

Ozone is the only pollutant for which Massachusetts monitors indicate violations of a NAAQS. Massachusetts is in attainment for the other criteria pollutants, including carbon monoxide, lead, nitrogen dioxide, sulfur dioxide, and particulate matter (including PM_{10} and $PM_{2.5}$).

Sulfur Dioxide, Nitrogen Dioxide, and Lead

Massachusetts has been in attainment for sulfur dioxide, nitrogen dioxide, and lead for a number of years based on decades of monitoring.

On October 15, 2008, USEPA lowered the lead standard from 1.5 ug/m³ to 0.15 ug/m³ averaged over a 'rolling' 3-month period and set the secondary standard identical to the primary standard. USEPA will retain the 1.5 ug/m³ standard until one year after designations for the new standards. Massachusetts must make a recommendation to USEPA by October 2009 on whether the state is in attainment or nonattainment of the new standard.

Carbon Monoxide

Prior to the mid-1980s, Massachusetts was in violation of the carbon monoxide (CO) standard. However, with the adoption of numerous control programs, CO emissions have significantly decreased. The last violation in the state of the CO NAAQS occurred in 1986. In 2000, MassDEP formally requested that the USEPA 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. With the re-designation of these cities to CO attainment in April 2002, the entire state is now in attainment of the CO standard.

Particulate Matter

There are currently two sets of NAAQS particulate matter standards: PM_{10} and $PM_{2.5}$. Massachusetts has been in attainment of the PM_{10} standard for several years. $PM_{2.5}$ standards were first established in 1997. In December 2004, USEPA designated Massachusetts "Attainment/Unclassifiable" for $PM_{2.5}$ statewide based on monitoring data. In December 2006, USEPA revised the PM_{10} and $PM_{2.5}$ standards. USEPA retained the 24-hour PM_{10} standard as is (at 150 ug/m³), and revoked the annual PM_{10} standard. In addition, USEPA retained the annual $PM_{2.5}$ standard as is (at 15 ug/m³) and lowered the 24-hour $PM_{2.5}$ standard to 35 ug/m³ (from 65 ug/m³).

In December 2008, USEPA designated Massachusetts as "Attainment/Unclassifiable" statewide for the 2006 24-hour $PM_{2.5}$ standards statewide based on monitoring data.

Ozone

In 1997, USEPA set a new stricter ozone standard of 0.08 ppm averaged over an eight-hour period, but implementation was delayed due to legal challenges to the standard. USEPA designated Massachusetts as "moderate nonattainment" for the 8-hour standard effective June 15, 2004. The 1-hour standard was revoked on June 15, 2005. The 1-hour ozone standard (0.12 ppm averaged over one hour) had been in place for almost two decades. Massachusetts had been classified as "serious nonattainment" for the 1-hour ozone standard since the early 1990s. However, with the adoption of numerous control programs, Massachusetts has made significant progress in reducing the number and severity of 1-hour ozone exceedances. Mitigation programs that were put in place to attain the 1-hour standard will continue as part of MassDEP's strategy to attain the new 8-hour standard. In January 2008, MassDEP submitted to USEPA an 8-hour Ozone SIP including strategies for attaining the 8-hour ozone standard by 2010.

On March 12, 2008, USEPA lowered the primary ozone standard to 0.075 ppm (from 0.08 ppm) and set the secondary standard identical to the primary standard. In March 2009, Massachusetts recommended to USEPA that the entire state be designated as nonattainment with the new standard. USEPA will issue a final designation by March 2010.

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 equal to or 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, 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 equal to or 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 0.075 ppm or greater, a violation of the 8-hour standard has occurred at that specific monitoring site.

Ozone Exceedances and Violations During 2008

Exceedances

The Table below shows the 2008 ozone exceedances. There were 15 days when the 8-hour ozone standard was exceeded at at least one monitoring station. There were 49 exceedances during those 15 days (i.e., multiple sites exceeded the standard on the same day).

Violations

Violations of the ozone standard are based on 3-year averages. Using data from 2006–2008, 11 sites out of 14 violated the 8-hour standard. These sites were located in Adams, Chicopee, Ware, Milton, Fairhaven, Haverhill, Lynn, Newbury, Stow, Truro, and Worcester.

2008 Ozone Exceedances (ppm)

DATE	2008 SITE	8-HOUR >.075 ppm	START HOUR	1-HOUR MAX (ppm) for the day
April 18, 2008	Chicopee	.076	11	.081
April 19, 2008	Chicopee	.078	9	.084
April 19, 2008	Amherst	.078	10	.087
April 19, 2008	Ware	.082	9	.087
April 19, 2008	Worcester	.080	11	.086
April 23, 2008	Ware	.076	11	.082
April 23, 2008	Worcester	.079	12	.081
April 23, 2008	Milton (Blue Hill)	.076	11	.081
May 30, 2008	Ware	.079	15	.085
June 3, 2008	Worcester	.078	13	.083
June 10, 2008	Chicopee	.086	12	.110
June 10, 2008	Fairhaven	.080	11	.085
June 10, 2008	Boston (Long Is)	.083	13	.088
June 10, 2008	Lynn	.081	10	.092
June 10, 2008	Newbury	.080	12	.098
June 10, 2008	Truro	.106	13	.128
June 10, 2008	Ware	.095	13	.113
June 10, 2008	Worcester	.081	14	.096
June 10, 2008	Milton (Blue Hill)	.082	13	.089
June 10, 2008	Haverhill	.093	12	.119
June 13, 2008	Adams	.100	20	.119
June 13. 2008	Chicopee	.076	13	.088
June 13, 2008	Ware	.076	14	.087
June 14. 2008	Adams	.092	0	.099
June 14, 2008	Milton (Blue Hill)	.078	9	.089
June 14, 2008	Stow	.090	10	.099
June 14, 2008	Worcester	.104	11	.114
June 28, 2008	Chicopee	.085	11	.091
July 3, 2008	Lynn	.079	10	.096
July 3, 2008	Stow	.076	10	.094
July 3, 2008	Worcester	.089	10	.113
July 3, 2008	Haverhill	.084	10	.097
July 8, 2008	Lynn	.078	13	.091
July 8, 2008	Ware	.079	13	.105
July 8, 2008	Worcester	.084	13	.105
July 8, 2008	Haverhill	.083	14	.092

(continued on next page)

2008 Ozone Exceedances (ppm) continued

DATE	2008 SITE	8-HOUR >.075 ppm	START HOUR	1-HOUR MAX (ppm) for the day
July 17, 2008	Fairhaven	.085	12	.093
July 18, 2008	Fairhaven	.088	13	.095
July 18, 2008	Lynn	.086	11	.104
July 18, 2008	Newbury	.085	10	.108
July 18, 2008	Truro	.086	11	.092
July 19, 2008	Fairhaven	.082	9	.095
July 19, 2008	Truro	.082	10	.092
July 19, 2008	Milton (Blue Hill)	.077	11	.083
July 26, 2008	Chicopee	.080	11	.106
July 26, 2008	Lynn	.076	12	.080
July 26, 2008	Newbury	.077	10	.084
July 26, 2008	Ware	.079	12	.101
July 26, 2008	Worcester	.077	12	.089

Exceedance Days and Total Exceedance Trends

Figures 1 and 2 show the trends 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 0.08 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.

Figure 1
1-hr Ozone Exceedance Days and Total Exceedances 1987-2008
1-hour standard = 0.12 ppm (revoked June 15, 2005)

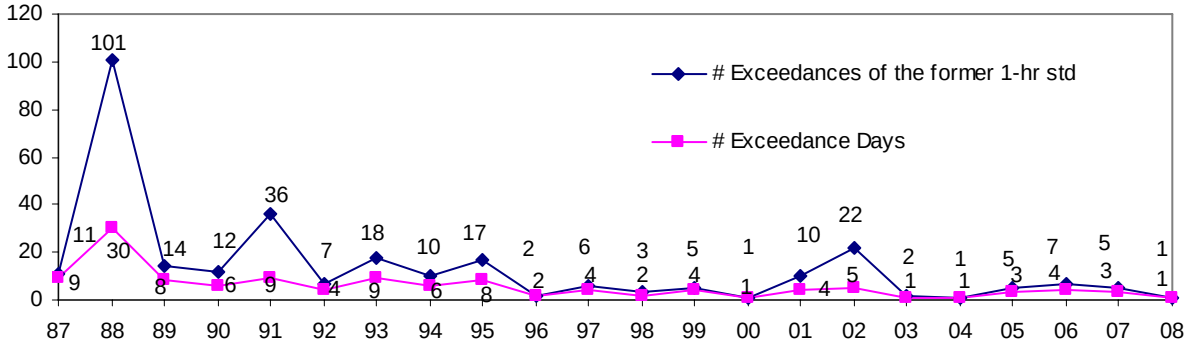
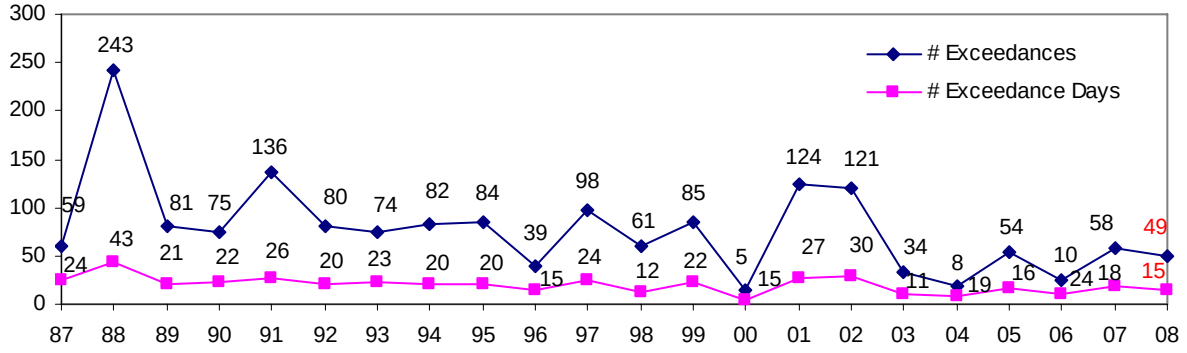


Figure 2
8-hr Ozone Exceedance Days and Total Exceedances 1987-2008*
1997-2007 8-hour standard = 0.08 ppm
2008 8-hour standard = 0.075 ppm
* Years 1987 – 1996 show what exceedances would have been with a 0.08 8-hour standard



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). USEPA web sites that contain regional and national pollution forecasts using data that is provided by participating states are 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

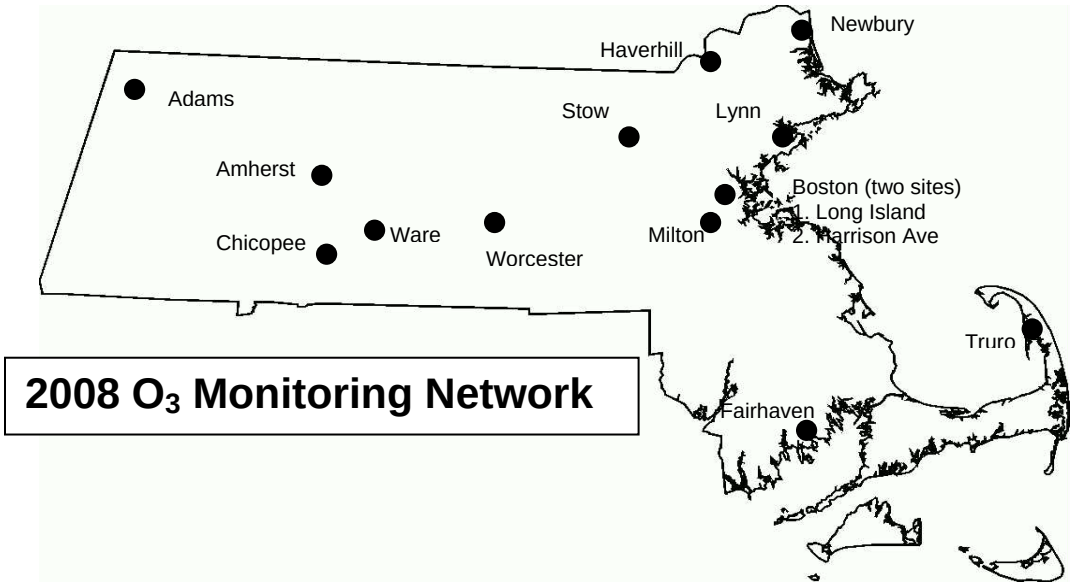
Ozone Summary

2008 Ozone Data Summary

A summary of the data collected during the 2008 ozone season (April 1 – Sept. 30) is shown below. There were 14 ozone sites in operation during 2008 in the state-operated monitoring network (an additional site in Uxbridge will operate during 2009). All of the sites achieved the requirement of 75% or greater data capture for the year.

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	79	.119	.099	0	.100	.092	.075	.072	2
25-025-0041	Boston	Suffolk	LONG ISLAND	97	.089	.088	0	.083	.073	.072	.072	1
25-025-0042	Boston	Suffolk	HARRISON AVE	99	.081	.079	0	.066	.065	.062	.062	0
25-013-0008	Chicopee	Hampden	ANDERSON RD AFB	99	.110	.110	0	.086	.085	.080	.078	6
25-005-1002	Fairhaven	Bristol	LEROY WOOD SCHOOL	98	.095	.095	0	.088	.085	.082	.080	4
25-009-5005	Haverhill	Essex	CONSENTINO SCHOOL	99	.119	.097	0	.093	.084	.083	.073	3
25-009-2006	Lynn	Essex	390 PARKLAND	99	.104	.096	0	.086	.081	.079	.078	5
25-021-3003	Milton	Norfolk	BLUE HILL OBSERVATORY	98	.089	.089	0	.082	.078	.077	.076	4
25-009-4004	Newbury	Essex	SUNSET BLVD	98	.108	.098	0	.085	.080	.077	.075	3
25-015-0103	North Amherst	Hampshire	N PLEASANT ST	98	.103	.091	0	.078	.075	.074	.073	1
25-017-1102	Stow	Middlesex	US MILITARY RES	98	.099	.094	0	.090	.076	.075	.074	2
25-001-0002	Truro	Barnstable	FOX BOTTOM AREA	98	.128	.092	1	.106	.086	.082	.075	3
25-015-4002	Ware	Hampshire	QUABBIN SUMMIT	98	.113	.105	0	.095	.082	.079	.079	7
25-027-0015	Worcester	Worcester	WORC AIRPORT	98	.114	.113	0	.104	.089	.084	.081	8

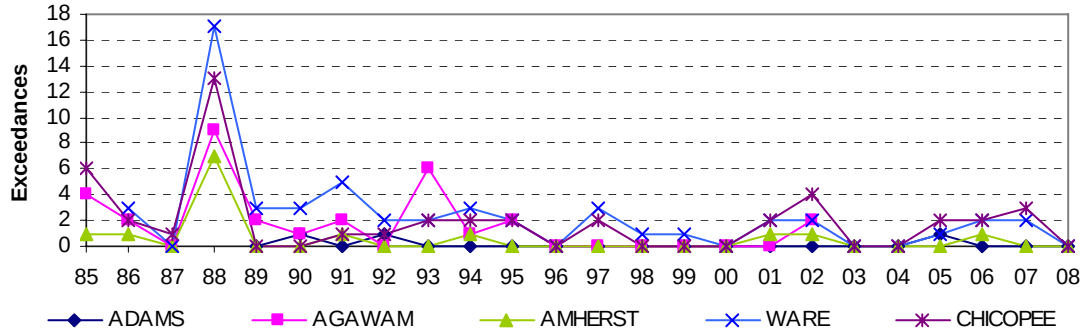
ABBREVIATIONS AND SYMBOLS USED IN TABLE
SITE ID = AIRS SITE IDENTIFICATION NUMBER **% OBS** = PERCENTAGE OF VALID DAYS MONITORED DURING O3 SEASON **1ST, 2ND MAX 1-HR** = MAXIMUM 1-HR VALUE FOR THE 1ST & 2ND HIGHEST DAY **DAY MAX ≥ 0.125** = NUMBER OF MEASURED DAILY 1-HOUR MAXIMUM VALUES GREATER THAN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

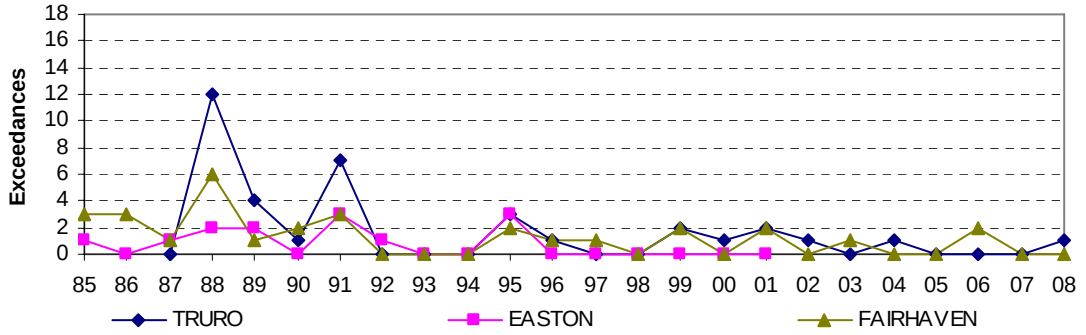


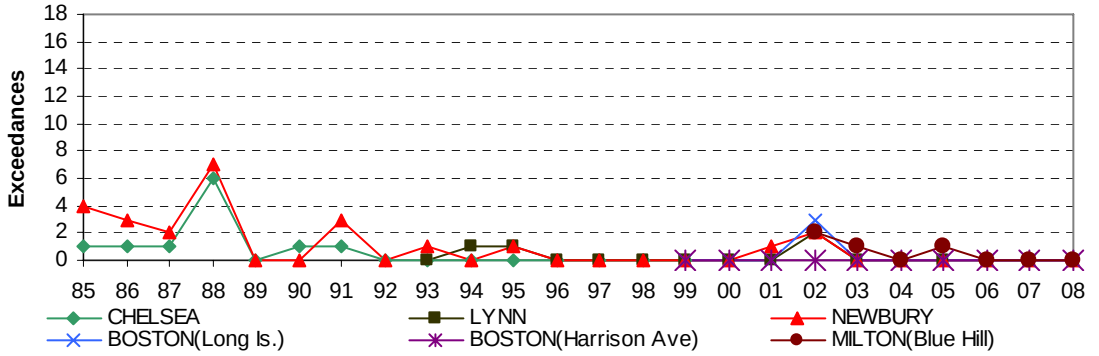
1-hour Ozone Exceedance Trends

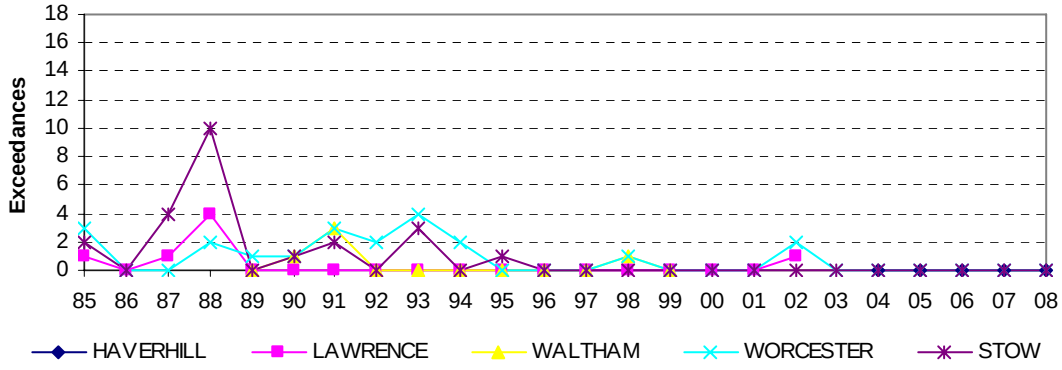
Shown below are ozone trends using exceedances of the former 1-hour standard for each site.

Figure 3
1-hour Ozone Exceedance Trends 1985 – 2008
Standard = 0.12 ppm (revoked June 15, 2005)





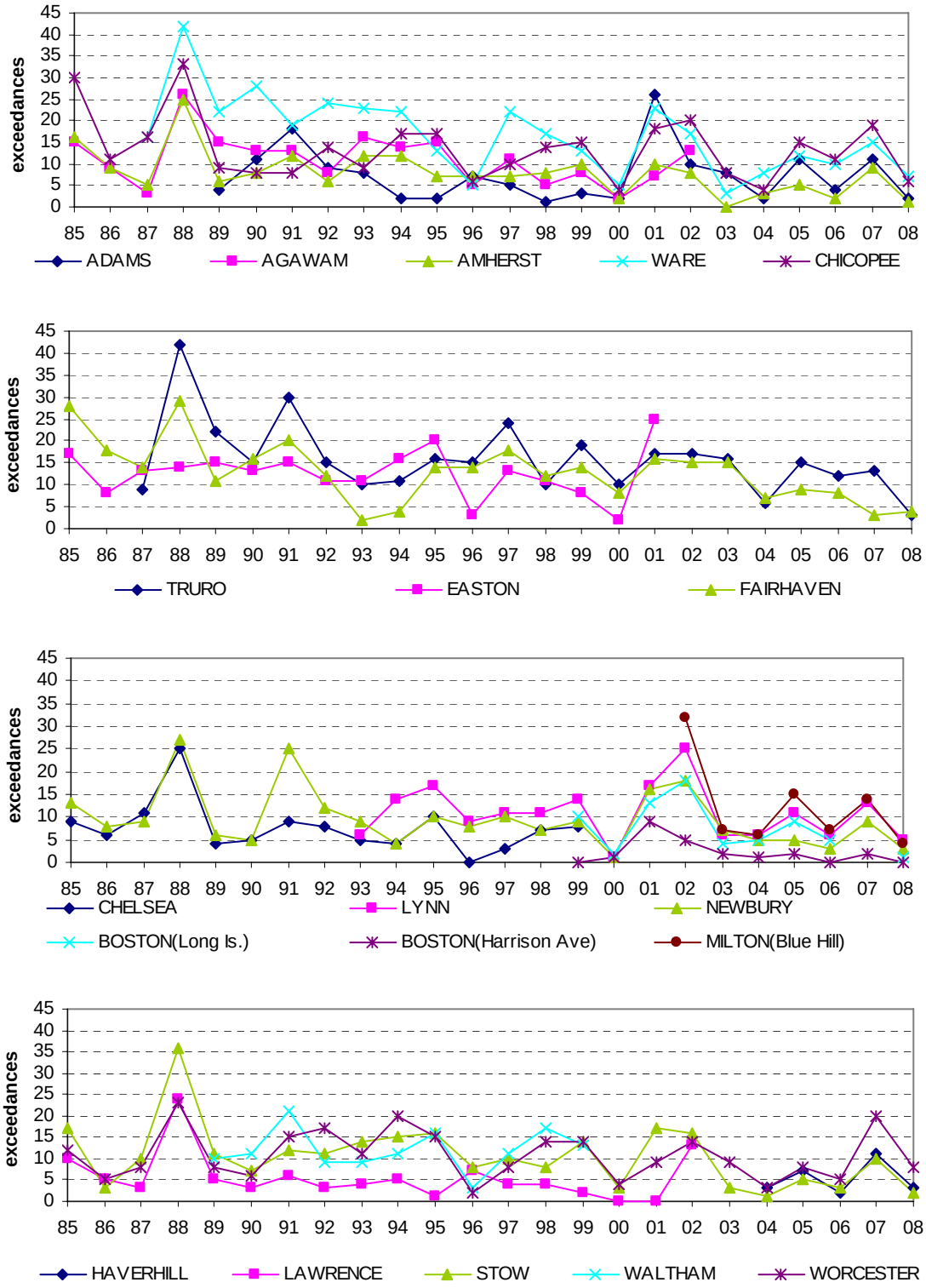




8-hour Ozone Exceedance Trends

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

Figure 4
8-hour Ozone Exceedance Trends 1985 – 2008
Standard = 0.075 ppm



Sulfur Dioxide (SO_2) Summary

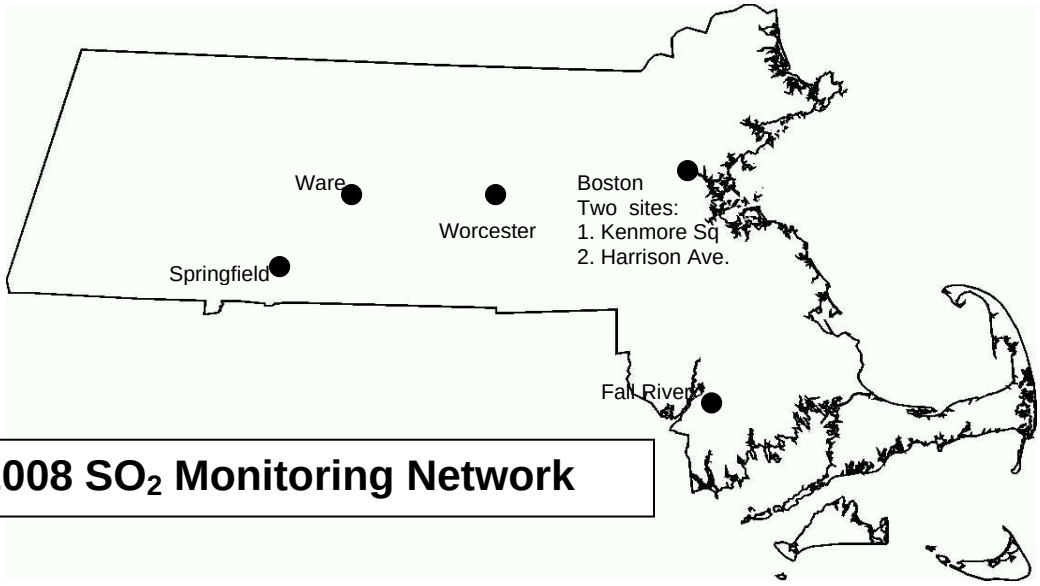
2008 SO_2 Data Summary

A summary of the 2008 SO_2 data is shown below. There were six SO_2 sites in operation during 2008 in the state-operated monitoring network. All of the sites achieved the requirement of 75% or greater data capture for the year.

SITE ID	CITY	COUNTY	ADDRESS	% OBS	1ST MAX 24-HR	2ND MAX 24-HR	#OBS >0.14	1ST MAX 3-HR	2ND MAX 3-HR	#OBS >0.5	1ST MAX 1-HR	2ND MAX 1-HR	ARITH MEAN
25-025-0002	Boston	Suffolk	KENMORE SQ	97%	.018	.014	0	.024	.024	0	.029	.025	.004
25-025-0042	Boston	Suffolk	HARRISON AV	97%	.013	.012	0	.021	.019	0	.025	.024	.002
25-005-1004	Fall River	Bristol	659 GLOBE ST	93%	.016	.009	0	.058	.032	0	.075	.071	.003
25-013-0016	Springfield	Hampden	LIBERTY P-LOT	98%	.016	.011	0	.033	.022	0	.038	.036	.003
25-015-4002	Ware	Hampshire	QUABBIN SUMMIT	96%	.012	.011	0	.016	.015	0	.020	.019	.002
25-027-0023	Worcester	Worcester	SUMMER ST	96%	.014	.009	0	.018	.017	0	.019	.018	.003

Standards: Annual Mean = 0.03 ppm 24-hour = 0.14 ppm 3-hour = 0.50 ppm

ABBREVIATIONS AND SYMBOLS USED IN TABLE
SITE ID = AIRS SITE IDENTIFICATION NUMBER **% OBS** = DATA CAPTURE PERCENTAGE **1ST, 2ND MAX 24-HR, MAX 3-HR, MAX 1-HR** = FIRST AND SECOND HIGHEST VALUE FOR TIME PERIOD INDICATED **# OBS > 0.14** = NUMBER OF OBSERVATIONS ABOVE THE 24-HOUR STANDARD OF 0.14 PPM **# OBS > 0.50** = NUMBER OF OBSERVATIONS ABOVE THE 3-HOUR STANDARD OF 0.50 PPM **ARITH MEAN** = ANNUAL ARITHMETIC MEAN (STANDARD = 0.03 PPM)

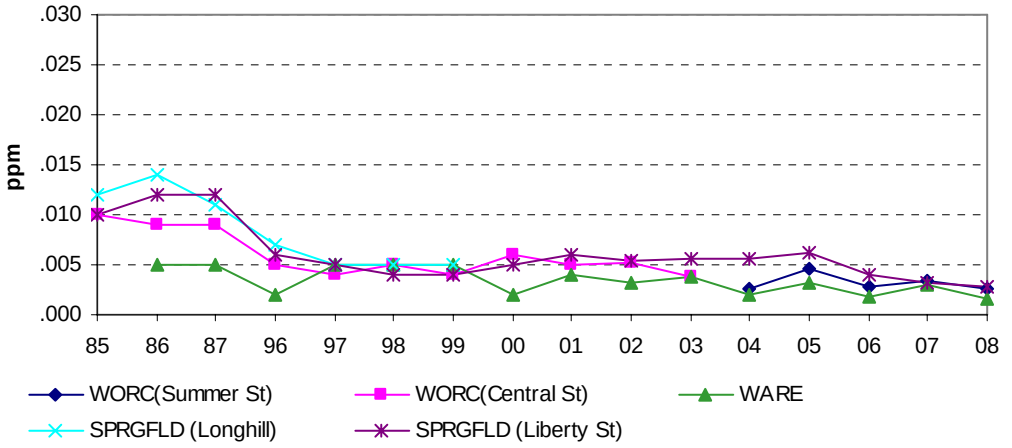


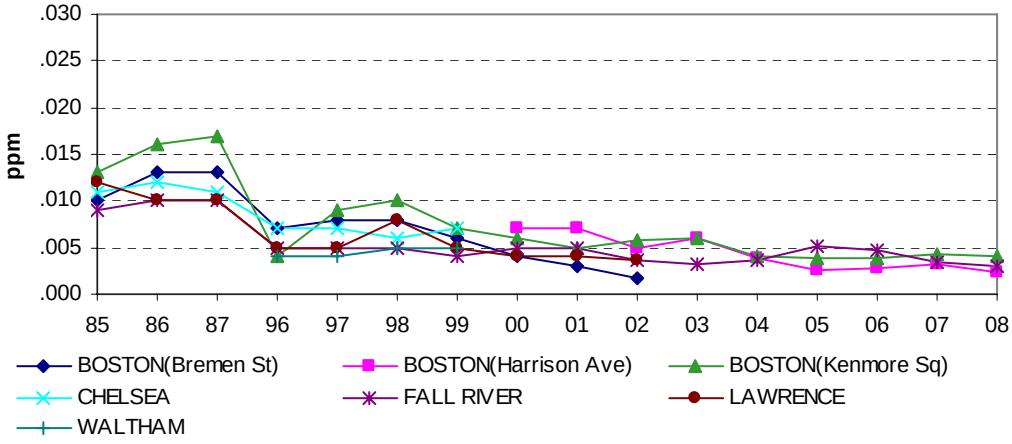
2008 SO_2 Monitoring Network

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 is well below the standard for SO_2.

Figure 5
SO_2 Trends 1985 –2008
Annual Arithmetic Means
Standard = 0.03 ppm





Nitrogen Dioxide (NO_2) Summary

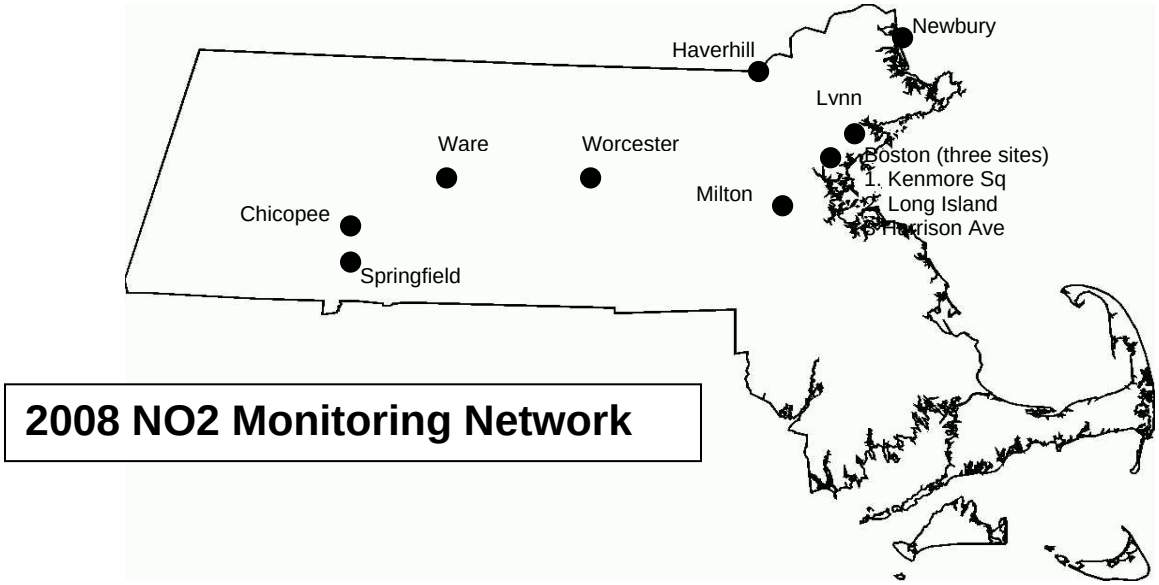
2008 NO_2 Data Summary

A summary of the 2008 NO_2 data is shown below. There were 11 NO_2 sites in operation during 2008 in the state-operated monitoring network. All of the sites met the requirement of 75% data capture for the year.

SITE ID	CITY	COUNTY	ADDRESS	% OBS	1ST MAX 1-HR	2ND MAX 1-HR	ARITH MEAN
25-025-0002	Boston	Suffolk	KENMORE SQ	95%	.071	.071	.022
25-025-0041	Boston	Suffolk	LONG ISLAND	95%	.054	.050	.007
25-025-0042	Boston	Suffolk	HARRISON AVE	96%	.063	.062	.020
25-013-0008	Chicopee	Hampden	ANDERSON RD AFB	94%	.048	.048	.008
25-009-5005	Haverhill	Essex	CONSENTINO SCHOOL	96%	.049	.048	.008
25-009-2006	Lynn	Essex	390 PARKLAND	92%	.061	.061	.008
25-021-3003	Milton	Norfolk	BLUE HILL OBS	95%	.032	.031	.005
25-009-4004	Newbury	Essex	SUNSET BLVD	94%	.024	.023	.003
25-013-0016	Springfield	Hampden	LIBERTY P-LOT	96%	.061	.060	.017
25-015-4002	Ware	Hampshire	QUABBIN SUMMIT	91%	.040	.037	.005
25-027-0023	Worcester	Worcester	SUMMER ST	92%	.095	.074	.015

Standard: Annual Arithmetic Mean = 0.053 ppm

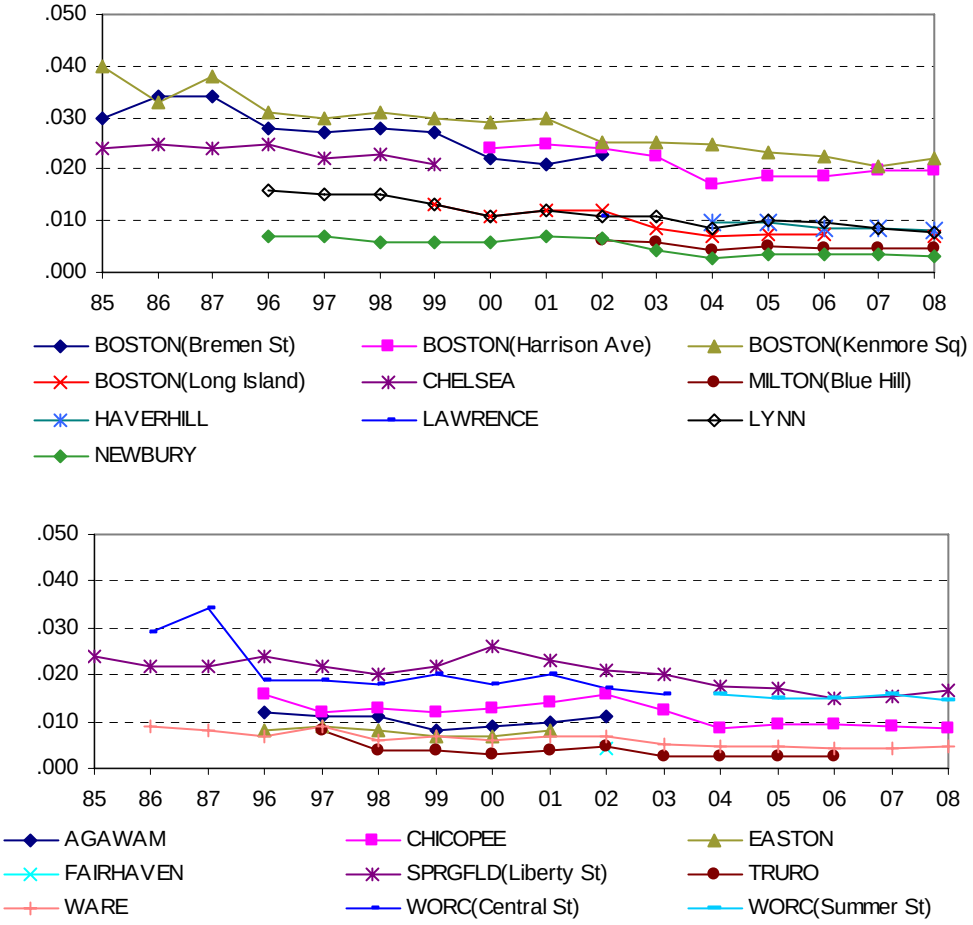
ABBREVIATIONS AND SYMBOLS USED IN TABLE
SITE ID = AIRS SITE IDENTIFICATION NUMBER **% OBS** = DATA CAPTURE PERCENTAGE **1ST, 2ND MAX 1-HR** = FIRST AND SECOND HIGHEST VALUE FOR TIME PERIOD INDICATED **ARITH MEAN** = ANNUAL ARITHMETIC MEAN



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 – 2008
Annual Arithmetic Means
Standard = 0.05 ppm



Carbon Monoxide (CO) Summary

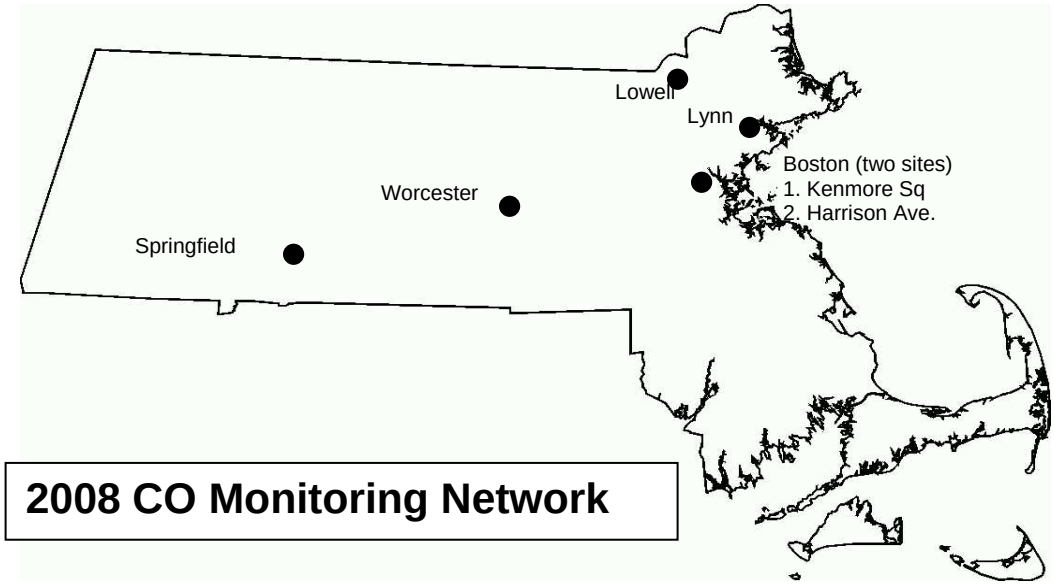
2008 CO Data Summary

A summary of the 2008 CO data is shown below. There were six CO sites in operation during 2008 in the state-operated monitoring network (a trace-level CO monitor was added to the existing Lynn monitoring station in 2008). All of the sites achieved the requirement of 75% or greater data capture for the year.

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%	1.7	1.6	0.0	1.3	1.1	0
25-025-0042	Boston	Suffolk	HARRISON AV	94%	1.5	1.5	0.0	1.1	1.0	0
25-017-0007	Lowell	Middlesex	MERRIMACK ST	93%	3.7	3.2	0.0	2.6	2.1	0
25-009-2006	Lynn	Essex	390 PARKLAND	82%	0.9	0.7	0.0	0.5	0.4	0
25-013-0016	Springfield	Hampden	LIBERTY P-LOT	91%	3.4	3.4	0.0	3.0	2.5	0
25-027-0023	Worcester	Worcester	SUMMER ST	93%	2.8	2.7	0.0	1.7	1.3	0

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

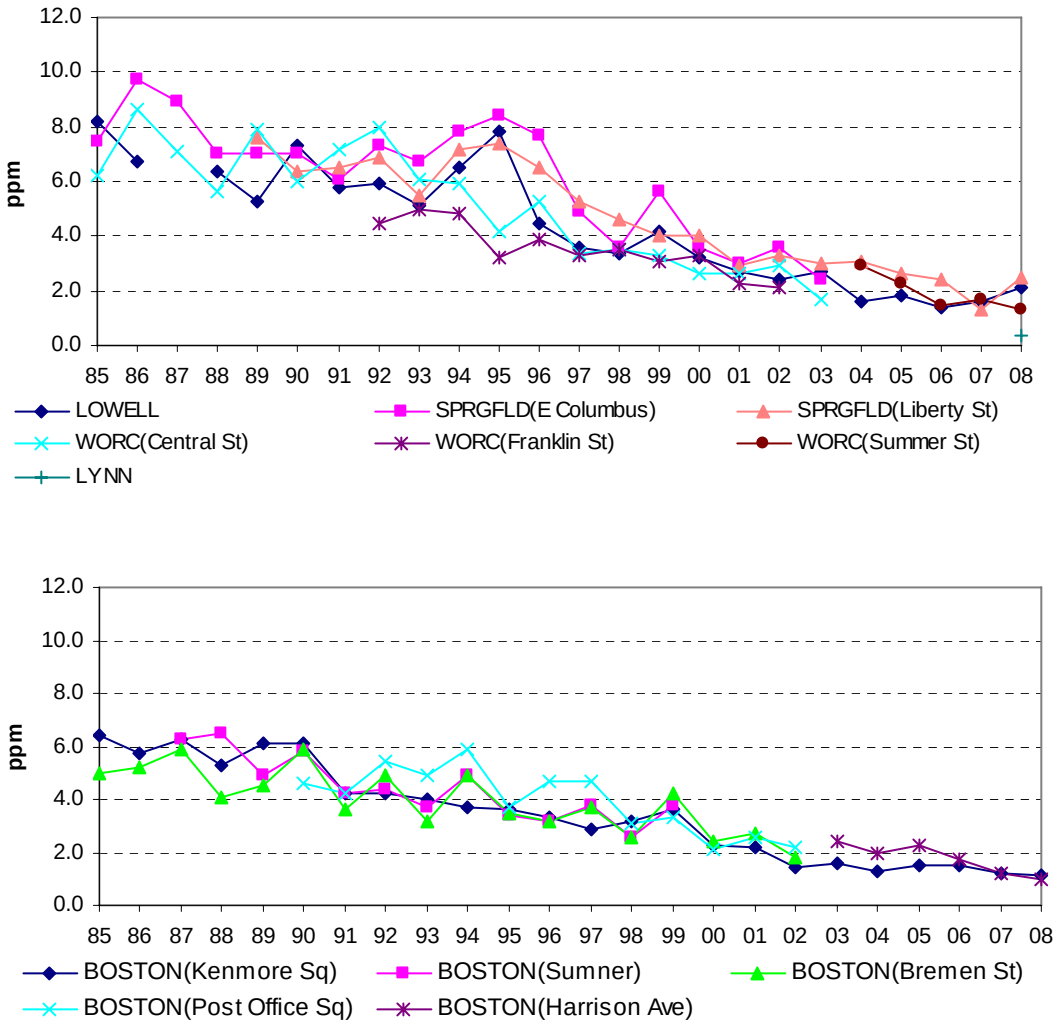
ABBREVIATIONS AND SYMBOLS USED IN TABLE
SITE ID = AIRS SITE IDENTIFICATION NUMBER **% OBS** = DATA CAPTURE PERCENTAGE **1ST, 2ND MAX 1-HR** = FIRST AND SECOND HIGHEST VALUE FOR TIME PERIOD INDICATED **OBS > 35** = NUMBER OF 1-HR AVG. GREATER THAN 35 PPM (1-HR STANDARD) **1ST, 2ND MAX 8-HR** = FIRST AND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



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 both the 1-hour and 8-hour standards.

Figure 7
CO Trends 1985-2008
2nd Maximum 8-hour Values
Standard = 9 ppm



Particulate Matter 10 Microns (PM_{10}) Summary

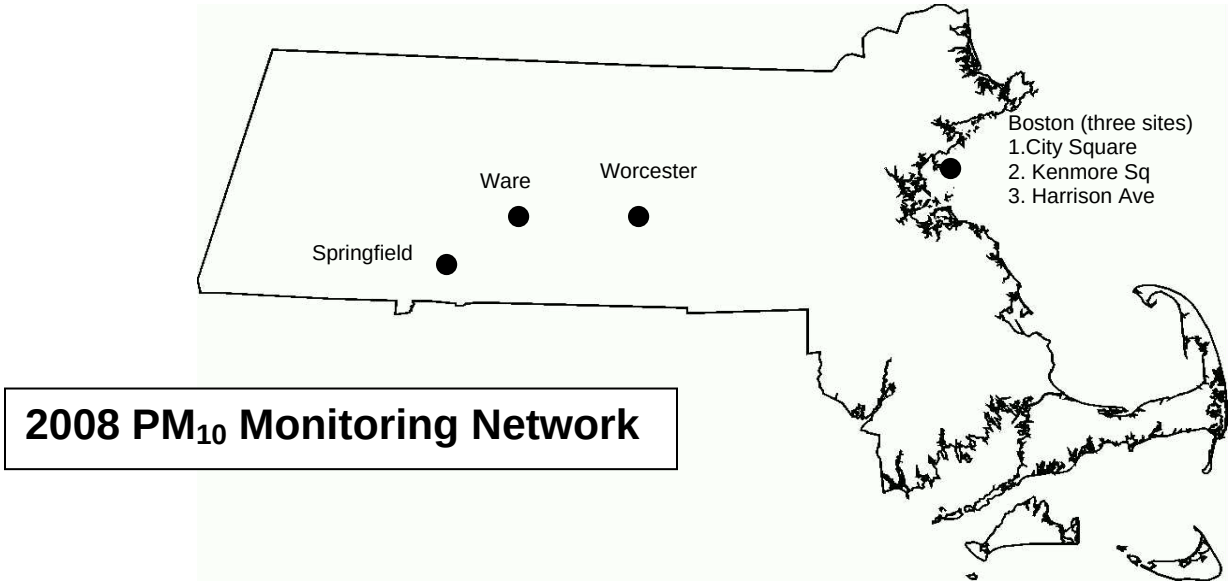
2008 PM_{10} Data Summary

A summary of the 2008 PM_{10} data is shown below. There were six PM_{10} sites in operation during 2008 in the state-operated monitoring network. All of the sites achieved data capture requirements for the year.

SITE ID	TYPE	CITY	COUNTY	ADDRESS	% OBS	1ST MAX	2ND MAX	3RD MAX	4TH MAX	DAY MAX >150	EST DAYS >150	WTD ARITH MEAN
25-025-0002	Lo-Vol	Boston	Suffolk	KENMORE SQ	95	53	39	39	38	0	0	23.0
25-025-0027	Lo-Vol	Boston	Suffolk	ONE CITY SQ	93	44	33	30	29	0	0	18.5
25-025-0042	Hi-Vol	Boston	Suffolk	HARRISON AVE	95	28	27	26	25	0	0	14.0
25-025-0042	Hi-Vol Co-loc	Boston	Suffolk	HARRISON AVE	90	28	27	24	24	0	0	14.1
25-025-0042	Lo-Vol	Boston	Suffolk	HARRISON AVE	98	34	34	34	28	0	0	16.7
25-025-0042	Lo-Vol Co-loc	Boston	Suffolk	HARRISON AVE	98	35	35	34	27	0	0	16.5
25-013-2009	Lo-Vol	Springfield	Hampden	1860 MAIN ST	98	57	35	34	28	0	0	16.6
25-015-4002	Lo-Vol	Ware	Hampshire	QUABBIN SUMMIT	98	33	25	19	18	0	0	9.8
25-027-0023	Lo-Vol	Worcester	Worcester	SUMMER ST	97	56	42	34	34	0	0	19.4

PM_{10} Hi Vol Standards: 24-hour = 150 μg/m³

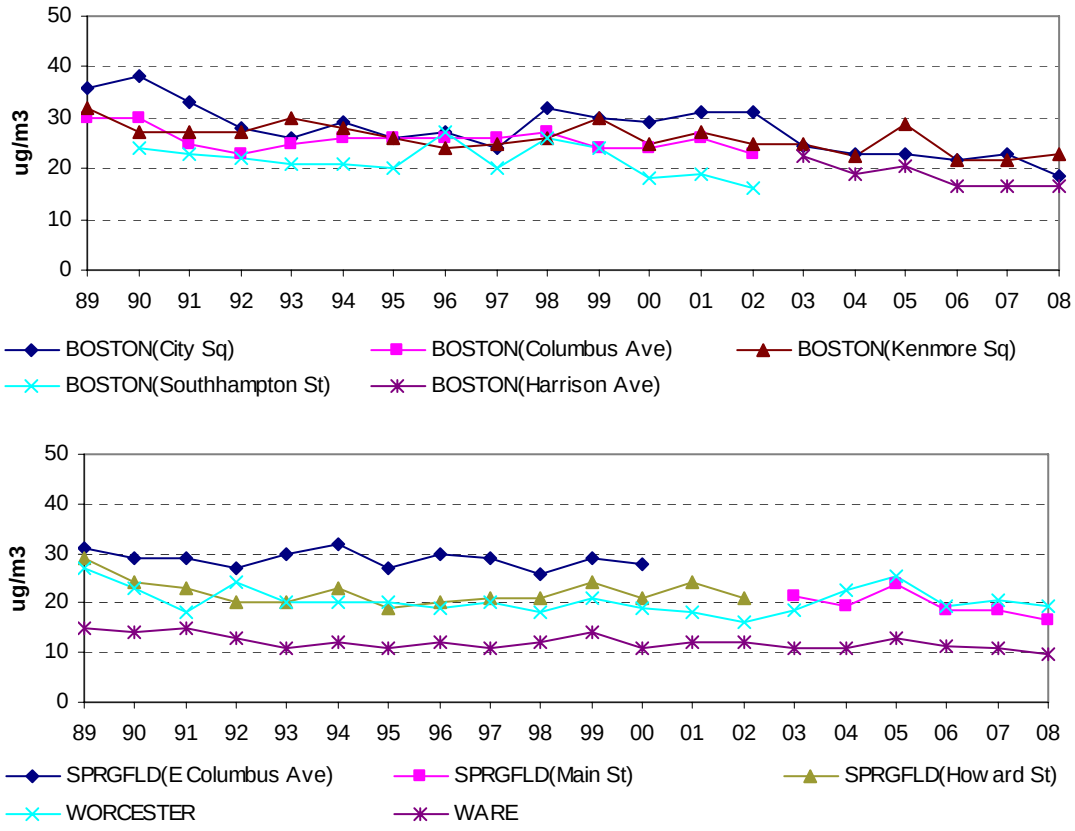
ABBREVIATIONS AND SYMBOLS USED IN TABLE
SITE ID = AIRS SITE IDENTIFICATION NUMBER **% OBS** = DATA CAPTURE PERCENTAGE **1ST, 2ND, 3RD, 4TH 24-HR MAX** = 1ST, 2ND, 3RD, AND 4TH HIGHEST 24-HOUR VALUES FOR THE YEAR **DAY MAX > 150** = DAILY MAXIMUM VALUE GREATER THAN STANDARD OF 150 μg/m³ **WTD ARITH MEAN** = WEIGHTED ANNUAL ARITHMETIC MEAN



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 a yearly variability at most sites, with the overall trend being downward.

Figure 8
PM_{10} Trends 1989-2008
Annual Arithmetic Mean



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

2008 $PM_{2.5}$ Operations

MassDEP operates 15 Federal Reference Method (FRM) filter-based samplers and 10 Beta Attenuation Monitors (BAMs) for measuring $PM_{2.5}$ concentrations at locations throughout the state. In Massachusetts, FRM samples are the only measure of $PM_{2.5}$ currently being compared to the NAAQS. The FRM sampler works by drawing air through a small Teflon filter for 24 hours (midnight to midnight) on the designated sample day, after which the filter is removed from the sampler and transported to the MassDEP Laboratory in Lawrence, Massachusetts where it is processed. The downside of filter-based monitors is that there is a time interval between when the sample is collected and the data is available.

USEPA has approved BAMs monitoring technology as a Federal Equivalent Method (FEM). BAMs samplers make it possible to collect and report $PM_{2.5}$ concentrations on an hourly basis without having to transport and weigh filters in the laboratory. Because of the informational value of the near real-time $PM_{2.5}$ data, MassDEP upgraded three monitoring sites BAM samplers in 2008. These sites were Harrison Avenue and North Street in Boston, and Liberty Street P-Lot in Springfield. In 2009, three more sites in the Boston and Springfield areas are scheduled to be upgraded.

The public can view concentration gradient maps using near real-time $PM_{2.5}$ data from the ten BAMs monitoring stations on USEPA's AirNOW website (www.epa.gov/airnow/). Different colors on the map indicate the $PM_{2.5}$ concentrations of the samples that were collected for each hour of the day.

A summary of the 2008 $PM_{2.5}$ data is shown below.

2008 $PM_{2.5}$ FRM Data Summary

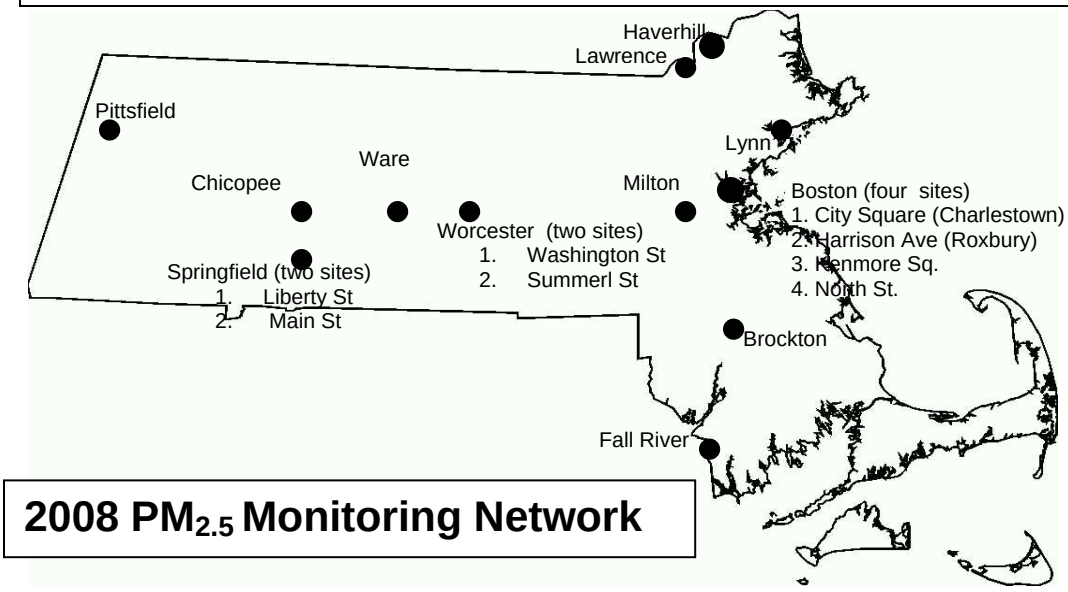
SITE ID	TYPE	CITY	COUNTY	ADDRESS	% OBS	1ST MAX	2ND MAX	3RD MAX	4TH MAX	98TH PERCENTILE VALUE	WTD ARITH MEAN
25-025-0002	FRM	Boston	Suffolk	KENMORE SQ	95%	28.4	26.3	26.0	25.5	26.0	11.14
25-025-0027	FRM	Boston	Suffolk	ONE CITY SQ	97%	30.5	24.1	23.2	22.1	23.2	10.69
25-025-0042	FRM	Boston	Suffolk	HARRISON AV	98%	28.1	28.0	25.7	23.8	25.7	9.82
25-025-0043	FRM	Boston	Suffolk	174 NORTH ST	100%	34.1	32.1	30.5	29.9	26.2	11.22
25-025-0043	FRM Co-loc	Boston	Suffolk	174 NORTH ST	96%	31.7	31.2	29.9	29.4	25.4	10.99
25-023-0004	FRM	Brockton	Plymouth	COMMERCIAL ST	100%	30.3	25.4	23.9	21.7	23.9	9.55
25-023-0004	FRM Co-loc	Brockton	Plymouth	COMMERCIAL ST	86%	30.3	25.4	24.1	21.8	24.1	9.61*
25-013-0008	FRM	Chicopee	Hampden	ANDERSON RD AFB	98%	38.4	26.6	26.2	25.3	26.2	9.2
25-013-0008	FRM Co-loc	Chicopee	Hampden	ANDERSON RD AFB	93%	38.0	26.9	26.0	25.5	26.0	9.22
25-005-1004	FRM	Fall River	Bristol	659 GLOBE ST	100%	34.3	23.7	23.7	21.4	23.7	9.04
25-009-5005	FRM	Haverhill	Essex	CONSENTINO SCHOOL	97%	28.2	27.8	24.1	21.3	24.1	8.59
25-009-6001	FRM	Lawrence	Essex	SHATTUCK ST	100%	29.8	28.3	25.2	20.6	25.2	9.04
25-009-2006	FRM	Lynn	Essex	390 PARKLAND	95%	28.8	27.2	24.8	21.8	24.8	8.67
25-003-5001	FRM	Pittsfield	Berkshire	78 CENTER ST	100%	40.5	27.9	26.6	25.6	26.6	9.94
25-013-0016	FRM	Springfield	Hampden	LIBERTY P-LOT	99%	50.8	29.1	28.4	27.5	28.4	10.78
25-013-2009	FRM	Springfield	Hampden	1860 MAIN ST	100%	46.6	28.1	27.0	27.0	27.0	10.81
25-027-0016	FRM	Worcester	Worcester	WASHINGTON ST	98%	31.8	27.7	27.7	23.3	27.7	9.79
25-027-0023	FRM	Worcester	Worcester	SUMMER ST	97%	27.7	27.5	23.3	22.5	23.3	10.29

* indicates that the mean does not satisfy summary criteria for one quarter

2008 $PM_{2.5}$ BAM Data Summary

SITE ID	CITY	COUNTY	ADDRESS	% OBS	ARITH MEAN
25-025-0042	Boston	Suffolk	HARRISON AVE	98%	12.4
25-025-0043	Boston	Suffolk	174 NORTH ST	90%	12.4
25-005-1004	Fall River	Bristol	659 GLOBE ST	100%	8.5
25-009-5005	Haverhill	Essex	CONSENTINO SCHOOL	98%	8.0
25-009-2006	Lynn	Essex	390 PARKLAND	95%	9.9
25-021-3003	Milton	Norfolk	BLUE HILL OBS	99%	8.7
25-003-0006	Pittsfield	Berkshire	BERKSHIRE COMMONS	99%	9.2
25-013-0016	Springfield	Hampden	LIBERTY P-LOT	94%	10.0
25-015-4002	Ware	Hampshire	QUABBIN SUMMIT	98%	11.4
25-027-0023	Worcester	Worcester	SUMMER ST	99%	7.9

ABBREVIATIONS AND SYMBOLS USED IN TABLE
SITE ID = AIRS SITE IDENTIFICATION **TYPE** = TYPE OF INSTRUMENT **FRM** = FEDERAL REFERENCE METHOD; **FRM COLOC** = FED. REF. METH. COLOCATED **BAM** = BETA ATENUATION MONITOR **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 **WTD ARITH MEAN** = WEIGHTED ANNUAL ARITHMETIC MEAN (STANDARD = 15.0 µg/m³)



2008 $PM_{2.5}$ Monitoring Network

Speciation

MassDEP has been collecting $PM_{2.5}$ samples for speciation at the air monitoring station in Roxbury since 2000 and in Chicopee since 2001. Speciation is the analysis of particulate matter collected on teflon, nylon and quartz filters simultaneously to determine the chemical composition of the particulate matter collected. The results are used to determine the levels of specific toxic air pollutants present in the atmosphere, and to provide clues about the nature and identity of air pollution sources that impact the monitoring station area. During each sampling event, the three separate filters are collected and shipped to an out-of-state national contract laboratory for analysis. Each different filter medium is analyzed for a different category of pollutant. These include elements (e.g., metals), sulfates, nitrates, and carbon (total and organic).

IMPROVE (Interagency Monitoring of Protected Visual Environments)

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

Lead (Pb) Summary

2008 Pb Data Summary

MassDEP operates a total suspended particulates (TSP) sampler at one site to measure airborne lead levels (MassDEP will begin operating two new background monitors in Worcester and Springfield in 2011 now that USEPA has lowered the lead NAAQS to 0.15 μg/m^3). The concentrations monitored are low. Since 1975, the use of unleaded gasoline has greatly diminished lead emissions from automobiles, which in the past were the primary source of airborne lead in the atmosphere in Massachusetts. A summary of the 2008 Pb data is shown below.

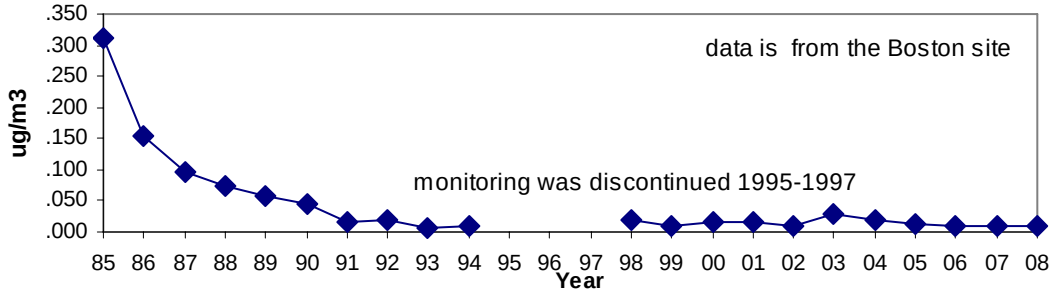
SITE ID	CITY	COUNTY	ADDRESS	% OBS	QTR1 ARITH MEAN	QTR2 ARITH MEAN	QTR3 ARITH MEAN	QTR4 ARITH MEAN	# MEANS > 1.5	1ST MAX	2ND MAX
25-025-0002	Boston	Suffolk	KENMORE SQUARE	100	.011	.015	.008	.010	0	.026	.025

Standard: 1.5 μg/m^3 (Calendar Quarter Arithmetic Mean)

ABBREVIATIONS AND SYMBOLS USED IN TABLE
SITE ID = AIRS SITE IDENTIFICATION # **OBS** = # OBSERVATIONS **QTR1,QTR2, QTR3, QTR4 ARITH MEAN** = THE MEANS FOR THE 1ST, 2ND, 3RD AND 4TH CALENDAR QUARTERS **# MEANS > 1.5** = THE NUMBER OF CALENDAR QUARTER MEANS GREATER THAN THE STANDARD (1.5 μg/m^3) **1ST, 2ND MAX** = THE 1ST AND 2ND MAXIMUM 24 HOUR VALUES

Figure 9

Pb Concentrations 1985-2008
Annual Arithmetic Mean
Standard = 1.5ug/m3



Industrial Network Summary

Introduction

The industrial ambient air quality network is comprised of monitoring stations operated by facilities that have the potential to emit large amounts of pollutants. An example would be a fossil fuel-fired power plant that has the potential to emit large quantities of SO_2.

The monitoring stations in the industrial network are sited to measure the maximum values from the specific point source. In the event that the measured SO_2 value reaches certain trigger levels, the power plant switches to lower-sulfur content fuel.

The data from the industrial network is submitted to MassDEP's Air Assessment Branch. AAB submits the data to the USEPA AQS database after completing the quality assurance process.

Continuous Emission Monitoring System (CEMS)

In addition to the ambient monitoring network, in-stack Continuous Emission Monitoring System (CEMS) equipment is required at certain facilities by a MassDEP-issued permit or other state and federal regulations. For example, the federal Acid Rain Program requires CEMS enabling measurement of SO_2, NO_x and CO_2 emissions from the nation's largest power generating facilities. The information on emissions collected by CEMS monitors can be found on USEPA's web site at www.epa.gov/airmarkets/arp/.

Sulfur Dioxide (SO_2) summary

There were four SO_2 sites in operation during 2008 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 2008 SO_2 data is shown below.

SITE ID	CITY	COUNTY	ADDRESS	% OBS	1ST MAX 24-HR	2ND MAX 24-HR	#OBS >0.14	1ST MAX 3-HR	2ND MAX 3-HR	#OBS >0.5	1ST MAX 1-HR	2ND MAX 1-HR	ARITH MEAN
25-025-0019	Boston	Suffolk	LONG ISLAND	96	0.014	0.01	0	0.018	0.018	0	0.028	0.02	0.0034
25-025-0020	Boston	Suffolk	DEWAR STREET	97	0.013	0.01	0	0.021	0.017	0	0.024	0.023	0.0046
25-025-0021	Boston	Suffolk	340 BREMEN ST	96	0.017	0.013	0	0.023	0.021	0	0.027	0.024	0.0046
25-025-0040	Boston	Suffolk	531A EAST FIRST ST	94	0.016	0.014	0	0.044	0.03	0	0.046	0.045	0.0037

ABBREVIATIONS AND SYMBOLS USED IN TABLE
SITE ID = AIRS SITE IDENTIFICATION NUMBER **%OBS** = DATA CAPTURE PERCENTAGE **1ST, 2ND MAX 24-HR, MAX 3-HR, MAX 1-HR** = FIRST AND SECOND HIGHEST 24-HOUR, 3-HOUR, AND 1-HOUR VALUES FOR TIME PERIOD INDICATED # **OBS** > 0.14 = NUMBER OF OBSERVATIONS ABOVE THE 24-HOUR STANDARD OF 0.14 PPM # **OBS** > 0.5 = NUMBER OF OBSERVATIONS ABOVE THE 3-HOUR STANDARD OF 0.5 PPM **ARITH MEAN** = ARITHMETIC MEAN (STANDARD = 0.03 PPM)

Nitrogen Dioxide (NO_2) summary

There was one NO_2 site that operated during 2008 in the industrial network. The site was owned by Exelon Energy in Boston (East First St.) but was operated by ENSR/AECOM. The site met the requirement of 75% or greater data capture. There were no reported violations of the NO_2 air quality standard during the year.

A summary of the 2008 NO_2 data is shown below.

SITE ID	CITY	COUNTY	ADDRESS	% OBS	1ST MAX 1-HR	2ND MAX 1-HR	ARITH MEAN
25-025-0040	Boston	Suffolk	531A EAST FIRST ST	97	0.166	0.163	0.0163

PRIMARY STANDARD: ANNUAL ARITHMETIC MEAN = 0.053 PPM

ABBREVIATIONS AND SYMBOLS USED IN TABLE
SITE ID = AIRS SITE IDENTIFICATION NUMBER %**OBS** = DATA CAPTURE PERCENTAGE **MAX 1-HR 1^{ST}, 2^{ND}** = FIRST AND SECOND HIGHEST VALUE FOR TIME PERIOD INDICATED **ARIT MEAN** = ARITHMETIC MEAN (STANDARD = 0.053 PPM)

Total Suspended Particulates (TSP) summary

There were four TSP sites that operated during 2008 in the industrial network. The sites were owned by Exelon Energy in Boston but were operated by ENSR/AECOM. 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 2008 TSP data is shown below.

SITE ID	TYPE	CITY	COUNTY	ADDRESS	% OBS	1ST MAX	2ND MAX	3RD MAX	4TH MAX	ARITH MEAN	GEO. MEAN	GEO. STD
25-025-0019	NC	Boston	Suffolk	LONG ISLAND	92	44	37	36	36	20.9	19.9	1.4
25-025-0020	NC	Boston	Suffolk	DEWAR STREET	98	95	79	77	71	42.6	39.8	1.5
25-025-0021	NC	Boston	Suffolk	340 BREMEN STREET	100	69	68	66	64	38.3	36	1.4
25-025-0040	NC	Boston	Suffolk	531A EAST FIRST ST	100	66	55	52	48	31.3	29.7	1.4
25-025-0040	NC Co-Loc	Boston	Suffolk	531A EAST FIRST ST	88	57	57	54	49	32.7	31.1	1.4

ABBREVIATIONS AND SYMBOLS USED IN TABLE
SITE ID = AIRS SITE IDENTIFICATION NUMBER **TYPE =** TYPE OF INSTRUMENT **– NC** = NON CONTINUOUS, **NC COLOC** – NON CONTINUOUS COLOCATED**. % OBS** = DATA CAPTURE PERCENTAGE **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 **GEO MEAN** = GEOMETRIC MEAN **GEO STD** = GEOMETRIC STANDARD DEVIATION

Sulfate (SO_4) summary

There were four SO_4 sites that operated during 2008 in the industrial network. The sites were owned by Exelon Energy in Boston but were operated by ENSR/AECOM. 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 2008 SO_4 data is shown below.

					% OBS	1ST MAX VALUE	2ND MAX VALUE	3RD MAX VALUE	4TH MAX VALUE	ARITH MEAN
25-025-0019	NC	Boston	Suffolk	LONG ISLAND	92	9.7	8.3	8.2	7.6	4.45
25-025-0020	NC	Boston	Suffolk	DEWAR STREET	98	12.9	10.3	9.7	9.4	5.83
25-025-0021	NC	Boston	Suffolk	340 BREMEN ST	100	12.2	9.5	9	8.9	6.12
25-025-0040	NC	Boston	Suffolk	531A EAST FIRST ST	100	12.5	9.7	9.1	9	5.77
25-025-0040	NC Co-Loc	Boston	Suffolk	531A EAST FIRST ST	88	12.5	10.5	9.1	8.8	5.85

ABBREVIATIONS AND SYMBOLS USED IN TABLE
SITE ID = AIRS SITE IDENTIFICATION NUMBER **TYPE** = TYPE OF INSTRUMENT **– NC =** NON CONTINUOUS, **NC COLOC =** NON CONTINUOUS COLOCATED **% OBS** = DATA CAPTURE PERCENTAGE **1^{ST}, 2^{ND}, 3^{RD}, 4^{TH} MAX VALUE** = 1^{ST}, 2^{ND}, 3^{RD} AND 4^{TH} HIGHEST 24-HOUR VALUES FOR THE YEAR **ARITH MEAN** = ARITHMETIC MEAN

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 USEPA 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 USEPA.

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

Section IV
PAMS/Air Toxics Monitoring

PAMS Monitoring

Introduction

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 NOx. 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, USEPA has required Massachusetts to conduct 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. The PAMS monitoring network was phased in during the 1990's. Competition for attention and resources from newer monitoring initiatives (including $PM_{2.5}$) has halted the expansion of the program and led to a consolidation of the network over the last several years. Looking toward the future, a holistic strategy that includes PAMS measurements at fewer but more enhanced air monitoring stations is being developed by USEPA. New USEPA regulations will reduce the number of PAMS sites in each area from the originally envisioned five sites per network to two.

PAMS Monitoring Areas

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

* Provides data for both Boston and Providence networks.

Air Toxics Monitoring

Introduction

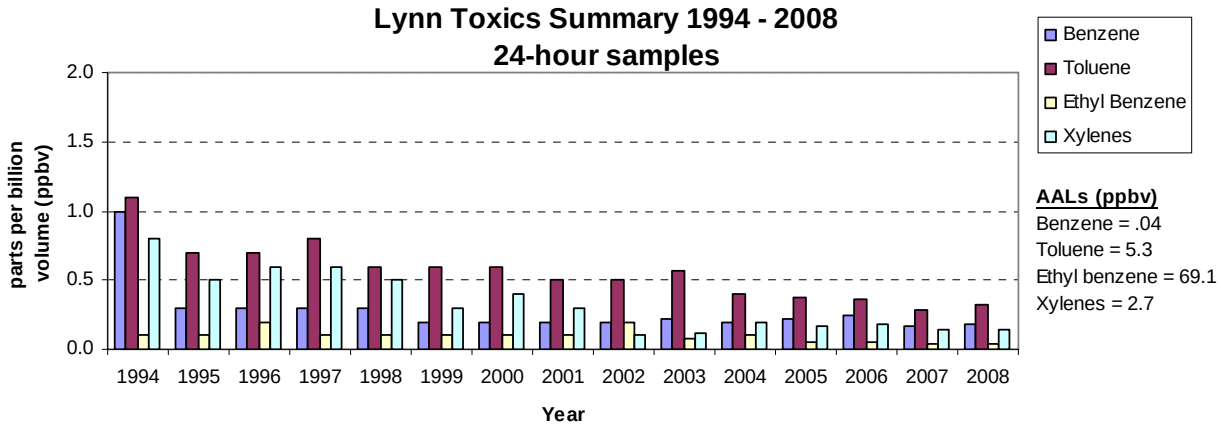
Toxic air pollutants are distinct from criteria air pollutants such as ozone and CO. The list includes pollutants known or suspected to cause cancer or other serious health effects, and includes volatile organic compounds (VOCs) and toxic metals (e.g., mercury).

MassDEP monitors VOCs as part of the PAMS monitoring program, many of which are classified as air toxics. From June through August, VOCs are monitored at six PAMS sites. In addition, in 1999 MassDEP added two monitors to measure specific health-relevant VOCs.

In 2003, a toxics monitoring project was started at the Harrison Avenue monitoring site in Roxbury and the site has been designated as a National Air Toxics Trends Station (NATTS) designed to collect and quantify a number of toxic air pollutants including VOCs, metals, aldehydes, black carbon and Polycyclic Aromatic Hydrocarbons (PAH). Data from this site is compared with data from a network of similar sites positioned across the country to identify transport, trends and site-specific characteristics of these pollutants. VOCs and black carbon have been collected at this site since 1999.

Figure 10 summarizes concentrations of 24-hour health-relevant PAMS target compounds for samples taken at the Lynn PAMS site from 1994 to 2008. 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 10 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. Safety factors are incorporated into the AALs to account for exposures from pathways other than air. AALs are reviewed and updated periodically to reflect current toxicity information. AAL concentrations were developed for a 70-year lifetime exposure, but are frequently used for comparison with annual averages.

Figure 10



Below is a table that summarizes results from the analysis of 24-hour samples for selected target VOCs from the two sites for 2008. The central city sampling location is Harrison Avenue and the area background site was Lynn.

Compound	BOSTON (Harrison Ave)		LYNN	
	Max Value ppb	Mean ppb	Max Value ppb	Mean ppb
1,3-butadiene	.157	.050	.092	.022
1,1,1-trichloroethane	.021	.013	.017	.012
trichloroethylene	.106	.012	.029	.008
tetrachloroethylene	.142	.038	.081	.025
Benzene	.728	.290	.498	.184
Toluene	2.348	.636	1.335	.317
Xylenes	1.530	.359	.563	.145
Ethylbenzene	.356	.097	.126	.043

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 2008 metals data.

BOSTON (Harrison Ave)			
Metal	# of Samples	Max Value $\mu g/m^3$	Mean $\mu g/m^3$
Chromium	43	.00296	.00171
Antimony	43	.00539	.00110
Arsenic	43	.00545	.00065
Beryllium	43	.00001	.00001
Cadmium	43	.00061	.00022
Cobalt	43	.00030	.00012
Lead	43	.02870	.00486
Manganese	43	.01010	.00370
Nickel	43	.00460	.00178
Mercury	43	.00046	.00010
Selenium	43	.00259	.00034

Appendix A

2008 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, TEMP
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
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
25-009-4004	NEWBURY	ESSEX	SUNSET BOULEVARD	8/1/1994	O3, NO, NO2, NOx, NOa, 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
25-017-4003	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, RH, BP, Solar Rad
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

2008 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

Appendix B
Air Quality Web Sites

Below is a listing of web sites that have air quality data or related information.

Web Address	Organization	Description
www.mass.gov/dep/	MassDEP	MassDEP Home Page. Links to MassDEP programs, regions and publications. Links to the Daily Ozone Forecast during ozone season (May 1 through September 30).
www.airbeat.org	MassDEP/EMPACT	Current AIR Quality in Roxbury – web page of MassDEP and EMPACT's Roxbury monitor that shows current levels of ozone and particulates in the air.
www.turi.org	TURI	Toxics Use Reduction Institute – a multi-disciplinary research, education, and technical support center located at the University of Massachusetts/Lowell. Promotes reduction in the use of toxic chemicals and the generation of toxic by-products in industry and commerce in Massachusetts. The web site includes a link to TURAData, which makes information available to the public about toxics use in their communities.
www.airnow.gov	USEPA	Ozone Mapping Project – color-coded animated maps using near real-time data that show how ozone is formed and transported downwind.
www.epa.gov/ne/aqi/index.html	USEPA	AQI New England Forecast and Real Time Ozone.
www.epa.gov/ne/airquality/index.html	USEPA	EPA Smog Alert System – sign up and receive e-mail alerts whenever Massachusetts predicts unhealthy ozone levels.
www.epa.gov/air/data/	USEPA	AIRSData - Access to air pollution data for the entire U.S.
www.epa.gov/bioindicators/	USEPA	Center for Environmental Information and Statistics – a single convenient source for information on environmental quality.
www.epa.gov/oar/oaqps/	USEPA	EPA's Office of Air and Radiation/Office of Air Quality Planning and Standards
www.epa.gov/region01/	USEPA	EPA Region 1 Home Page
www.epa.gov/ttn/	USEPA	EPA Technology Transfer Network - a collection of technical Web sites containing information about many areas of air pollution science, technology, regulation, measurement, and prevention.

Appendix B (continued)

Web Address	Organization	Description
www.epa.gov/enviro/	USEPA	EPA Envirofacts – data extracted from (4) major EPA databases: • PCS (Permit Compliance System) • RCRIS (Resource Conservation and Recovery Information System) • CERCLIS (Comprehensive Environmental Response, Compensation and Liability Information System) • TRIS (Toxic Release Inventory System)
www.epa.gov/index.html	USEPA	Enviroene Network - a free, public environmental information system. Provides users with pollution prevention/cleaner production solutions, compliance and enforcement assistance information, and innovative technology options.
www.epa.gov/docs/ozone/index.html	USEPA	EPA Ozone Depletion Home Page – learn about the importance of the "good" ozone in the stratospheric ozone layer.
www.epa.gov/acidrain	USEPA	The Acid Rain Program – overall goal is to achieve significant environmental and public health benefits through reductions in emissions of sulfur dioxide (SO_2) and nitrogen oxides (NO_X), the primary causes of acid rain. Emissions data from the nation's largest power generating facilities is available here.
www.wampweather.org	Wampanoag Tribe	Weather monitoring information is listed under Natural Resources.
Maine www.state.me.us/dep/air/ New Hampshire www.des.state.nh.us/ New York www.dec.ny.gov/ New Jersey www.state.nj.us/dep/airmon/ Rhode Island www.dem.ri.gov/programs/benviron/air/		Ozone predictions and some real-time ozone data from neighboring states (some states report other pollutants, as well).

Appendix B (continued)

Web Address	Organization	Description
www.epa.gov/ttn/atw/	USEPA	Unified Air Toxics Website - This site is a central clearinghouse and repository for air toxics implementation information
www.epa.gov/airtrends	USEPA	AIRTrends - information on USEPA's evaluation of status and trends in the nation's outdoor air quality.
www.cleanairworld.org/	NACAA	National Association of Clean Air Agencies – site has links to state and local air quality agencies.
www.nescaum.org/	NESCAUM	Northeast States for Coordinated Air Use Management – an interstate association of air quality control divisions from the six New England states, New York and New Jersey.
www.wunderground.com/	University of Michigan	The Weather Underground -. another good source of weather information in the US and world.
http://cirrus.sprl.umich.edu/wxnet/	University of Michigan	The WeatherNet – a good source of weather information. Also has a great list of weather links.
http://www.erh.noaa.gov	NWS	The National Weather Service's Boston office provides local forecasts and climate information.
www.thebostonchannel.com	WCVB	WCVB TV Pollen Count – provides the daily pollen and mold count.
www.hazecam.net/	NESCAUM (CAMNET)	Real-time Air Pollution Visibility Camera Network - live pictures and air quality conditions for urban and rural vistas across the Northeast U.S.
www.arb.ca.gov/homepage.htm	CARB	California Air Resources Board Home Page
www.awma.org/	AWMA	The Air & Waste Management Association - a nonprofit, nonpartisan professional organization that provides training, information, and networking opportunities to 12,000 environmental professionals in 65 countries.
http://nadp.sws.uiuc.edu/	NADP	National Atmospheric Deposition Program – maps and data from the nationwide precipitation monitoring network. Site also has data from the Mercury Deposition Network.
http://profiler.noaa.gov/npn/profiler.jsp	NPN	NOAA Profiler Network provides hourly vertical wind profile data.
www.lungusa.org/	American Lung Association	American Lung Association – public health advocacy organization involved in public policy, research, and education mission is to prevent lung disease
http://nh.water.usgs.gov/projects/nawqa/hg_dep.htm	NACB	New England Coastal Basins Mercury Deposition Network – Atmospheric deposition