STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR RESOURCES

Rhode Island 2014 Annual Monitoring Network Plan

Proposed

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Submitted to the EPA on

Regulatory Background

Section 58.10(a) of Title 40 of the Code of Federal Regulations (40 CFR 58.10(a)) requires states to submit a monitoring network plan to the United States Environmental Protection Agency (EPA) in July of each year. The plan must provide a description of the state's current monitoring network, demonstrate that the network conforms to EPA requirements, and discuss any plans to remove or move a monitoring station in the 18 months following the plan submittal. The plan must be posted for public comment 30 days prior to submittal to the EPA. This document will serve as Rhode Island's 2014 annual Monitoring Network Plan.

Rhode Island Monitoring Network

The Rhode Island Department of Environmental Management (RI DEM), in conjunction with the Rhode Island Department of Health (RI DOH), operates a network of air monitoring stations to measure ambient concentrations of pollutants for which the EPA has established a National Ambient Air Quality Standard (NAAQS). Those pollutants, which are known as criteria pollutants, include ozone (O_3), particulate matter smaller than 10 microns (PM_{10}), particulate matter smaller than 2.5 microns ($PM_{2.5}$), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO) and lead. The criteria pollutant monitoring sites are part of the EPA's State or Local Air Monitoring Stations network (SLAMS).

In addition, RI DEM and RI DOH monitor ambient levels of toxic air pollutants and of ozone precursors, which are substances that react in the atmosphere to form ground-level ozone. The State operates one monitoring site that is part of the National Air Toxics Trends Sites (NATTS) network, two that are part of the Photochemical Assessment Monitoring Stations (PAMS) network, one that is part of the $PM_{2.5}$ Speciation Trends Network (STN) and one that is part of the network of core multipollutant monitoring stations (NCore).

Table 1 summarizes the NAAQS and Table 2 lists the locations of the eight air monitoring stations that operated in the State in 2013 or are currently operating, along with the parameters monitored and monitoring methods used at each of the sites. The locations of those sites are shown in Figures 1-4. All of these sites have been approved by EPA Region 1 as meeting applicable siting criteria, as specified in Subpart B of 40 CFR Part 58. All criteria pollutants are monitored, as required in the CFR, using Federal Reference Methods (FRMs) or Federal Equivalent Methods (FEMs) and monitors are operated according to the procedures specified in Quality Assurance Project Plans (QAPPs) that have been approved by EPA.[1] All sites are located in the Providence-Fall River-Warwick, RI-MA Metropolitan Statistical Area (MSA), which encompasses all of Rhode Island as well as Bristol County in Massachusetts.

[1] RI DEM and RI DOH, "QAPP for Criteria Pollutants Including Particulates and NCore Parameters, Revision 10.0," approved by EPA December 5, 2012 and "QAPP: Air Toxics and PAMS Monitoring Programs, Revision 4.1," approved by EPA December 5, 2012.

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Table 1 National Ambient Air Quality Standards (NAAQS)

POLLUTANT	AVERAGING TIME	PRIMARY STANDARD	SECONDARY STANDARD
Sulfur Dioxide (SO_2)	3-Hour[A]	None	0.5 ppm (1300 μg/m³)
	1-Hour[B]	0.075 ppm (75 ppb)	None
Carbon Monoxide (CO)	8-Hour[A]	9 ppm	None
	1-Hour[A]	35 ppm	None
Ozone (O_3)	8-Hour[C]	0.075 ppm (75 ppb)	Same as Primary Standard
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.053 ppm (53 ppb)	Same as Primary Standard
	1-Hour[D]	100 ppb	None
Particulate Matter ≤ 10 micrometers (PM_{10})	24-Hour[E]	150 μg/m³	Same as Primary Standard
Particulate Matter ≤ 2.5 micrometers ($PM_{2.5}$)	Annual Arithmetic Mean[F]	12.0 μg/m³	15.0 μg/m³
	24-Hour[G]	35 μg/m³	Same as Primary Standard
Lead (Pb)	Rolling 3-Month Average[H]	0.15 μg/m³	Same as Primary Standard

Primary standards protect against adverse health effects. **Secondary standards** protect against welfare effects such as damage to crops, vegetation, and buildings.

[A]Not be exceeded more than once a year.

[B] A rule revoking the annual and 24-hour SO_2 NAAQS and promulgating a new 1-hour SO_2 NAAQS was signed on June 2, 2010. To attain the 1-hour NAAQS, the 3-year average of the 99th percentile of the daily maximum 1-hour average SO_2 level at each monitor must not exceed 75 ppb.

[C] The ozone NAAQS is violated when the average of the 4th highest daily eight-hour concentration measured in 3 consecutive years exceeds 0.075 ppm (75 ppb). The 0.075 ppm NAAQS became effective in May 2008.

[D] To attain the 1-hour NO_2 NAAQS, effective January 22, 2010, the 3-year average of the 98th percentile of the daily maximum 1-hour average NO_2 concentration at each monitor must not exceed 100 ppb.

[E] To attain the PM_{10} standard, the 24-hour concentration at each site must not exceed 150 μg/m³ more than once per year, on average over 3 years.

[F] The primary annual average $PM_{2.5}$ NAAQS was revised on December 10, 2012. The secondary NAAQS was not changed. To attain the $PM_{2.5}$ annual standard, the 3-year average of the weighted annual means of the 24-hour concentrations must not exceed the NAAQS value.

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[G] To attain the $PM_{2.5}$ 24-hour standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-based monitor must not exceed 35 $\mu g/m^3$.

[H]On October 15, 2008, the Pb NAAQS was changed to 0.15 $\mu g/m^3$ as a rolling 3-month average, not to be exceeded in a 3-year period.

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

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Table 2: Monitoring Sites

Site	AQS ID	Latitude Longitude	Parameter Measured	Method Of Sampling	EPA Method Designation
Vernon Trailer Vernon Street Pawtucket	440070026	41.874675 -71.379953	$PM_{2.5}$	Lo Vol	Reference
			PM_{10}	Hi Vol	Reference
			VOC	Canisters, GC/FID/MS	Reference
Johnson & Wales 111 Dorrance Street Providence	440070027	41.822686 -71.411089	PM_{10}	Hi Vol	Reference
Brown University 10 Prospect Street Providence	440070012	41.825556 -71.405278	Oxides of Nitrogen	Chemiluminescence (low range)	Reference
			Nitrogen Dioxide		
			Sulfur dioxide	Pulsed Fluorescence (low range)	Equivalent
USEPA Laboratory 27 Tarzwell Drive Narragansett	440090007	41.4950779 -71.4236587	Ozone	U.V. Photometric	Reference
			$PM_{2.5}$	Beta Attenuation/Cont	Equivalent
			Wind Speed	Anemometer	N/A
			Wind Direction	Wind Vane	N/A
			Temperature	Spot Reading	N/A
Francis School 64 Bourne Avenue E. Providence	440071010	41.840920 -71.36094	Oxides of Nitrogen	Chemiluminescence (low range)	Reference
			Nitrogen Dioxide		
			NO/NO_y	Chemiluminescence (low range)	Reference
			Carbon Monoxide	Gas Filter Correlation (low range)	Equivalent
			Sulfur dioxide	Pulsed Fluorescence (low range)	Equivalent
			Ozone	U.V. Photometric	Reference
			$PM_{2.5}$	Lo Vol	Reference
			$PM_{2.5}$	Beta Attenuation/Cont	Equivalent
			Speciated $PM_{2.5}$	Speciation Monitor	N/A
			Coarse PM ($PM_{10-2.5}$)	Lo Vols (PM_{10} & $PM_{2.5}$)	Reference
			Black Carbon	Aethalometer	N/A
			Lead	Lo Vol PM_{10}, XRF	Equivalent
			VOC	Canisters, GC/FID/MS	Reference
			Carbonyls	HPLC Cartridges	Reference
			Wind Speed	Anemometer	N/A
			Wind Direction	Wind Vane	N/A
			Barometric Pressure	Barometer	N/A
			Temperature	Spot Reading	N/A
			Relative Humidity	Plastic Film	N/A
			Solar Radiation	Pyranometric	N/A
			UV Radiation	UV Photometric	N/A
			Precipitation	Bucket/Continuous	N/A

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Site	AQS ID	Latitude Longitude	Parameter Measured	Method Of Sampling	EPA Method Designation
Urban League 212 Prairie Avenue Providence	440070022	41.807949 -71.415103	$PM_{2.5}$	Lo Vol	Reference
			$PM_{2.5}$	Beta Attenuation/Cont	Equivalent
			PM_{10}	Lo Vol	N/A
			PM_{10}/Metals	Hi Vol	Reference
			Chromium VI (discontinued 6/14)	TSP/Ion chromatograph	N/A
			VOC	Canisters, GC/FID/MS	Reference
			Carbonyls	HPLC Cartridges	Reference
			Black Carbon	Aethalometer	N/A
			Semi-volatiles	PUF/XAD, GC/MS	N/A
			Wind Speed	Anemometer	N/A
			Wind Direction	Wind Vane	N/A
			Temperature	Spot Reading	N/A
			Relative Humidity	Plastic Film	N/A
Alton Jones Campus Victory Highway West Greenwich	440030002	41.615600 -71.719900	Ozone	U.V. Photometric	Reference
			Nitrogen Dioxide	Chemiluminescence	Reference
			Oxides Of Nitrogen	Chemiluminescence	Reference
			VOC	Canisters, GC/FID/MS	Reference
			PM_{10}	Hi Vol	Reference
			$PM_{2.5}$	Lo Vol	Reference
			$PM_{2.5}$	Beta Attenuation/Cont	Equivalent
			Wind Speed	Anemometer	N/A
			Wind Direction	Wind Vane	N/A
			Barometric Pressure	Barometer	N/A
			Temperature	Spot Reading	N/A
			Relative Humidity	Plastic Film	N/A
			Solar Radiation	Pyranometric	N/A
Near-Road Site Hayes and Park Sts. Providence	440070030	41.829495 -71.417457	Oxides of Nitrogen	Chemiluminescence (low range)	Reference
			Nitrogen Dioxide		
			Carbon Monoxide	Gas Filter Correlation (low range)	Equivalent
			$PM_{2.5}$	Beta Attenuation/Cont	Equivalent
			Black Carbon (summer 2014)	Aethalometer	N/A

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Network Evaluation

Following is a discussion, by pollutant, of:

- the current monitoring network,
- the NAAQS and a comparison of recent measurements with the NAAQS,
- whether that network meets EPA's monitoring criteria,
- whether new sites are needed,
- whether any existing sites are no longer needed, and
- plans for modification of the network in the next 18 months.

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Ozone (O_3)

The sites in the current ozone monitoring network are listed in Table 3:

Table 3 Rhode Island Ozone Monitoring Sites

SITE	MEASUREMENT SCALE	MONITORING OBJECTIVE
Alton Jones Campus Victory Highway West Greenwich	Regional (PAMS Type I)	Upwind background Population exposure
USEPA Laboratory 27 Tarzwell Drive Narragansett	Regional	Population exposure
Francis School 64 Bourne Avenue E. Providence	Neighborhood (PAMS Type II, NCore)	Maximum precursor emissions impact Population exposure

The NAAQS for ozone is 75 ppb. A site is in violation of that NAAQS when the average of the 4th highest daily eight-hour ozone concentration measured in 3 consecutive years (the design value) at that site exceeds 75 ppb.

Ozone design values for all of the Rhode Island sites have decreased over time, but design values increased or remained constant in 2012 and 2013, as shown in Table 4 and graphically in Figure 5. Based on 2009-2011 design values, EPA designated Rhode Island as unclassifiable/attainment for the 75 ppb NAAQS on April 30, 2012. Note, however, that the 2009-2011 design values were lower than normal, due to unusually cool temperatures in the summer of 2009. In the most recent three year period, 2011-2013, the design values for both the Narragansett and the E. Providence sites were above the 75 ppb NAAQS, while the design value for the W. Greenwich site remained slightly lower than that standard.

Table 4 Ozone Design Values (ppb)

	W. Greenwich	Narragansett	E. Providence
2001 - 2003	95	95	93
2002 - 2004	87	90	84
2003 - 2005	84	89	82
2004 - 2006	83	85	81
2005 - 2007	86	84	84
2006 - 2008	80	81	82
2007 -2009	77	77	77
2008 - 2010	71	76	72
2009 –2011	73	73	71
2010 - 2012	74	78	75
2011 - 2013	74	78	76

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Since EPA's rules require Rhode Island to operate at least two ozone monitors, the State has one more monitor than the minimum number required. Continued operation of all of the current monitors is important for the following reasons:

- Ground-level ozone levels have generally decreased in the past several years; however, ozone concentrations in the State continue to reach unhealthy levels on several days each summer. Note that 8-hour average ozone levels were above 75 ppb at one or more of the Rhode Island monitoring sites on 7 days in 2013. EPA's Clean Air Scientific Advisory Committee has advocated strengthening the ozone NAAQS to a level in the range of 60 – 70 ppb to protect public health. In 2013, there were 11 days with levels above 70 ppb and 31 days with levels above 60 ppb.

- The three sites represent three distinct geographical areas that are affected by different weather patterns and therefore experience very different ozone levels on some days.

- The availability of real-time ozone data from the three ozone sites enables RI DEM to issue area-specific health advisories as appropriate and to provide residents with real-time information about ozone concentrations and associated health risks in their neighborhoods.

On July 16, 2009, the EPA proposed revisions to its ambient ozone monitoring network design requirements.[2] Those requirements, as proposed, would require additional ozone monitors in rural areas that are not part of MSAs. It is not clear how this requirement would apply to Rhode Island, since all portions of the State, including areas that are commonly considered rural, are part of the Providence-Fall River-Warwick, RI-MA MSA. When that rule is finalized, RI DEM will evaluate the amended requirements and determine what actions are required.

The July 2009 Federal Register Notice also proposed an increase in the length of the ozone season in several states, including Massachusetts and Connecticut. EPA did not propose a change in Rhode Island's ozone monitoring season, April – September, but may do so in the final rule. Although the proposed rule did not change Rhode Island's ozone season, RI DEM has extended the period of operation of its ozone monitors to be consistent with monitoring in neighboring states. Beginning in 2011, the ozone monitors at the Narragansett and East Greenwich sites have been operated from March through October. Note also that, beginning in 2011, ozone is being measured year round at the East Providence site, consistent with NCore requirements.

[2] EPA, "Ambient Ozone Monitoring Regulations: Revisions to Network Design Requirements," Proposed Rule, Federal Register 74 (135):34525, July 16, 2009. http://www.gpo.gov/fdsys/pkg/FR-2009-07-16/pdf/E9-16802.pdf

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Carbon Monoxide (CO)

The current CO monitoring network is as shown in Table 5:

Table 5 Carbon Monoxide Monitoring Network

SITE	MEASUREMENT SCALE	MONITORING OBJECTIVE
Francis School 64 Bourne Avenue E. Providence	Neighborhood	Maximum precursor emissions impact Population exposure
Near-Road Site Hayes and Park Sts. Providence	Microscale	Maximum emissions Near-road (began operation in April 2014)

The NAAQS for CO are:

- 35 ppm as a 1 hour average, not to be exceeded more than once per year (design value is the highest annual 2nd maximum 1-hour concentration) and
- 9 ppm as an 8 hour average, not to be exceeded more than once per year (design value is the highest annual 2nd maximum non-overlapping 8-hour concentration)

The highest CO design values recorded at the East Providence site in the last five years are:

- 2.7 ppm – 1 hour average, 8% of NAAQS,
- 1.6 ppm – 8-hour average, 18 % of NAAQS

The 2013 CO design values for Rhode Island are:

- 2.04 ppm – 1 hour average, 6% of NAAQS
- 1.3 ppm – 8 hour average, 14% of NAAQS

The CO NAAQS has not been exceeded in Rhode Island since 1984. Since 2001, all CO levels recorded in Rhode Island have been in the "Good" category of the EPA's Air Quality Index (AQI). As shown in Figure 6, ambient CO levels in Rhode Island have decreased since the year 2000, although there has been no clear trend in recent years.

EPA's regulations do not specify a minimum number of CO monitors that must be operated in a state, except that CO monitoring is required at Type 2 PAMS sites (40 CFR 58, Appendix D, Table D-6) and at NCore sites (40 CFR 58, Appendix D 3(b)). Since the East Providence site is both a Type 2 PAMS site and the State's NCore site, carbon monoxide monitoring will continue at that site using a low range monitor, consistent with NCore requirements.

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On August 21, 2011, EPA issued a decision retaining the CO NAAQS at the current levels.[3] The decision requires the operation of CO monitors at sites established to comply with the near-road monitoring requirements specified in the 2010 NO_2 NAAQS. Near-road sites are required in all urban areas which, like the Providence-New Bedford-Fall River, RI-MA MSA, have a population of 1,000,000 or more. Near-road CO monitoring is not required until January 1, 2017; however, Rhode Island began operating a low-range CO monitor at a site adjacent to Interstate Route 95 that meets the above near-road specifications in April 2014.

No changes to the CO monitoring network are planned in the next 18 months.

Sulfur Dioxide (SO_2)

The current SO_2 monitoring network is as shown in Table 6:

Table 6 Sulfur Dioxide Monitoring Network

SITE	MEASUREMENT SCALE	MONITORING OBJECTIVE
Brown University 10 Prospect Street Providence	Neighborhood	Population exposure
Francis School 64 Bourne Avenue E. Providence	Neighborhood	NCore

The NAAQS for SO_2[4] are:

- 75 ppb, 1-hour average (primary standard effective June 2, 2010). The design value is the average of the 99th percentile maximum daily hour measured in 3 consecutive years
- 0.5 ppm (500 ppb) - 3 hour average (secondary standard), not to be exceeded more than once per year

The highest SO_2 design values recorded in the last five years in Rhode Island are:

[3] US EPA, "Review of National Ambient Air Quality Standards of Carbon Monoxide: Final Rule," Federal Register 76 (169):54294, August 31, 2011. http://www.gpo.gov/fdsys/pkg/FR-2011-08-31/pdf/2011-21359.pdf

[4] An EPA rule amending the SO_2 NAAQS was signed on June 2, 2010. The rule revokes the previous annual and 24-hour NAAQS and sets a new one-hour average NAAQS at 0.075 ppm (75 ppb). Revisions of monitoring networks consistent with the requirements in the rule must be in place by January 1, 2013.

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- 28 ppb - 1 hour average, 37% of primary NAAQS (Brown monitor)
- 27 ppb - 3-hour average, 5% of secondary NAAQS (Brown monitor)

The highest 2013 SO_2 design values are:

- 19 ppb – 1 hour average, 25% of NAAQS (E. Providence monitor)
- 14 ppb- 3 hour average, 34% of NAAQS (E. Providence monitor)

The SO_2 NAAQS has never been exceeded in the State. One-hour design values for SO_2 have been below 75 ppb, the one-hour NAAQS promulgated in 2010, since 1994. All measurements have been in the "Good" range of the AQI since 2007. As shown in Figure 7, one-hour average SO_2 design levels in Rhode Island have declined over the past decade. SO_2 levels measured at the Brown University monitor in Providence declined dramatically in 2013, probably due to the increased use of natural gas rather than fuel oil by nearby sources.

EPA's 2006 amended monitoring regulation requires SO_2 monitoring only at NCore sites. However, the 2010 SO_2 NAAQS rule requires at least one SO_2 monitor in the Providence-New Bedford-Fall River RI, MA MSA, which includes all of Rhode Island and Bristol County, Massachusetts. That SO_2 monitor must be sited to meet one or more of the following objectives: (1) characterizing concentrations around emissions sources, (2) measuring the highest concentrations in an area, (3) determining population exposure, (4) establishing general background levels and (5) evaluating regional transport.

Rhode Island operates a SO_2 monitor at Brown University in Providence and, to meet NCore requirements, began operating a low-range SO_2 monitor at the East Providence site in January 2011.The Brown University SO_2 monitor was updated to a low-range unit in January 2013. RI DEM believes that the Brown University and East Providence monitors appropriately characterize population exposure in the major urban areas in Rhode Island.

The State of Massachusetts also operates a SO_2 monitor in the Providence-New Bedford-Fall River RI-MA MSA. Since that monitor is located in Fall River, MA, approximately two miles southeast of Dominion Energy- Brayton Point, a coal-fired power plant, the SO_2 levels recorded at that site tend to be substantially higher than those at the Rhode Island sites. The 2013 one-hour design value for SO_2 at the Fall River monitor was 64 ppb, 85% of the NAAQS and more than three times the highest Rhode Island design value. According to EPA's Emissions Inventory System (EIS), in 2008 the Brayton Point facility emitted 30,085 tons of SO_2, more than 100 times more than the highest emitting Rhode Island source, Central Landfill (268 tons). Therefore, the Fall River monitor is more appropriate than a Rhode Island location for characterizing maximum concentrations in the MSA. Note that, since the Brayton Point facility is less than two miles east of the border with Bristol County, Rhode Island, maximum SO_2 levels in that Rhode Island county may be better represented by levels measured at the Fall River site than by those at the Rhode Island sites.

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The 2010 SO_2 NAAQS rule requires states to conduct dispersion modeling of large SO_2 emitting sources and stipulates that the EPA will use the modeling results, in addition to monitoring data, to determine whether areas are in attainment of the one-hour standard. However, in response to comments received subsequent to the promulgation of that NAAQS, EPA reevaluated the monitoring and modeling requirements in the rule and has recently proposed a revised Data Requirements Rule for the NAAQS[5]. When monitoring requirements are finalized, RI DEM will determine whether the current sites meet the monitoring specifications and whether continued operation of the Providence site is necessary.

Nitrogen Dioxide (NO_2)

The current NO_2 monitoring network is shown in Table 7a:

Table 7a Nitrogen Dioxide Monitoring Network

SITE	MEASUREMENT SCALE	MONITORING OBJECTIVE	SCHEDULE
Brown University 10 Prospect Street Providence	Neighborhood	Population exposure	Continuous Year round
Francis School 64 Bourne Avenue E. Providence	Neighborhood (PAMS)	Population exposure	Continuous Ozone season (Continuous 3/1/12 – 10/1/15)
Alton Jones Campus Victory Highway West Greenwich	Regional (PAMS)	Population exposure Upwind background	Continuous Ozone season
Near-Road Site Hayes and Park Sts. Providence	Microscale	Maximum emissions Near-road	Continuous Year round Beginning April 2014

In January 2013, NO_2 monitors at all sites were replaced with low-range units.

[5] USEPA, "Data Requirements Rule for the Sulfur Dioxide (SO_2) One-Hour Primary National Ambient Air Quality Standard (NAAQS)," FR 79(92):27446, May 13, 2014.

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The NO_2 NAAQS are:

- 100 ppb - 1 hour average (effective January 22, 2010). The design value is the average of the 98th percentile maximum daily hour measured in 3 consecutive years.

- 0.053 ppm (53 ppb) - annual average

The highest NO_2 design values recorded in the last five years are:

- 47 ppb - 1 hour average, 47% of NAAQS
- 11.3 ppb - annual average, 21% of NAAQS

Design values for 2013 are:

- 42.7 ppb - 1 hour average, 43% of NAAQS
- 10.42 ppb annual average, 20% of NAAQS

The NO_2 NAAQS have never been exceeded in Rhode Island. Since there was no short-term NAAQS for NO_2 until the standard was amended in 2010, this pollutant was not used for the Air Quality Index (AQI) before that date. The amended NO_2 NAAQS rule, which was published on February 9, 2010[6], establishes hourly levels of 54 -100 ppb as the range for a "Moderate" AQI. In the 5 year period of 2009 – 2013, there were a total of 4 days when NO_2 levels recorded in Rhode Island were in that range. No levels in the "Unhealthy for Sensitive Populations" or more serious AQI categories were recorded in that period.

The 2010 amended NO_2 NAAQS requires Rhode Island to operate two NO_2 monitoring sites, one at "a location of expected highest NO_2 concentrations representing the neighborhood or larger spatial scales" and a second monitor at a near-road location where maximum microscale-representative concentrations are expected, Rhode Island intends to use the current NO_2/NO_x site at Brown University in Providence to fulfill the requirement for a neighborhood scale site. NO_2/NO_x monitoring has been conducted at that site, which has been approved as neighborhood scale representative, since 1994; therefore, the data collected at that site can be used to track trends in NO_2/NO_x concentrations over time. Moreover, the site is in the area of the State with the largest NO_2/NO_x- emitting sources and the highest density of NO_2/NO_x emissions. NO_2 concentrations measured at the Brown University site are substantially lower than the NAAQS for that pollutant, including the 1-hour average standard.

[6] USEPA, "Primary National Ambient Air Quality Standards for Nitrogen Dioxide: Final Rule," FR 75(26):6474, 9 February 2010. http://www.epa.gov/ttn/naaqs/standards/nox/fr/20100209.pdf

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After an evaluation of meteorology, traffic counts, diesel traffic and congestion, RI DEM and EPA agreed to locate the Rhode Island near-road site on the east side of the Interstate Route 95 near downtown Providence. Monitoring for NO_2/NO_x, as well as CO, $PM_{2.5}$ and black carbon, began at that site in April 2014. It should be noted that the Rhode Island Department of Transportation is currently engaged in a large scale highway reconstruction/bridge repair project on the southbound side of I-95, just southwest of the monitoring site, and emissions from construction equipment and activities may have a measureable impact on monitored levels at the near-road site. In addition, construction is due to shift to the northbound lanes in two or three years, at which time the monitoring site will need to be relocated.

To fulfill PAMS requirements, NO_2/NO_x is also monitored at the East Providence and West Greenwich sites during the ozone season. To determine how NO_2/NO_x levels at the East Providence site compare to those measured at the Brown University site, Rhode Island has operated the East Providence monitor continuously since March 2012. In 2013, the first year that the East Providence monitor operated year-round, one hour and annual average concentrations were considerably lower at that site than at the Brown site, as shown in Table 7b.

Table 7b 2013 Nitrogen Dioxide Levels at Brown and East Providence Sites (ppb)

Site	98th Percentile One-Hour	Annual Average
Brown Univ., Providence	43.1	10.42
Francis School, East Providence	38.2	7.50

Therefore, it does not appear likely that operation of the East Providence monitor year-round would affect Rhode Island's NO_2 design values. However, NO_2 levels were higher at the East Providence site than at the Brown University sites on some days. On February 10, 2013, the maximum one-hour concentration measured at the East Providence site, 55.0 ppb, was in the moderate air quality range, while the maximum at the Brown University site, 48.7 ppb, was in the good air quality range. Year-round operation of the East Providence monitor will be continued at least until the end of the 2015 ozone season.

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Particulate Matter

Particles smaller than 10 microns (PM_{10})

The current PM_{10} monitoring network is as shown in Table 8 and Figure 2:

Table 8 PM_{10} Monitoring Network

SITE	MEASUREMENT SCALE	MONITORING OBJECTIVE	SCHEDULE
Vernon Trailer Vernon Street Pawtucket	Middle	Population exposure	24-hour 1 in 6 day
Johnson & Wales 111 Dorrance Street Providence	Neighborhood	Population exposure	24-hour 1 in 6 day
Urban League 212 Prairie Avenue Providence	Neighborhood (NATTS)	Population exposure Highest concentration	24-hour 1 in 6 day
Alton Jones Campus Victory Highway West Greenwich	Regional	Upwind background	24-hour 1 in 6 day
Francis School 64 Bourne Avenue E. Providence	Neighborhood (NCore)	Population exposure (Lead and $PM_{10-2.5}$)	24-hour 1 in 6 day

The PM_{10} NAAQS is:

- 150 $\mu g/m^3$ – 24-hour average, not to be exceeded more than once per year on average over 3 years (design value is 4^{th} high value in a 3-year period)

The highest PM_{10} value recorded in Rhode Island in the last five years is:

- 70 $\mu g/m^3$ – 24-hour average, 46% of NAAQS, recorded at Vernon St. in 2013

The highest design value for PM_{10} recorded at a Rhode Island site for the 2011 – 2013 period is:

- 39 $\mu g/m^3$ – 24-hour average, 26% of NAAQS, recorded at Vernon St. (note that 2012 data were incomplete for that site due to road construction)

The PM_{10} NAAQS has never been exceeded in Rhode Island. Since PM_{10} is measured using a filter-based method, results are not immediately available and cannot be used for Air Quality Index calculations. Trends in PM_{10} design values are shown in Figure 8. Levels tend to be highest at the

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Vernon Street site, which is adjacent to I-95, and higher at the two Providence sites than at the rural West Greenwich site. PM_{10} levels appear to have slightly decreased over the past decade.

Since late 2011, PM_{10} has also been measured at the East Providence NCore site every sixth day using a lo-vol sampler. Those PM_{10} measurements are used, in conjunction with $PM_{2.5}$ measurements at that site, for calculating $PM_{10-2.5}$ levels. The lo-vol PM_{10} filters are also used for lead measurements.

EPA's monitoring regulations require areas like the Rhode Island MSA, which has a population greater than 1,000,000 and measured PM_{10} concentrations below 80% of the NAAQS, to operate a minimum of 2-4 PM_{10} monitoring sites. Since Rhode Island is currently operating five sites and is not measuring levels close to the NAAQS at any of the sites, one or more sites could be discontinued without violating the minimum criteria.

As discussed above, PM_{10} measurements at the East Providence site are used for calculating $PM_{10-2.5}$ levels and, since this measurement is required at NCore sites, PM_{10} sampling cannot be discontinued at that site. Similarly, PM_{10} samples collected at the Urban League site in Providence are analyzed for metals to fulfill NATTS requirements, so PM_{10} sampling at that location cannot be discontinued. The rural Alton Jones, West Greenwich site provides useful information about background concentrations of PM_{10} in Rhode Island. The Vernon St., Pawtucket site, which is adjacent to I-95, tends to record the highest PM_{10} concentrations in the State. Therefore, the Johnson & Wales Library in downtown Providence is the only site that is being considered for possible discontinuation at this time.

The Johnson & Wales site is approximately one mile from the Urban League location. In the ten years that the Johnson & Wales site has been operational, the PM_{10} design values at that site have been, on average, 2.8 $\mu g/m^3$ higher than those at the Urban League site and 7.1 $\mu g/m^3$ lower than those at the Vernon Street, Pawtucket site. The PM_{10} levels at the Johnson & Wales site correlate well with those at the Urban League ($r^2 = 0.81$). Since operation of the Johnson & Wales site is currently not resource-intensive, RI DEM plans to continue to operate this site for the present. If the continued operation of this site becomes problematic, RI DEM will seek EPA approval to discontinue monitoring at Johnson & Wales.

Note that the Vernon Street site was not operated for much of the first two quarters of calendar year 2012, due to heavy construction in the immediate area of that site. Monitoring at that site resumed in July 2012.

Fine Particulate Matter (Particulate Matter smaller than 2.5 microns, or $PM_{2.5}$)

The Federal Reference Method/Federal Equivalent Method (FRM/FEM) $PM_{2.5}$ monitoring network is shown in Table 9 and in Figure 3:

Proposed

Table 9 $PM_{2.5}$ Monitoring Network

SITE	MEASUREMENT SCALE	MONITORING OBJECTIVE	SCHEDULE
Vernon Trailer Vernon Street Pawtucket	Middle	Population exposure	24-hour, 1 in 3 day
Urban League 212 Prairie Avenue Providence	Neighborhood	Population exposure Highest concentration	24-hour, daily 1 in 6 day co-located sampler Continuous FEM
Francis School 64 Bourne Avenue E. Providence	Urban	Population exposure Highest concentration	24-hour, daily Continuous FEM
Alton Jones Campus Victory Highway West Greenwich	Regional	Population exposure General/Background Regional Transport	Continuous FEM 1 in 6 day co-located sampler
USEPA Laboratory 27 Tarzwell Drive Narragansett	Regional	Population exposure	Continuous FEM
Near Road Site Hayes and Park Sts. Providence	Microscale	Near-road	Continuous FEM (began operation April 2014)

Filter-based FRM $PM_{2.5}$ units are operated as the primary samplers at the Vernon, Urban League and East Providence sites and FEM continuous $PM_{2.5}$ monitors are used as the primary samplers at the West Greenwich, Narragansett and, as of April 2014, the near-road site in Providence. Continuous $PM_{2.5}$ FEM monitors are operated at the Urban League site and the East Providence NCore site as secondary monitors; data recorded by those monitors are used as substitute measurements on days when valid data from the primary samplers at those locations are not available. Before 2013, continuous $PM_{2.5}$ data collected at the Narragansett site were not used in determinations of compliance with the NAAQS for that pollutant but, since the monitor at that site has been upgraded to a FEM unit, those data are now suitable for regulatory purposes. Co-located filter-based FRM samplers are operated every 6^{th} day at the Urban League and West Greenwich sites for quality assurance purposes.

Note that the Vernon Street site was not operated for much of the first two quarters of calendar year 2012, due to heavy construction in the immediate area of the monitors. Monitoring at that site resumed in July 2012. Monitoring at a site on Eddy Street, Providence site was discontinued at the end of 2012.

Proposed

The $PM_{2.5}$ NAAQS are:

- 35 $\mu g/m^3$ – 24-hour average (design value is the 3-year average of the 98th percentile 24-hour concentration)
- 12 $\mu g/m^3$- annual average (design value is calculated by averaging the daily concentrations from each quarter, averaging these quarterly averages to obtain an annual average, and then averaging the annual averages for three consecutive years)[7]

The highest $PM_{2.5}$ design values recorded in Rhode Island in the last 5 years are:

- 25.8 $\mu g/m^3$ – 24-hour average, 74% of NAAQS, recorded at Vernon St.
- 10.4 $\mu g/m^3$ – annual average, 87% of current NAAQS, recorded at Vernon St.

The highest $PM_{2.5}$ design values for 2013 are:

- 22 $\mu g/m^3$ – 24-hour average, 63% of NAAQS, recorded at Vernon St. and Urban League
- 9.2 $\mu g/m^3$ – annual average, 77% of NAAQS, recorded at Vernon St. (note that the Vernon St. monitor did not operate for several months in 2012, so the design values for that site were calculated as the average of 2011 and 2013 values)

Trends in 24-hour and annual average $PM_{2.5}$ design values are shown in Figures 9 and 10, respectively. Annual average levels are consistently highest at the Vernon Street site, which is adjacent to I-95, and higher at the East Providence and the two Providence sites than at the rural West Greenwich site. $PM_{2.5}$ levels have decreased over the past decade.

Although none of the monitors violate the NAAQS (including the revised annual average NAAQS), $PM_{2.5}$ levels at one or more sites in the State were at or above 35 $\mu g/m^3$ and, therefore, the air quality was unhealthy, on four days in the past five years (2009 – 2013). Note also that many members of the scientific community have recommended that the 24-hour $PM_{2.5}$ NAAQS be reduced to a level of 30 $\mu g/m^3$or less to be protective of public health. In the 2009-2013 period, there were 11 days with concentrations at or above that level at one or more Rhode Island sites.

EPA regulations require a minimum of two $PM_{2.5}$ monitoring sites in Rhode Island. These sites must characterize the following:

[7] In December 2012, EPA revised the PM NAAQS, reducing the annual average $PM_{2.5}$ NAAQS from 15 to 12 $\mu g/m^3$. The rule left the PM_{10} NAAQS and the 24-hour average $PM_{2.5}$ NAAQS and the secondary annual average $PM_{2.5}$ NAAQS unchanged.

Proposed

- Community-wide air quality;
- Background $PM_{2.5}$ levels in the State; and
- Regional transport of $PM_{2.5}$.

Although Rhode Island operates more $PM_{2.5}$ sites than required, each site fulfills a specific information need or EPA requirement. The West Greenwich site fulfills EPA's requirements for measurement of background and regional transport concentrations of $PM_{2.5}$. The 24-hour and annual $PM_{2.5}$ design values for the Vernon Street, Pawtucket site, which is immediately adjacent to Interstate Rte. 95, tend to be higher than those at the other sites, so that is a maximum impact site. The East Providence monitor is cannot be removed because $PM_{2.5}$ monitoring is required at NCore sites, and the Urban League and Narragansett monitors fulfill the need for air quality data for urban and coastal areas of the State, respectively. Note that another Providence $PM_{2.5}$ site, the Eddy Street monitor, was discontinued at the end of 2012.

As discussed above, $PM_{2.5}$ monitoring at the Rhode Island near-road site began in April 2014 and will continue until such time that that site is no longer tenable, due to the progression of construction activity in the area. Note also that the long-term future of the Urban League building is unknown at this time; RI DEM is working to identify nearby locations to which that site could be moved if that building becomes unavailable . RI DEM will request approval from the EPA of alternative locations for these sites if moves are required. No other changes to the $PM_{2.5}$ network are planned in the near future.

Speciation Monitoring

The EPA's $PM_{2.5}$ Speciation Trends Network (STN) EPA is designed to characterize metal, ion and carbon constituents of $PM_{2.5}$. RI DEM began operating $PM_{2.5}$ speciation monitors at the Urban League and East Providence sites as a part of that network on a one in six-day schedule in June 2002. Operation of the East Providence speciation equipment was discontinued in May 2004 and, at that time, the monitoring frequency at the Urban League speciation site was increased to one in three days. In November 2008, the speciation equipment at the Urban League was replaced by a SASS speciation unit and, in March 2009, a URG carbon sampler began operation at that location as part of the speciation program. To conform to NCore requirements, the speciation equipment, including the carbon sampler, was moved to the East Providence NCore site in January 2011 and is now being operated there on a one-in-three day schedule. Speciation filters are analyzed by an EPA contractor.

Lead (Pb)

On November 12, 2008, the EPA promulgated an amended NAAQS for lead (FR 73:66964). The new NAAQS is an order of magnitude more stringent than the previous standard. To determine

Proposed

whether an area is in compliance with the new standard, the rule requires two types of lead monitoring: source- specific monitoring in the vicinity of lead sources that emit 0.5 or more tons of lead per year and area-wide lead monitoring at urban NCore sites. Rhode Island has no sources emitting 0.5 tons or more of lead per year and, therefore, is not required to operate any source-specific monitors. To fulfill the requirement for area-wide monitoring, RI DEM and RI DOH began collecting lo-vol PM-10 samples to be analyzed for lead at the East Providence NCore site in June 2011. As specified in the lead NAAQS rule, sampling is conducted on a one-in-six day schedule.

The current lead (Pb) monitoring network is as shown in Table 10:

Table 10 Lead Monitoring Network

SITE	MEASUREMENT SCALE	MONITORING OBJECTIVE
Francis School 64 Bourne Avenue E. Providence	Neighborhood	Population exposure (area-wide) (NCore)

The NAAQS for Pb is 0.15 $\mu g/m^3$, as a rolling three month average, measured in total suspended particulate matter (TSP) . The highest 24-hour average concentration measured in Rhode Island since NAAQS Pb monitoring began in the State in June 2011 is 0.016 $\mu g/m^3$ (11% of the NAAQS) and the highest 3-month average during that period is 0.007 $\mu g/m^3$ (5% of the NAAQS).

Rhode Island measures Pb in PM_{10}, not in TSP. In the lead NAAQS rule, EPA allows states to use Pb- PM_{10} monitoring, without a scaling factor, as a surrogate for Pb-TSP NAAQS monitoring at area-wide monitoring sites, as long as the 3-month average Pb- PM_{10} concentrations at those sites remain below 0.10 $\mu g/m^3$. Note that the highest 3-month average PM_{10} concentration that has been measured at the East Providence site is approximately 7% of that trigger level.

Rhode Island's lead filters are currently analyzed by the State of Maine using EPA-approved XRF methodology. In June 2012, EPA approved an ICP/MS analytical method to measure lead collected on lo-vol filters. Rhode Island plans to switch to this method so that the analysis can be conducted at the RI DOH Air Pollution Laboratory once the laboratory has verified that it can obtain accurate results using that methodology. As specified in the lead NAAQS rule, sampling is conducted on a one-in-six day schedule.

Proposed

Ozone Precursor and Air Toxics Measurements

Photochemical Assessment Monitoring Stations (PAMS)

The Clean Air Act Amendments of 1990 (CAAA) required serious, severe and extreme ozone nonattainment areas to establish enhanced monitoring networks to measure ozone and ozone precursors. In response to that mandate, the US EPA promulgated rules in 1993 that required the establishment of a network of Photochemical Assessment Monitoring Stations (PAMS) to measure ozone, NO_x, volatile organic compounds (VOCs), carbonyls, and meteorological parameters in serious and above nonattainment areas. This network was designed to provide comprehensive data on trends in ambient concentrations of ozone and ozone precursors and to evaluate the spatial and diurnal variability of those pollutants in order to track the formation and transport of ozone across large areas and to evaluate the effectiveness of strategies implemented to reduce levels of that pollutant.

The EPA rule identifies four types of PAMS sites:

- Type 1 sites, located on the upwind side of the nonattainment area and used to characterize background and transported concentrations of ozone, NO_x and VOC;

- Type 2 sites, sited to measure the maximum impact of VOC and NO_x emitted in the area;

- Type 3 sites, sited to measure maximum ozone concentrations occurring downwind of the area, and

- Type 4 sites, sited to measure the concentration of ozone, NO_x and VOC exiting the area.

Two PAMS sites, including a Type 2 site, are required in each serious and above nonattainment area. Since Rhode Island was a serious nonattainment area for the one-hour average ozone NAAQS, the ozone standard that was in effect at the time the enhanced monitoring requirements were promulgated, a PAMS network is required in the State. The Alton Jones monitoring site in West Greenwich is designated as the State's Type 1 PAMS site and the East Providence site as a Type 2 PAMS site. In addition, the Massachusetts Department of Environmental Protection (MA DEP) operates a site at the Blue Hills Observatory in Milton, Massachusetts (Site ID 25-021-3003) that serves as the Type 1 (upwind) site for the Boston area and has served as the Type 3 (downwind) site for the Providence area.

Proposed

Rhode Island monitors the following PAMS pollutants:

- 24-hour speciated Volatile Organic Compounds (VOC) samples are collected every sixth day year round at the Type 1 and Type 2 sites and eight 3-hour VOC samples are collected every day during June, July and August at the Type 2 site. Eight 3-hour samples were collected every third day during June, July and August until 2011 at the Type 3 station in Milton, MA, but MA DEP stopped collecting 3-hour VOC samples in 2012, due to staffing limitations.

- 24-hour carbonyl samples are collected year round and eight 3-hour carbonyl samples per day were collected every third day during June, July and August through 2011 at the Type 2 site. 3-hour carbonyl samples are required only in nonattainment areas classified as serious or above for the 8-hour ozone standard. Since Rhode Island has never had a nonattainment classification higher than "moderate" for that NAAQS, this requirement does not apply to the State. Rhode Island collected the 3-hour samples through the 2011 PAMS season but is no longer collecting those samples.

- NO_x has historically been measured continuously at the Type 1 and Type 2 sites during June, July and August. After determining that the EPA rule requires NO_x monitoring at the Type 2 site for the entire ozone season, Rhode Island continued NO_x monitoring at the East Providence site through the end of the ozone season (September 30th) in 2011. That monitor was operated from March through the end of December in 2012 and will be operated year-round at least until the end of 2015 to enable a comparison of NO_2 levels measured at that site with those measured at the Brown University, Providence site. In January 2013, the NO_x monitors at the Rhode Island sites were replaced with low-range monitors. NO_x is also measured by MA DEP at the Milton, MA site, the Type 3 site for Rhode Island, during the ozone season.

- Rhode Island began measuring reactive nitrogen oxides (NO_y) at the Type 2 site in January 2011 to fulfill NCore requirements. EPA regulations require NO_y measurements at one Type 3 or Type 1 PAMS site during the ozone season. Rhode Island currently monitors NO_x, but not NO_y, at its Type 1 site. Similarly, NO_x, rather than NO_y, is monitored at the Type 3 site in Milton, MA, although MA DEP has measured NO_y at that site in the past. Rhode Island does not have any immediate plans to install NO_y equipment at the Type 1 site.

- CO is measured year round at the Type 2 site. In 2010, the conventional CO monitor at that site was replaced with a low-range (ppb) CO monitor, in fulfillment of both NCore and PAMS network requirements.

- Ozone is measured during the ozone season at all three sites. Beginning in 2011, ozone is being measured year-round at the Type 2 site to fulfill NCore requirements.

- Surface meteorological parameters are measured at all three sites year-round.

Proposed

- Rhode Island uses the upper air data collected at the Brookhaven, New York meteorological site to fulfill the PAMS requirements for those measurements

Note that the EPA is currently reviewing the PAMS program to determine whether changes in site locations, pollutants monitored, or monitoring methods are necessary to obtain the most appropriate and cost-effective data for assessing ozone formation and transport of ozone and precursors. If the EPA decides to link PAMS requirements to a state's attainment status for the current ozone NAAQS, rather than the former one-hour NAAQS, PAMS sites may no longer be required in the State.

Air Toxics

Rhode Island operates one site that is part of the National Air Toxics Trends Stations (NATTS) network. The primary purposes of the NATTS network are to track trends in ambient air toxics levels, to characterize exposures, and to measure progress toward emission and risk reduction goals.

The Rhode Island NATTS site is located on the roof of the Urban League building in an urban residential neighborhood on the south side of Providence, approximately ½ mile west of I-95. This site was chosen as the State's NATTS site because it is not dominated by local sources and because levels of air toxics at this site appear to be representative of those in urban areas in the State. Note that, since the long-term future of the Urban League building is unknown at this time, RI DEM is working to identify nearby locations to which the NATTS site could be moved if necessary. RI DEM will request the EPA's approval of an alternative location if such a move is needed.

In keeping with EPA requirements, the following pollutants, at a minimum, are measured at the Rhode Island NATTS site:

Volatile Organic Compounds (VOC)

- Acrolein
- Perchloroethylene (tetrachloroethylene)
- Benzene
- Carbon tetrachloride
- Chloroform
- Trichloroethylene
- 1,3-butadiene
- Vinyl Chloride

Proposed

Carbonyls

- Formaldehyde
- Acetaldehyde

Metals

- Nickel compounds (PM_{10})
- Arsenic compounds (PM_{10})
- Cadmium compounds (PM_{10})
- Manganese compounds (PM_{10})
- Beryllium (PM_{10})
- Lead (PM_{10})
- Hexavalent chromium (TSP) – Discontinued as of the end of June 2013 in accordance with changing EPA priorities.

Semi-Volatile Organic Compounds (SVOC)

- Benzo(a)pyrene
- Napthalene

VOC, carbonyls and PM_{10} metal samples are analyzed by RI DOH. SVOC samples are analyzed by an EPA contractor. Note that, due to the redirection of EPA resources, monitoring for hexavalent chromium in Rhode Island was discontinued at the end of June 2013. Sampling at the NATTS site is conducted for all of the above parameters for 24-hour periods every sixth day. 24-hour VOC samples are also collected every sixth day at the PAMS sites in West Greenwich and East Providence and at the Vernon Street, Pawtucket site, which is adjacent to I-95 in Pawtucket. 24-hour carbonyl samples are collected at the East Providence site on the same schedule.

In addition, RI DEM /RI DOH operates aethalometers, which measure black carbon, an indicator of diesel exhaust, at the Urban League NATTS site and the East Providence Type 2 PAMS/NCore site and, as of April 2014, at the near-road site in Providence.

RI DEM is not planning any changes to the ozone precursor or air toxics monitoring sites in the next 18 months, unless EPA promulgates changes to the PAMS program that are effective during that period.

Proposed

National Core (NCore) Multi-pollutant Monitoring Stations Network

As required in an October 17, 2006 Federal Register notice (FR 71:61236), Rhode Island began operating a site that is part of EPA's network of core multipollutant monitoring (NCore) stations in January 2011. This network is designed to address the following monitoring objectives:

- timely reporting of data to the public through AIRNow, air quality forecasting, and other public reporting mechanisms
- supporting development of emission strategies through air quality model evaluation and other observational methods
- accessing accountability of emission strategy progress through tracking long-term trends of criteria and non-criteria pollutants and their precursors
- supporting long-term health assessments that contribute to ongoing reviews of the NAAQS
- establishing nonattainment/attainment areas by comparison with the NAAQS
- supporting multiple disciplines of scientific research, including; public health, atmospheric and ecological.

The Rhode Island Type 2 PAMS site in East Providence is also operating as the State's NCore site. Ozone, low-range NO_2/NO_x, reactive oxides of nitrogen (NO_y), low-range CO, low range SO_2, $PM_{2.5}$ (FRM, continuous and speciated), coarse PM ($PM_{10-2.5}$), VOCs, carbonyls, black carbon, lead in lo-vol PM_{10}, and meteorological parameters are monitored at that site. $PM_{10-2.5}$ is measured as the difference between lo-vol PM_{10} and lo-vol $PM_{2.5}$ concentrations. Note that the conventional NO_2/NO_x monitor at this site was replaced by a low-range NO_2/NO_x monitor in January 2013 and is being operated year-round, at least until the end of the 2015 ozone season. Rhode Island has no plans to change NCore monitoring in the next 18 months.

Proposed

Summary of Proposed Changes in the Rhode Island Monitoring Network

In summary, RI DEM plans to modify the current monitoring network as follows:

- If operation of the PM_{10} monitoring at Johnson & Wales in Providence becomes problematic, RI DEM may ask EPA for authorization to discontinue monitoring at that site.

- After the RI DOH Laboratory verifies that it can accurately measure lead concentrations in lo-vol PM_{10} samples, Rhode Island plans to begin to analyze its lead samples in-house using EPA's newly approved ICP/MS methodology.

- If the Urban League building becomes unavailable, RI DEM will seek the EPA's approval for moving the $PM_{2.5}$ and NATTS monitors at that site to an alternative location.

RI DEM understands that all network modifications that involve discontinuation or moving of any sites are subject to EPA approval, even if the remaining network meets EPA's minimum requirements.

Proposed

Figure 1
Air Quality Monitoring Network
Continous Gas Monitors
Site Locations

Figure 2
PM-10 Air Pollution Monitoring Network
Site Locations

Figure 3
PM-2.5 Air Pollution Monitoring Network
Site Locations

Figure 4
Air Toxics Monitoring Network
Site Locations

Figure 5 Trends in Rhode Island Ozone Concentrations

NAAQS = 75 ppb (8-hour average)

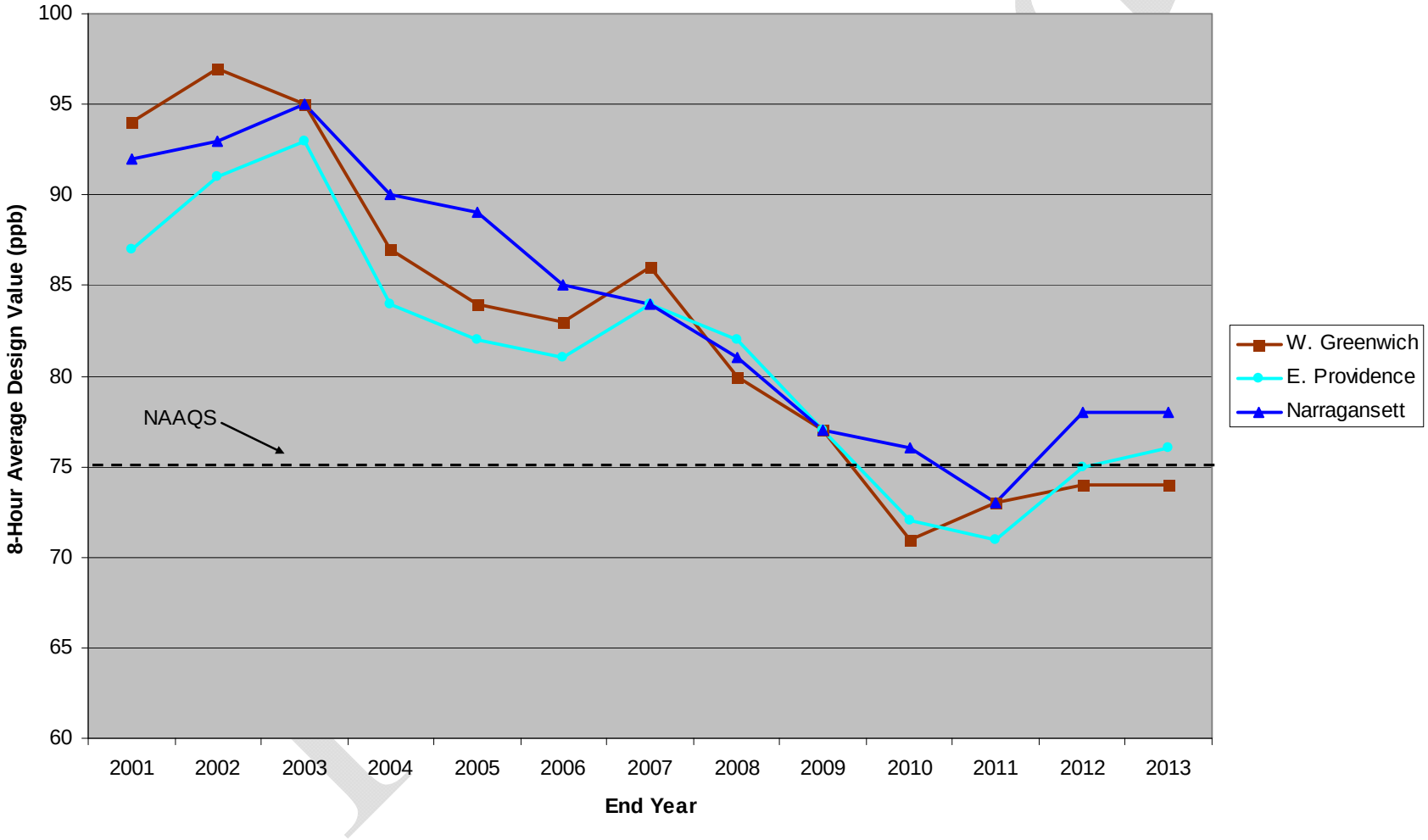

Figure 6 Trends in Carbon Monoxide (CO) Levels (8-Hour Average)

8-Hour Average NAAQS is 9 ppm

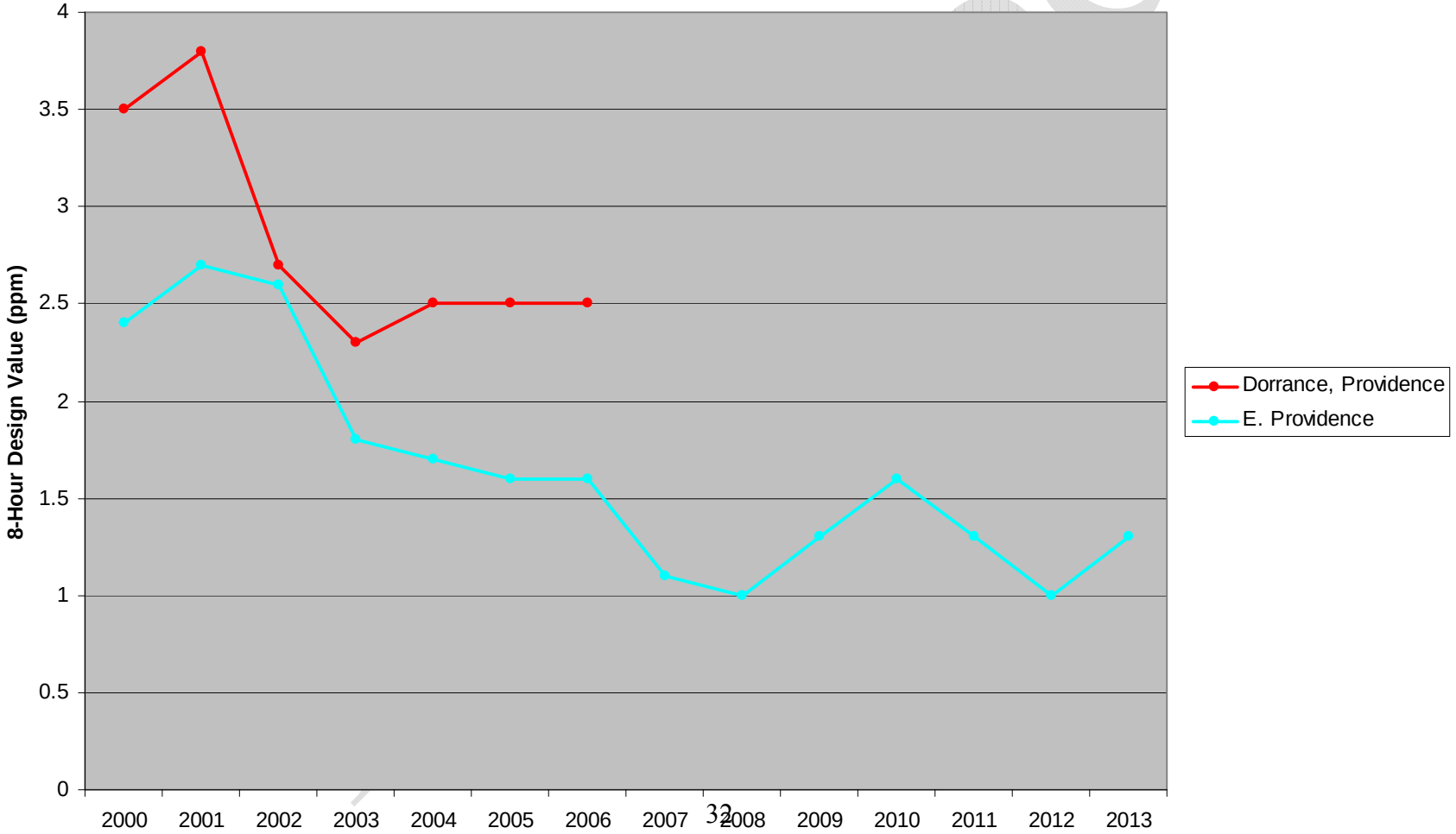

Figure 7 Trends in Sulfur Dioxide Levels (1-Hour Average)

Current 1-Hour NAAQS = 75 ppb

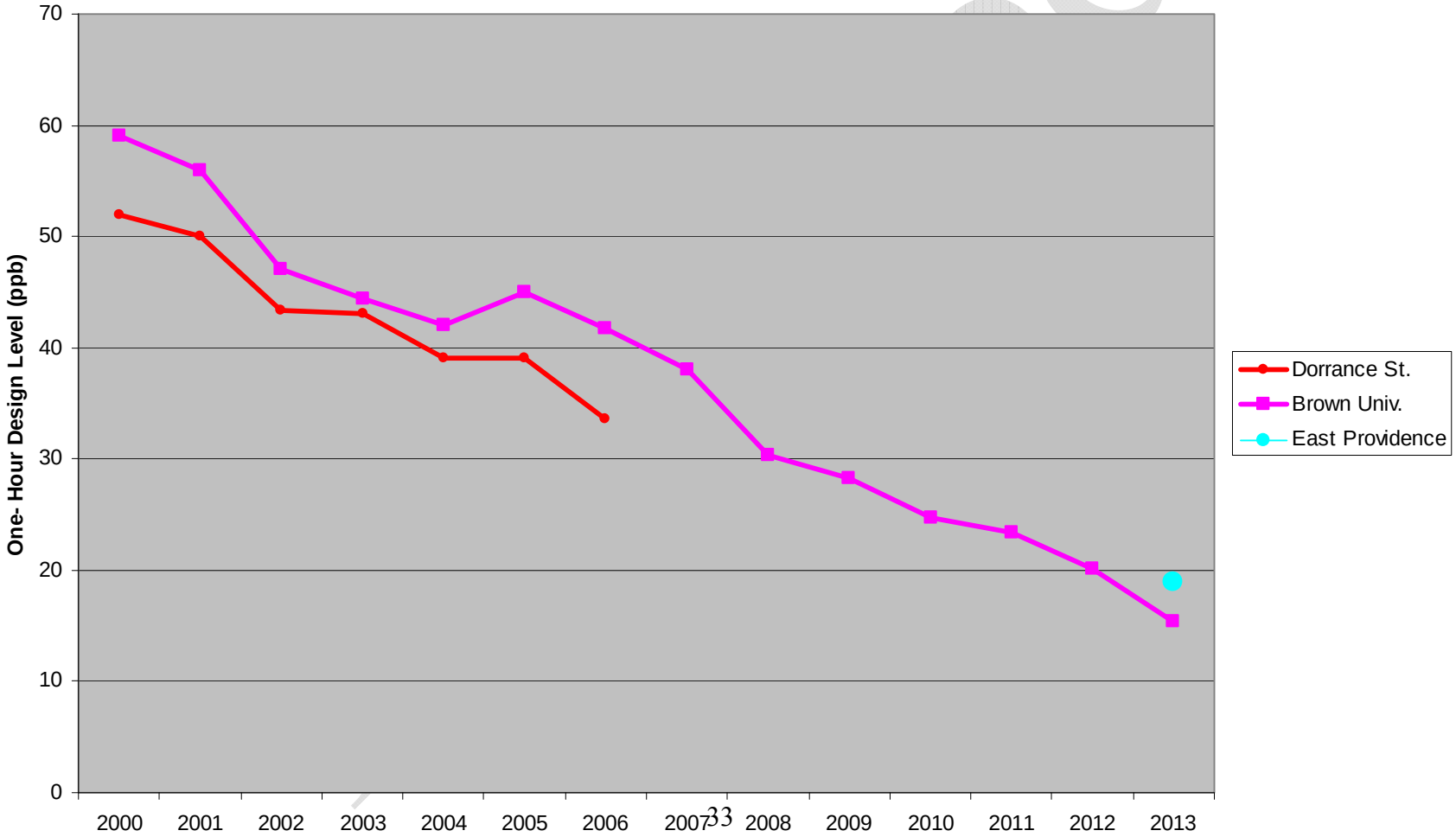

Figure 8 Trends in 24-Hour Average PM-10 Levels

NAAQS = 150 ug/m3

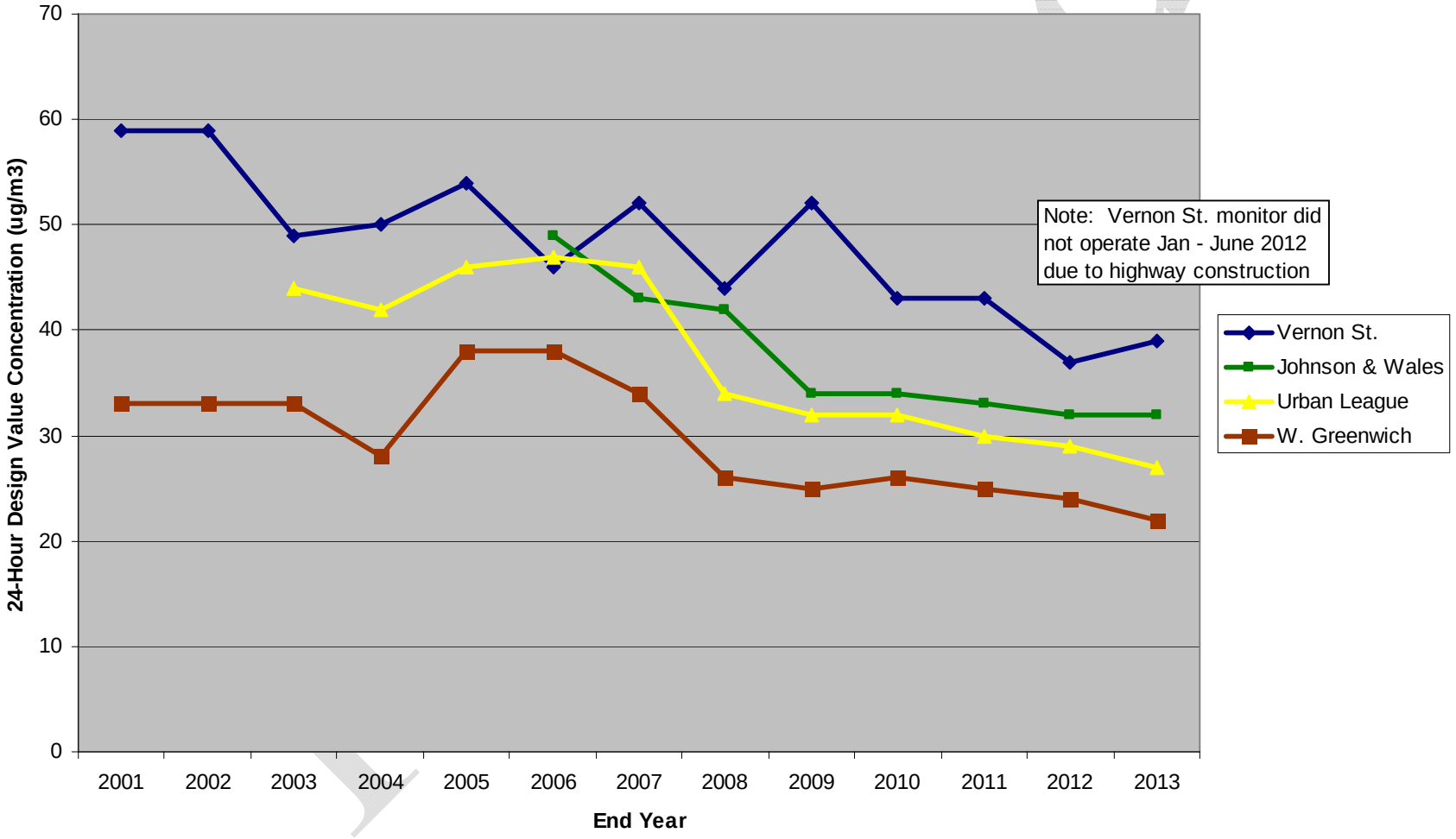

Figure 9 Trends in 24-Hour Average PM-2.5 Levels

NAAQS = 35 ug/m3

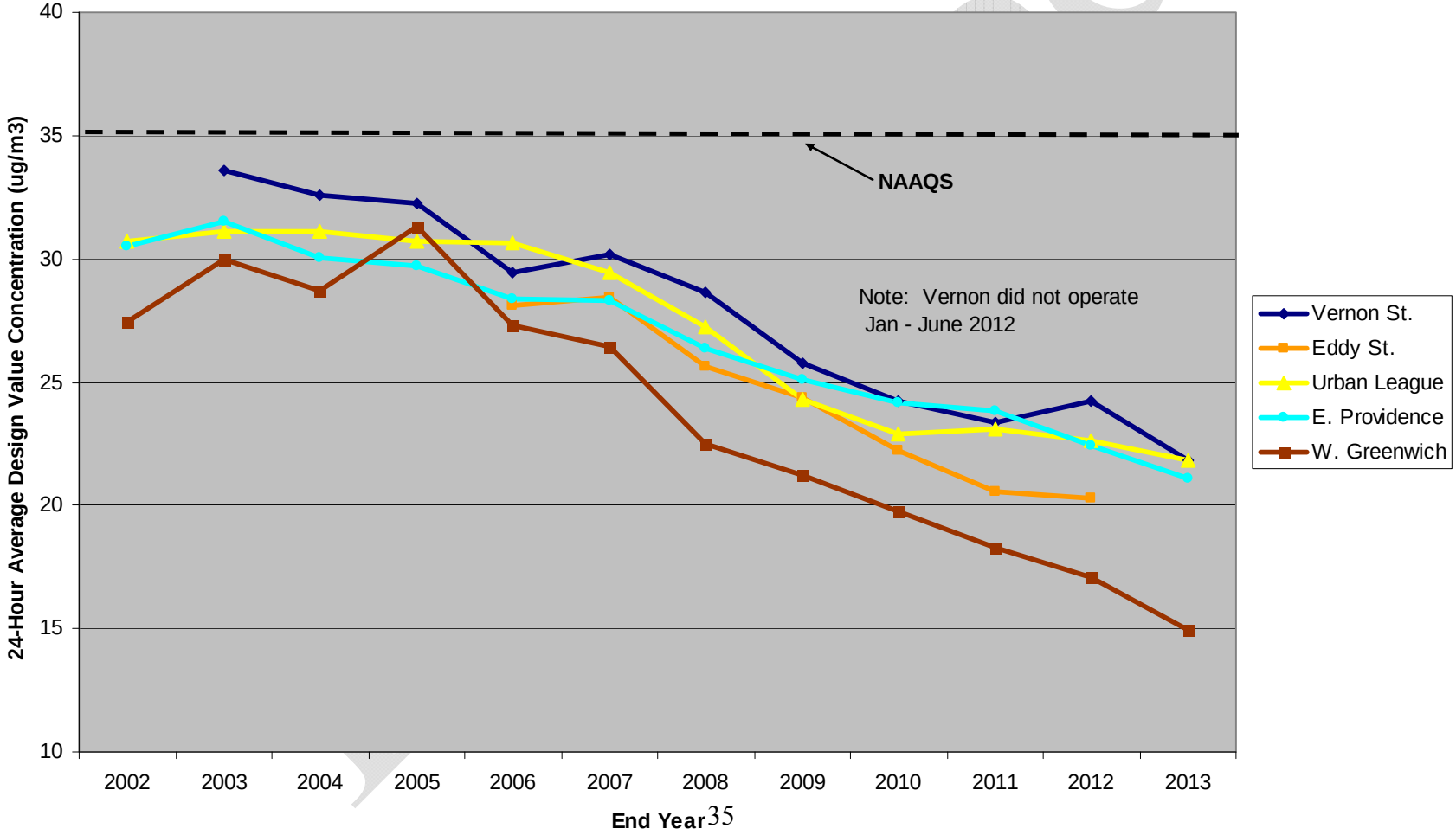

Figure 10 Trends in Annual Average PM-2.5 Levels
NAAQS = 12 ug/m3