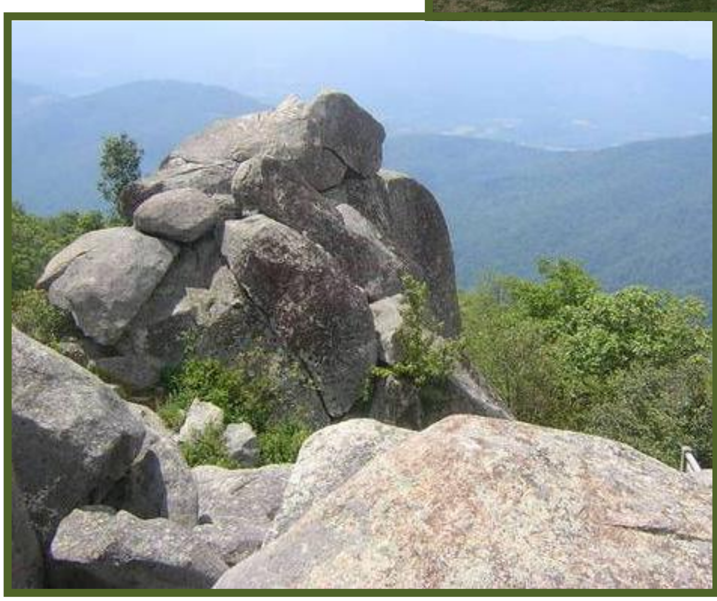
Virginia Ambient Air Monitoring 2010 Data Report



Department of Environmental Quality

Commonwealth of Virginia
Department of Environmental Quality

Office of Air Quality Monitoring

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This Ambient Air Monitoring Data Report is for the time period of January 1, 2010 to December 31, 2010.

On The Cover

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2010 Annual Report prepared by:
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Introduction

The 2010 Virginia Ambient Air Monitoring Data Report is a compilation of air pollutant measurements made by the Virginia Department of Environmental Quality, the City of Alexandria, the U.S. Department of Agriculture Forest Service, and the National Park Service. Ambient air quality was measured at 46 locations within the Commonwealth during 2010. These monitoring sites were established in accordance with EPA's siting criteria contained in 40 CFR Part 58, Appendices D and E (http://edocket.access.gpo.gov/cfr_2007 /julqtr/pdf/40cfr58.61.pdf), and monitoring network operations conformed to EPA guidance documents and generally accepted air quality monitoring practices. All data reported for these monitoring sites were quality assured in accordance with requirements contained in 40 CFR Part 58, Appendix A (http://edocket.access.gpo. gov/cfr_2007/julqtr/pdf/40cfr58.61.pdf). Ambient concentrations of carbon monoxide, nitrogen dioxide, and sulfur dioxide were within the EPA's national ambient air quality standards (NAAQS) in 2010. Virginia continues to experience exceedances of the ozone pollution standard, particularly in Northern Virginia, Richmond, and Hampton Roads. In 2010, Northern Virginia had 19 days when an eight-hour ozone average greater than .075 ppm was recorded at one or more monitoring stations in the area. Richmond had 10 days, Hampton Roads recorded 6 days, and Stafford County recorded 5 ozone exceedance days. Caroline County recorded 3 days that exceeded the 0.075 standard and the Charlottesville/Albemarle area recorded 3 days as well.

In 2010, the Office of Air Quality Monitoring (AQM) established new sites for lead monitoring in Amherst County and Buchanan County, and added a lead monitor at an existing site in Henrico County. The lead monitors were installed as part of the new monitoring requirements associated with the revised lead ambient standard. Other changes in 2010 included the relocation of a temporary site in Newport News to a permanent home at the NASA Langley Research Center in Hampton, as well as the discontinuation of three sites in Fairfax County, that had been part of the Fairfax County Health Department network. The long term monitoring site that had been in Hampton at the Virginia School for the Deaf and Blind was relocated onto the NASA Langley facility in Hampton in 2010. Also during the year the CO, NO2 and SO2 monitors that had been moved from the NOAA site in Norfolk were moved back to the site once the nearby construction was completed. In compliance with 40 CFR part 58, AQM completed the first ever Air Quality Monitoring Network Assessment. This assessment is to be completed every 5 years with 2010 being the first year it was required. The AQM Special Studies section completed a preliminary sampling project at 2 fumigation facilities located in the City of Suffolk. The National Core or NCore site was completed in November of 2010 fully 2 months prior to the regulatory deadline. This site employs new, more sensitive measurement methods to complement existing methods, and is part of a national network of sites designed to characterize urban and regional-scale patterns of air pollution.

AQM is responsible for seeing that the Virginia ambient air monitoring network is maintained and operated in accordance with state and federal guidelines. Personnel from the Department of Environmental Quality (DEQ) regional offices, the City of Alexandria, the National Park Service, and the U.S. Department of Agriculture Forest Service conduct the daily operations at these sites. One of AQM's primary jobs is to support these people in their air quality monitoring efforts. AQM does this by:

- calibrating air monitoring instrumentation and associated support equipment on a set schedule
- auditing the instrumentation to insure that it is operating within set standards
- troubleshooting instrumentation problems reported by the regional operators
- supplying field operators with necessary items so they can perform their job properly
- repairing malfunctioning sampling instrumentation and ancillary equipment

Other functions:

- respond to regional and locality requests for special sampling such as emergency response or to answer citizen complaints
- coordinate efforts with the regional offices and localities to determine new air monitoring site locations
- conduct AQM generated special sampling projects to characterize a community's air quality
- furnish ambient air data to the regional offices, localities, Central Office, EPA and the EPA database
- answer FOIA requests for ambient air sampling data
- work with the regions and the localities to see that area monitoring needs are met
- work with EPA to see that necessary state and federal monitoring needs are met
- support VISTAS (Visibility Improvement State and Tribal Association) and MARAMA (Mid-Atlantic Regional Air Management Association of the Southeast) on routine and special projects

Criteria Pollutant Monitoring:

A portion of the air monitoring network is made up of instruments that sample for the Criteria Pollutants. Sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, lead and particulate matter (PM10 & PM2.5) can injure health, harm the environment and cause property damage. EPA calls these pollutants criteria air pollutants because they have regulated them by first developing health-based criteria (science-based guidelines) as the basis for setting permissible limits. One set of limits (primary standard) protects health; another set of limits (secondary standard) is intended to prevent environmental and property damage

Special Monitoring:

In addition to overseeing the air sampling network for criteria pollutants, AQM conducts routine and short term sampling for VOCs (volatile organic compounds), Carbonyls, Toxic Metals and NOy (total reactive nitrogen). Sampled VOCs are made up of 39HAPs (Hazardous Air Pollutants) and 56 Hydrocarbon Ozone Precursors.

1. **What is the Clean Air Act?**

The Clean Air Act is a federal law that provides for the protection of human health and the environment. The original Clean Air Act was passed in 1963, and the 1970 version of the law resulted in the creation of the U.S. Environmental Protection Agency (EPA), which was charged with setting and enforcing ambient air quality standards. The law was amended in 1977, and most recently in 1990. Most of the activities of the Virginia Department of Environmental Quality's Air Division come from mandates of the Clean Air Act, and are overseen by the EPA. More information on the 1990 amendments to the Clean Air Act can be found at: http://www.epa.gov/air/caa/.

2. **What is a criteria air pollutant?**

The Clean Air Act names six air pollutants that are commonly found in the air throughout the United States, and that can injure humans by causing respiratory and cardiovascular problems, and harm the environment by impairing visibility, and causing damage to animals, crops, vegetation and buildings. EPA has developed health-based criteria for these pollutants through scientific studies, and has established regulations setting permissible levels of these pollutants in the air. The "criteria" pollutants are: carbon monoxide, sulfur dioxide, nitrogen dioxide, ozone, particulate matter, and lead, and the limits that have been set for them are the National Ambient Air Quality Standards (NAAQS).

3. **What is the difference between a primary and secondary National Ambient Air Quality Standard?**

The National Ambient Air Quality Standards are divided into two types. The first type, the primary standard, is designed to protect human health, especially those who are most vulnerable such as children and the elderly, and people suffering from asthma, emphysema, chronic bronchitis, and heart ailments. The second type, the secondary standard, is designed to prevent damage to property and the environment. For a list of the primary and secondary National Ambient Air Quality Standards, see http://www.epa.gov/air/criteria.html or page 67 of this report.

4. **How is the location of an air monitoring station decided?**

Generally, the deciding factor in all Virginia air monitoring sampling is to determine where the highest pollutant concentrations will occur, and place the sampler as near as possible to that location. A wind rose is typically used to determine the prevailing wind direction for an area and identify the downwind direction from a probable source. A wind rose is a meteorological map showing the frequency and strength of winds from different directions at a specific location.

For typical criteria pollutant monitoring, the federal guidelines on siting an air monitor for measuring maximum concentrations are followed. These guidelines not only encourage siting in areas with free airflow and a minimum amount of obstructions, but they also give the height requirements for the sample inlet and the desired separation distances from obstructions such as tree lines, localized sources such as oil furnace flues, and other influences that can skew the data.

Other determining factors for placing air monitoring stations include:

- security of the site
- safety of the operator
- availability of electric power and communication service
- accessibility of the site

For more specific information, consult EPA's Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II, Section 6, http://www.epa.gov/ttn/amtic/qalist.html

5. **How large of an area does an air monitoring station represent?**

The sampling area of a monitoring site is dependent on the parameters selected for representation, such as:

- type of pollutants being sampled
- rural vs. urban sampling
- source oriented, population oriented, or background oriented
- sampling for pollution transported from outside the Commonwealth

Many sites are also dependant on topography and meteorology of an area, which play an important role. Federal guidelines spell out the general area of representation. Some examples of varied air sampling sites are:

- A background research site in central Virginia may represent an area with a radius of 50 to 100 kilometers.
- An ozone or fine particulate site in the Shenandoah Valley may represent an elongated area with an axis running with the valley and is a hundred kilometers long but only twenty-five kilometers wide.
- A carbon monoxide sampling site in an urban street canyon setting may represent an area of only a few blocks in radius.
- A source oriented site in south central Virginia may represent an area from 0.5 to 4 kilometers in radius.

For more specific information, consult EPA's Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II, Section 6, http://www.epa.gov/ttn/amtic/qalist.html

6. **What is a "nonattainment" area?**

A nonattainment area is a geographic area that has been determined by EPA as not meeting the air quality standards for one or more pollutants. Typically, an area is declared nonattainment based on data collected at one or more ambient air monitoring sites within the area. However, sometimes the nonattainment designation can be made based on the use of air quality models that use monitoring data from other areas. In Virginia, nonattainment areas are designated for two of the criteria pollutants, ozone and fine particulate matter ($PM_{2.5}$).

7. **How can I find out if I live in a nonattainment area?**

A list of nonattainment areas in Virginia can be found in this report on page 71. EPA has a list of all nonattainment areas in the country at http://www.epa.gov/air/oaqps/greenbk/.

Frequently Asked Questions

8. **What are the impacts of a nonattainment designation?**

To demonstrate how they plan to achieve federal air quality standards, states must draft a "State Implementation Plan," or SIP. This plan lists specific actions that the state will undertake to improve and maintain acceptable air quality, and a time frame for accomplishing these goals. The SIP may require new factories to install the newest and most effective air pollution control technologies. Other actions could be requiring older factories to retrofit their smokestacks with better pollution control devices, requiring an area to sell only reformulated gasoline during the summer months, requiring vapor recovery systems on gasoline pumps, and requiring vehicle exhaust emission checks, to name a few. SIP development is a lengthy process, and involves negotiation between the state and the EPA until it is finalized.

9. **What is a Maintenance Area?**

A maintenance area is an area that has formerly been designated nonattainment, but is now recognized by EPA as meeting the NAAQS. A maintenance area must have an approved "maintenance plan" to meet and maintain air quality standards.

10. **What is a design value?**

A design value is a statistic that describes the air quality status of a given area relative to the level of the National Ambient Air Quality Standards (NAAQS). Design values are typically used to classify nonattainment areas, assess progress towards meeting the NAAQS, and develop control strategies. Design values are expressed as concentrations in the ambient air and are calculated according to regulatory specifications to determine the highest monitored concentration in an attainment or non-attainment area.

11. **How can I get current or historical air quality data?**

Current ozone data for Virginia, as well as current AQI and air quality forecasts can be obtained at www.deq.virginia.gov/airquality/homepage.html. Summary air quality data PM2.5 can also be found at www.deq.virginia.gov/airmon/ pm25home.html. Annual monitoring data reports can be found at http://www.deq.virginia.gov/airmon/publications.html. EPA provides monitoring data, as well as maps, on the web at www.epa.gov/airexplorer/index.htm and www.epa.gov/air/emissions/where.htm. Detailed data for monitoring sites in Virginia can also be obtained by contacting the VA DEQ Office of Air Quality Monitoring, or from EPA's AQS Data Mart at www.epa.gov/ttn/airs/aqsdatamart.

12. **What do I do if I have a complaint about air quality in my neighborhood?**

Contact the DEQ regional office in your area. To see a list of regional offices and phone numbers, see page 58 of this report, or visit www.deq.virginia.gov/prep.

13. **Who can I call about an indoor air quality problem, such as mold or radon gas?**

Your local health department may be able to assist you with some indoor air quality problems. See www.vdh.state.va.us/lhd for the health department office in your area. Other excellent sources of information on indoor air quality can be found on EPA's website at www.epa.gov/iaq/index.html and through the American Lung Association website at www.lungusa.org.

Criteria Pollutants

$PM_{2.5}$ is particulate matter (PM) that is less than or equal to 2.5 micrometers (a micrometer is one millionth of a meter) in aerodynamic diameter. These particles are often called "fine particles" because of their small size. Fine particles originate from a variety of man-made stationary and mobile sources, such as factory smoke stacks and diesel engines, as well as from natural sources, such as forest fires. These particles may be emitted directly into the air, or they may be formed by chemical reaction in the atmosphere from gaseous emissions of sulfur dioxide (SO2), nitrogen oxides (NOx), and volatile organic compounds (VOCs).

Scientific research has linked fine particle pollution to human health problems. The particles are easily inhaled deep into the lungs, and can actually enter the bloodstream. Particle pollution is of particular concern to people with heart or lung disease, such as coronary artery disease, congestive heart failure, asthma, or chronic obstructive pulmonary disease (COPD). Older adults are at risk because they may have underlying, undiagnosed heart or lung problems. Young children are also at risk because their lungs are still developing, they are more likely to have asthma or acute respiratory disease, and they tend to spend longer periods of time at high activity levels, causing them to inhale more particles than someone at rest. Even otherwise healthy people may suffer short-term symptoms such as eye, nose, throat irritation, coughing, and shortness of breath during episodes of high particulate levels.

$PM_{2.5}$ air quality standards were implemented by EPA in 1997 to protect against the health effects of fine particle pollution. In September 2006, EPA announced revisions to the National Ambient Air Quality Standards (NAAQS) for particulate matter. While the long-term $PM_{2.5}$ annual average standard of 15.0 $\mu g/m^3$ remained the same, the short-term 24-hour average $PM_{2.5}$ standard was significantly reduced from 65 $\mu g/m^3$ to 35 $\mu g/m^3$. This was done to better protect public health, based on a large body of scientific evidence which supported the stricter limits. For more information, see www.epa.gov/air/particlepollution/pdfs/20060921_factsheet.pdf.

In addition to health problems, fine particle pollution contributes to haze that causes deterioration of visibility in scenic areas, and also deposits harmful compounds on the soil and water. Unlike ozone, which is a seasonal pollutant in most areas of the country, particle pollution can occur year-round, and is monitored throughout the year in Virginia. The Virginia DEQ $PM_{2.5}$ monitoring network uses three different types of samplers to monitor fine particulate in the state:

$PM_{2.5}$ 24-hour Mass Sampler: This Federal Reference Method (FRM) sampler collects particulate matter on a stretched Teflon filter media. Four samplers (Henrico Co., Roanoke, Virginia Beach, and Fairfax Co.) collect 24-hour samples every day. The rest of these samplers collect 24-hour samples on a one-in-three day schedule. Filters are retrieved from the field and shipped via courier to the Virginia Division of Consolidated Laboratory Services (DCLS) in Richmond. At the laboratory, the filters are equilibrated for a minimum of 24 hours prior to the final weighing.

$PM_{2.5}$ 24-hour Speciation: Speciated $PM_{2.5}$ data are collected at one site in Virginia, the MathScience Innovation Center in Henrico Co., using two co-located samplers that operate simultaneously. One sampler, the MetOne SASS, collects particulate matter on two filters, one nylon and the other Teflon. The second sampler, the URG 3000N carbon sampler, uses a quartz filter to collect particulate matter. The samplers run for 24 hours, on a one-in-three day sampling schedule. After the completion of a sample run, the instrument operator removes the exposed filters and ships them via refrigerated container to RTI, the EPA contract lab in North Carolina. RTI analyzes the filters for the following:

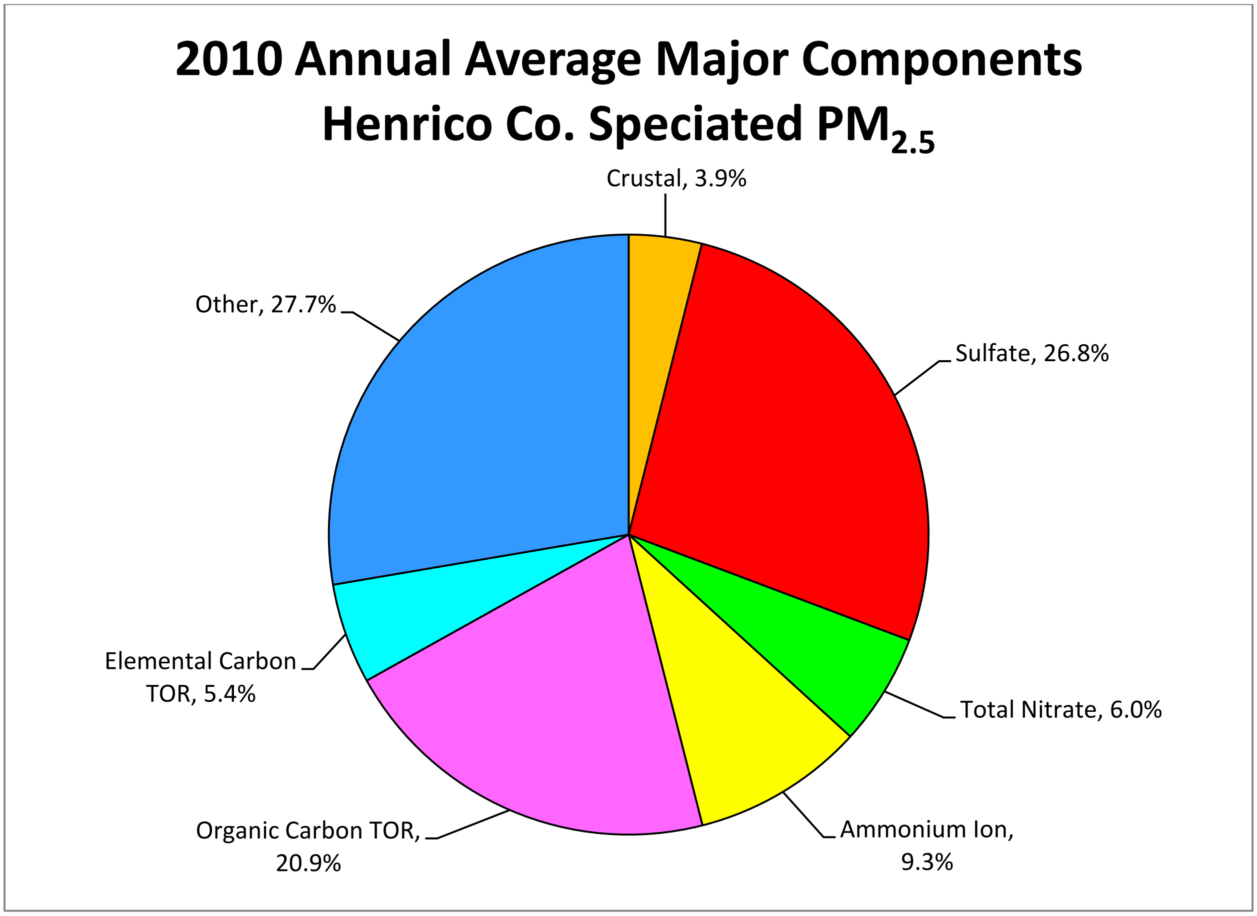
- Teflon filter: total mass loading and thirty-three trace elements including aluminum, antimony, arsenic, bromine, calcium, iron, lead, silicon, titanium, vanadium, and zirconium
- Nylon filter: cations (ammonium, potassium, sodium) and anions (nitrate, sulfate)
- Quartz filter: carbons (carbonate carbon, elemental carbon, organic carbon, total carbon)

The resulting data provide a "chemical fingerprint" of air masses moving through the Richmond area. These data, in conjunction with historical data from other speciation sites, including those outside Virginia, give a representative picture of the constituents of the air samples, which help identify sources of high values and show how the air masses move over a broad area.

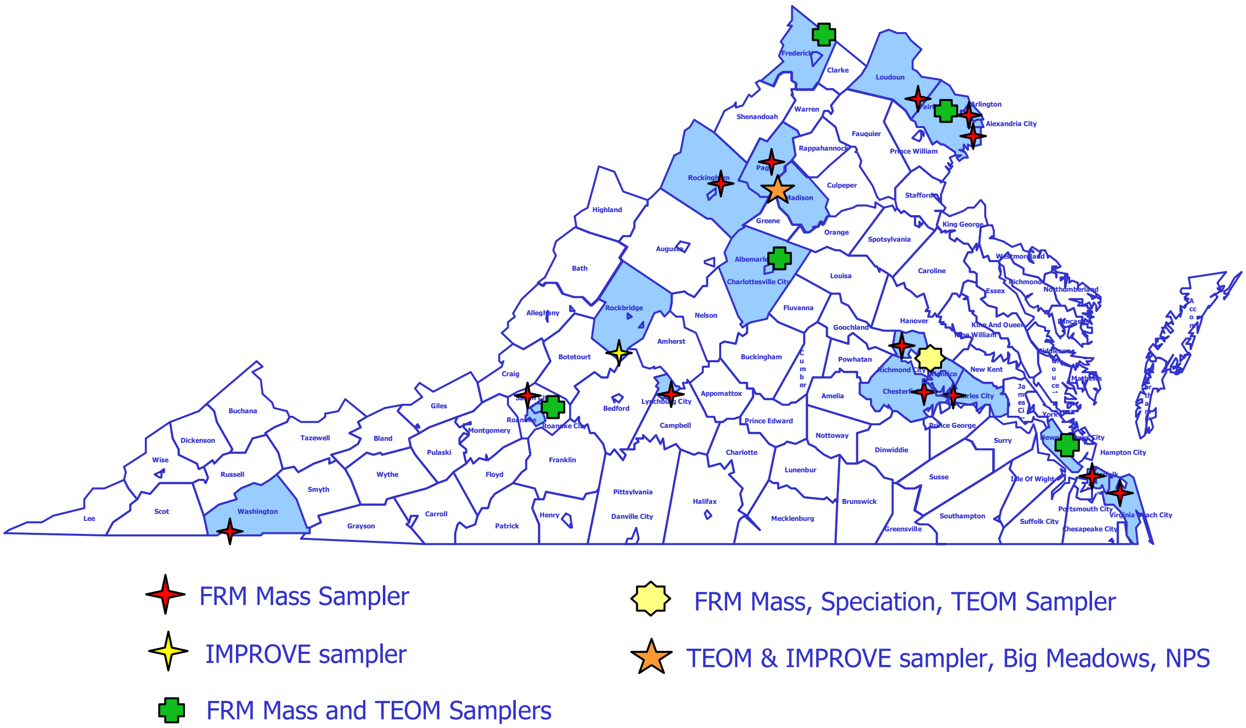
$PM_{2.5}$ Continuous Monitor: This sampler collects particulate samples on a continuous basis, and data are compiled into hourly averages. The sampler utilizes a Tapered Element Oscillating Microbalance (TEOM) in the sampling design. TEOM samplers are operated in Hampton Roads, Henrico Co., Roanoke, Fairfax Co., Shenandoah National Park, Frederick Co., and Albemarle Co.

Each type of $PM_{2.5}$ sampler has a unique function. The FRM samplers collect data that are used to determine if the state is complying with the national ambient air quality standards (NAAQS) for particulate matter. The speciation sampler collects data about the composition of particulate matter in Virginia, and is useful for identifying potential sources of air pollution both within and outside the state boundaries. The FRM and speciation monitors are manual, filter-based methods, and the samples they collect must be transported to a laboratory for processing. Consequently, they are not useful for reporting real-time air quality conditions. The TEOM is a continuous particulate monitor that provides hourly data on fine particulate levels. The data are polled each hour by a central computer at DEQ, used to compute the current air quality index, and then posted on the agency website at www.deq.virginia.gov/airquality/homepage.html. The data are also simultaneously sent to EPA's national air quality website at www.airnow.gov.

In addition to the $PM_{2.5}$ network operated by the DEQ, the National Park Service and the USDA Forest Service operate $PM_{2.5}$ samplers at Big Meadows in Shenandoah National Park, and in Rockbridge Co. as part of the IMPROVE (Interagency Monitoring of Protected Visual Environments) network. This network employs different sampling methods than those used by the DEQ. Data for the IMPROVE network can be found on the internet at http://vista.cira.colostate.edu/improve.



PM2.5 Monitoring Network



National Ambient Air Quality Standards (NAAQS)

Primary Standard for $PM_{2.5}$:

- Annual Arithmetic Mean – the 3 year average of the weighted annual mean $PM_{2.5}$ concentration must not exceed 15.0 $\mu g/m^3$.
- 24-Hour concentration – the 3 year average of the 98^{th} percentile of 24-hour concentrations must not exceed 35 $\mu g/m^3$.

Secondary Standard for $PM_{2.5}$:

- Same as Primary.

2008-2010 $PM_{2.5}$ 24-hour Averages, 98^{th} Percentile Values ($\mu g/m^3$)				
Site	**2008**	**2009**	**2010**	**3-Year Average**
(101-E) **Bristol**	25.9	19.7	21.1	22
(29-D) **Page Co.**	25.0	20.8	24.3	23
(33-A) **Albemarle Co.**	26.0*	17.5	19.8	21
(109-M) **Roanoke**	27.3**	20.5	22.7	24
(26-F) **Rockingham Co.**	24.7	21.7	25.2	24
(28-J) **Frederick Co.**	25.9	21.3	24.8	24
(155-Q) **Lynchburg**	25.4	18.5	20.4	21
(71-D) **Chesterfield Co.**	22.8	19.0	21.6	21
(72-M) **Henrico Co.**	25.3**	20.8	22.4	23
(72-N) **Henrico Co.**	21.9	20.2	21.1	21
(75-B) **Charles City Co.**	22.1	18.5	20.6	20
(181-A1) **Norfolk**	30.3	17.7	21.7	23
(184-J) **Va. Beach**	38.6**	20.1	23.9	28
(38-I) **Loudoun Co.**	27.5**	20.0	19.6	22
(47-T) **Arlington Co.**	27.9	23.2	21.8*	24
(46-B9) **Franconia, Fairfax Co.**	28.4	24.2	23.7	25

* Annual value did not meet completeness criteria.

** In 2009, VA DEQ submitted documentation to EPA requesting exclusion of high values that resulted from large wildfires in the Dismal Swamp and eastern North Carolina during the summer of 2008, under the Exceptional Events rule, 40 CFR, 50.14. As of November 2010, the EPA has agreed to exclude high values from the monitors in Norfolk (181-A1), Va. Beach (184-J), Hampton (179-C, which was discontinued in April 2009), Henrico Co. (72-M), Roanoke (109-M), and Loudoun Co. (38-I). However, as of August 2011, only the PM2.5 high values from Norfolk have received the concurrence flags in AQS that are necessary for exclusion.

National Ambient Air Quality Standards (NAAQS)

Primary Standard for $PM_{2.5}$:

- Annual Arithmetic Mean – the 3 year average of the weighted annual mean $PM_{2.5}$ concentration must not exceed 15.0 $\mu g/m^3$.
- 24-Hour concentration – the 3 year average of the 98th percentile of 24-hour concentrations must not exceed 35 $\mu g/m^3$.

Secondary Standard for $PM_{2.5}$:

- Same as Primary.

2008-2010 PM $_{2.5}$ Weighted Annual Arithmetic Means ($\mu g/m^3$)				
Site	**2008**	**2009**	**2010**	**3-Year Average**
(101-E) **Bristol**	10.6	9.2	10.8	10.2
(28-J) **Frederick Co.**	12.0	10.4	10.8	11.1
(29-D) **Page Co.**	10.5	8.8	10.2	9.8
(33-A) **Albemarle Co.**	10.4*	8.4	9.4	9.4
(109-M) **Roanoke**	11.6	9.4	10.2	10.4
(26-F) **Rockingham Co.**	11.5	9.8	11.2	10.8
(155-Q) **Lynchburg**	10.0	8.4	9.7	9.4
(71-D) **Chesterfield Co.**	11.3	9.2	10.2	10.3
(72-M) **Henrico Co.**	10.7	9.3	9.9	10.0
(72-N) **Henrico Co.**	10.5	8.8	9.7	9.6
(75-B) **Charles City Co.**	10.5	8.6	9.4	9.5
(181-A1) **Norfolk**	13.7	9.4	10.2	11.1
(184-J) **Va. Beach**	11.8	9.2	9.9	10.3
(38-I) **Loudoun Co.**	11.5	9.2	10.3	10.3
(47-T) **Arlington Co.**	12.0	10.1	10.3*	10.8
(46-B9) **Franconia, Fairfax Co.**	11.1	9.8	9.9	10.3

* Annual value did not meet completeness criteria.

3-Day Monitoring Schedule for PM2.5

2010

January

Su	M	Tu	W	Th	F	Sa
					1	**2**
3	4	**5**	6	7	**8**	9
10	**11**	12	13	**14**	15	16
17	18	19	**20**	21	22	**23**
24	25	**26**	27	28	**29**	30
31						

February

Su	M	Tu	W	Th	F	Sa
	1	2	3	**4**	5	6
7	8	9	**10**	11	12	**13**
14	15	**16**	17	18	**19**	20
21	**22**	23	24	**25**	26	27
28						

March

Su	M	Tu	W	Th	F	Sa
	1	2	**3**	4	5	**6**
7	8	**9**	10	11	**12**	13
14	**15**	16	17	**18**	19	20
21	22	23	**24**	25	26	**27**
28	29	**30**	31			

April

Su	M	Tu	W	Th	F	Sa
				1	**2**	3
4	**5**	6	7	**8**	9	10
11	12	13	**14**	15	16	**17**
18	19	**20**	21	22	**23**	24
25	**27**	27	28	**29**	30	

May

Su	M	Tu	W	Th	F	Sa
						1
2	3	4	**5**	6	7	**8**
9	10	**11**	12	13	**14**	15
16	**17**	18	19	**20**	21	22
23	24	25	**26**	27	28	**29**
30	31					

June

Su	M	Tu	W	Th	F	Sa
		1	2	3	**4**	5
6	**7**	8	9	**10**	11	12
13	14	15	**16**	17	18	**19**
20	21	**22**	23	24	**25**	26
27	**28**	29	30			

July

Su	M	Tu	W	Th	F	Sa
				1	2	3
4	5	6	**7**	8	9	**10**
11	12	**13**	14	15	**16**	17
18	**19**	20	21	**22**	23	24
25	26	27	**28**	29	30	**31**

August

Su	M	Tu	W	Th	F	Sa
1	2	**3**	4	5	**6**	7
8	**9**	10	11	**12**	13	14
15	16	17	**18**	19	20	**21**
22	23	**24**	25	26	**27**	28
29	**30**	31				

September

Su	M	Tu	W	Th	F	Sa
			1	**2**	3	4
5	6	7	**8**	9	10	**11**
12	13	**14**	15	16	**17**	18
19	**20**	21	22	**23**	24	25
26	27	28	**29**	30		

October

Su	M	Tu	W	Th	F	Sa
					1	**2**
3	4	**5**	6	7	**8**	9
10	**11**	12	13	**14**	15	16
17	18	19	**20**	21	22	**23**
24	25	**26**	27	28	**29**	30
31						

November

Su	M	Tu	W	Th	F	Sa
	1	2	3	**4**	5	6
7	8	9	**10**	11	12	**13**
14	15	**16**	17	18	**19**	20
21	**22**	23	24	**25**	26	27
28	29	30				

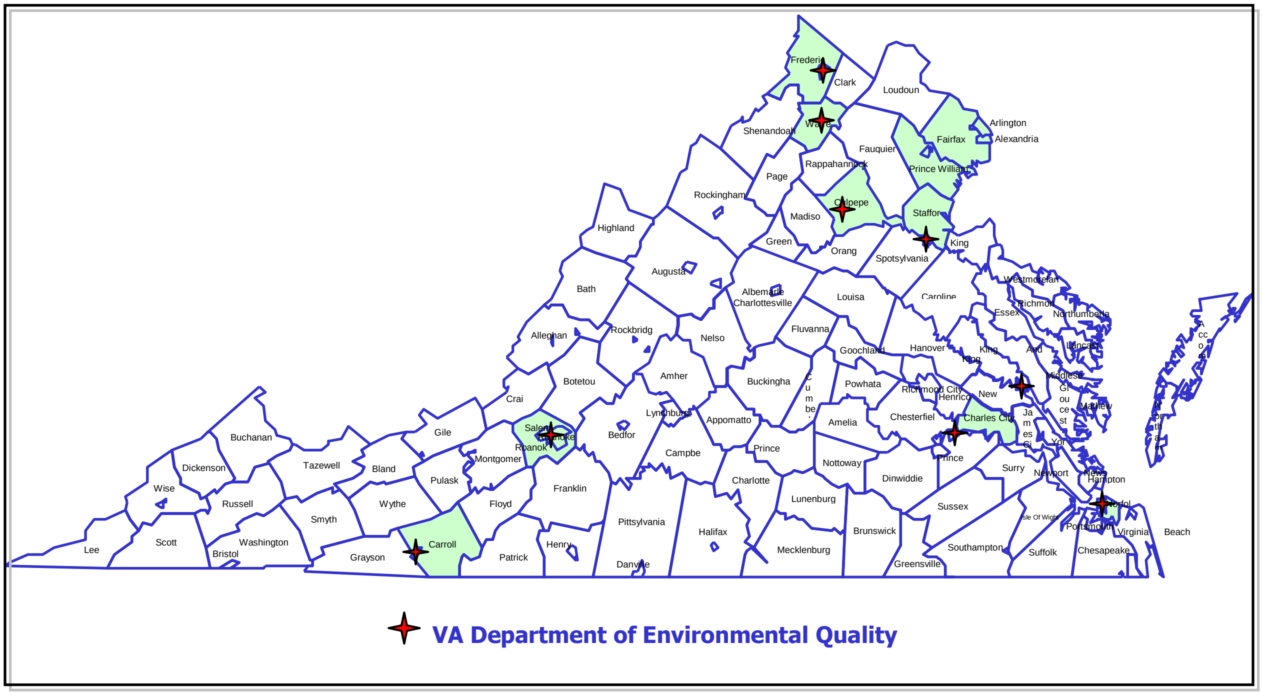
December

Su	M	Tu	W	Th	F	Sa
			1	2	3	**4**
5	6	**7**	8	9	**10**	11
12	**13**	14	15	**16**	17	18
19	20	21	**22**	23	24	**25**
26	27	**28**	29	30	**31**	

PM_{10} is particulate matter comprised of solid particles or liquid droplets with an aerodynamic diameter of less than or equal to 10 micrometers, and is sometimes referred to as "coarse particles." PM_{10} particles are larger than $PM_{2.5}$, but are still in a size range that can pose health problems because they can be inhaled, and retained in the human respiratory system, causing breathing difficulties, and eye, nose and throat irritation. In addition to the health effects of PM_{10}, these particles can impair visibility, can contribute to climate change, and result in "acidic dry deposition." Acidic dry deposition occurs when particles containing acidic compounds fall to the ground. The acidic particles can corrode surfaces that they settle on, and can increase the acidity of the soil and water.

The National Ambient Air Quality Standards, or NAAQS, for particulate matter were revised in September 2006. EPA changed the existing standards for PM_{10} by revoking the annual standard of 50 micrograms per cubic meter, because current scientific evidence did not support a link between long-term exposure to coarse particles and health problems. However, the 24-hour PM_{10} standard was retained to protect citizens from effects of short-term exposures. For additional information on the revised particulate matter standards, see www.epa.gov/air/particlepollution/pdfs/20060921_factsheet.pdf.

To measure $PM_{10,}$ ambient air is drawn into a sampler that uses a particle size discrimination inlet. The inlet is designed so that particles in the size range of 10 micrometers (also called microns) or below stay suspended in the air stream, while larger particles settle out. The sample air flows across an 8 x 10 inch micro-quartz filter at a rate of 40 cubic feet per minute for a 24-hour period. The particles are captured on the filter, which is weighed before and after sampling, and the PM_{10} concentration is determined by dividing the change in filter mass by the volume of sampled air. The resulting PM_{10} concentration is reported as micrograms per cubic meter ($\mu g/m^3$). The filters are processed at the DEQ Office of Air Quality Monitoring. The normal sampling schedule is once every sixth day from midnight to midnight.



National Ambient Air Quality Standards (NAAQS)

Primary Standard for PM_{10}:

- 24-Hour concentration not to exceed 150 μg/m^3 more than once per year averaged over three years.

Secondary Standard for PM_{10}:

- Same as Primary.

2008-2010 PM_{10} 24-Hour Average Concentrations (units in μg/m^3)							
Site	2008		2009		2010		>150 μg/m^3
	1st Max	2nd Max	1st Max	2nd Max	1st Max	2nd Max	
(23-A) **Carroll Co.**	29	28	40	30	34	25	0
(30-E) **Warren Co.**	38	36	31	24	42	28	0
(134-C) **Winchester**	36	36	29	28	43	32	0
(109-H) **Roanoke**	68	61	65	63	34	33	0
(154-M) **Hopewell**	36	34	35	27	42	30	0
(82-C) **King William Co.**	36	35	35	27	45	31	0
(181-A1) **Norfolk**	88	69	45	35	45	37	0
(42-B) **Culpeper Co.**	39	33	27	26	46	30	0
(130-E) **Fredericksburg**	40	39	30	28	45	40	0

6-Day Monitoring Schedule for PM10

2010

January

Su	M	Tu	W	Th	F	Sa
					1	**2**
3	4	5	6	7	**8**	9
10	11	12	13	**14**	15	16
17	18	19	**20**	21	22	23
24	25	**26**	27	28	29	30
31						

February

Su	M	Tu	W	Th	F	Sa
	1	2	3	4	5	6
7	8	9	10	11	12	**13**
14	15	16	17	18	**19**	20
21	22	23	24	**25**	26	27
28						

March

Su	M	Tu	W	Th	F	Sa
	1	2	**3**	4	5	6
7	8	**9**	10	11	12	13
14	**15**	16	17	18	19	20
21	22	23	24	25	26	**27**
28	29	30	31			

April

Su	M	Tu	W	Th	F	Sa
				1	**2**	3
4	5	6	7	**8**	9	10
11	12	13	**14**	15	16	17
18	19	**20**	21	22	23	24
25	**26**	27	28	29	30	

May

Su	M	Tu	W	Th	F	Sa
						1
2	3	4	5	6	7	**8**
9	10	11	12	13	**14**	15
16	17	18	19	**20**	21	22
23	24	25	**26**	27	28	29
30	31					

June

Su	M	Tu	W	Th	F	Sa
		1	2	3	4	5
6	**7**	8	9	10	11	12
13	14	15	16	17	18	**19**
20	21	22	23	24	**25**	26
27	28	29	30			

July

Su	M	Tu	W	Th	F	Sa
				1	2	3
4	5	6	**7**	8	9	10
11	12	**13**	14	15	16	17
18	**19**	20	21	22	23	24
25	26	27	28	29	30	**31**

August

Su	M	Tu	W	Th	F	Sa
1	2	3	4	5	**6**	7
8	9	10	11	**12**	13	14
15	16	17	**18**	19	20	21
22	23	**24**	25	26	27	28
29	**30**	31				

September

Su	M	Tu	W	Th	F	Sa
			1	2	3	4
5	6	7	8	9	10	**11**
12	13	14	15	16	**17**	18
19	20	21	22	**23**	24	25
26	27	28	**29**	30		

October

Su	M	Tu	W	Th	F	Sa
					1	2
3	4	**5**	6	7	8	9
10	**11**	12	13	14	15	16
17	18	19	20	21	22	**23**
24	25	26	27	28	**29**	30
31						

November

Su	M	Tu	W	Th	F	Sa
	1	2	3	**4**	5	6
7	8	9	**10**	11	12	13
14	15	**16**	17	18	19	20
21	**22**	23	24	25	26	27
28	29	30				

December

Su	M	Tu	W	Th	F	Sa
			1	2	3	**4**
5	6	7	8	9	**10**	11
12	13	14	15	**16**	17	18
19	20	21	**22**	23	24	25
26	27	**28**	29	30	31	

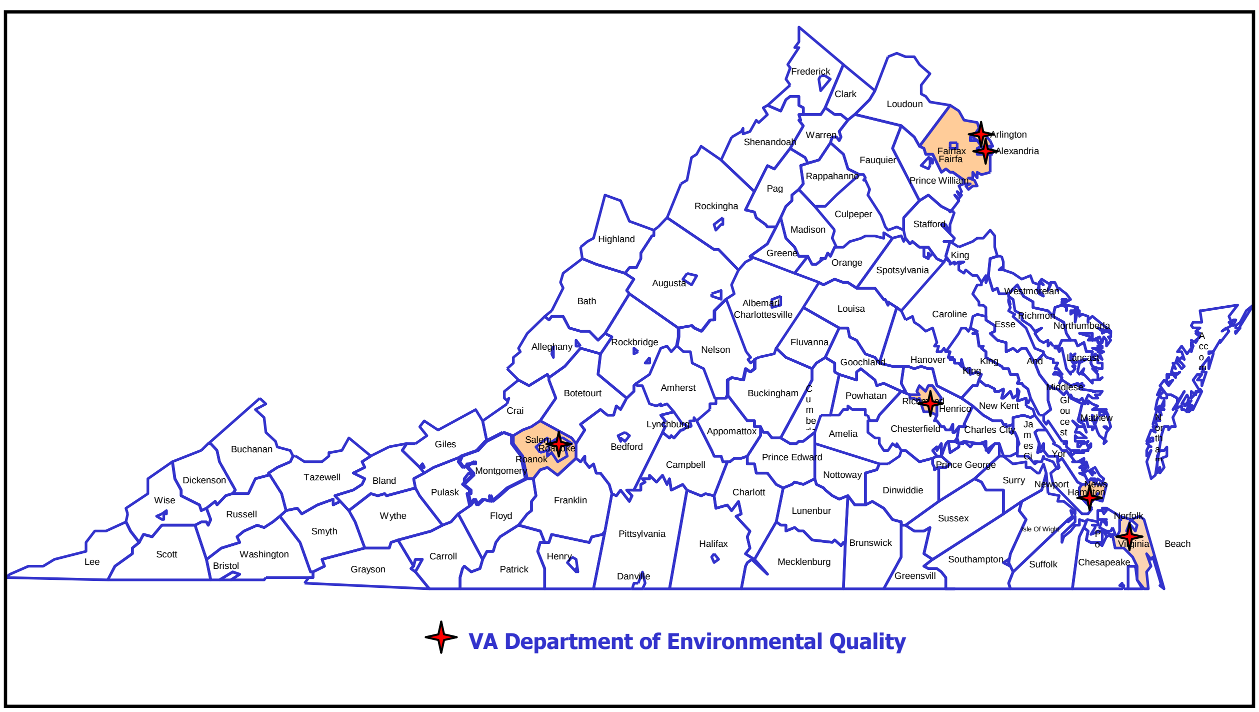
CO Monitoring Network

Carbon monoxide (CO) is a colorless, odorless gas that is produced by incomplete burning of carbon compounds in fossil fuels (gasoline, natural gas, coal, oil, etc.). Over half of the CO emissions in the country come from motor vehicle exhaust. Other sources include construction equipment, boats, lawnmowers, woodstoves, forest fires, and industrial manufacturing processes.

CO concentrations are higher in the vicinity of heavily traveled highways, and drop rapidly the further the distance from the road. Ambient levels of carbon monoxide tend to be higher in the colder months due to "thermal inversions" that trap pollutants close to the ground. A thermal inversion occurs when the temperature of the air next to the ground is colder than air above it. When this happens, the air resists vertical mixing that can help the pollutants to disperse, forming a layer of smog close to the ground.

Carbon monoxide is harmful because it reacts in the bloodstream, reducing the amount of oxygen that is supplied to the heart and brain. CO can be harmful at lower levels to people who suffer from cardiovascular disease, like angina, arteriosclerosis, or congestive heart failure. At high levels, CO can impair brain function, causing vision problems, reduce manual dexterity, and reduce ability to perform complicated tasks. At very high levels, carbon monoxide can be deadly.

Carbon monoxide in the ambient air is measured continuously with an electronic instrument that uses NDIR, "non-dispersive infrared" photometry. The instrument has a pump that continuously draws air through a sample chamber that contains an infrared light source and a detector. Any CO molecules that are present in the sample air absorb some of the infrared light, reducing the intensity of the light reaching the detector. The portion of the infrared light absorbed by the CO molecules is converted into an electrical signal corresponding to the CO concentration, and stored in the instrument computer.



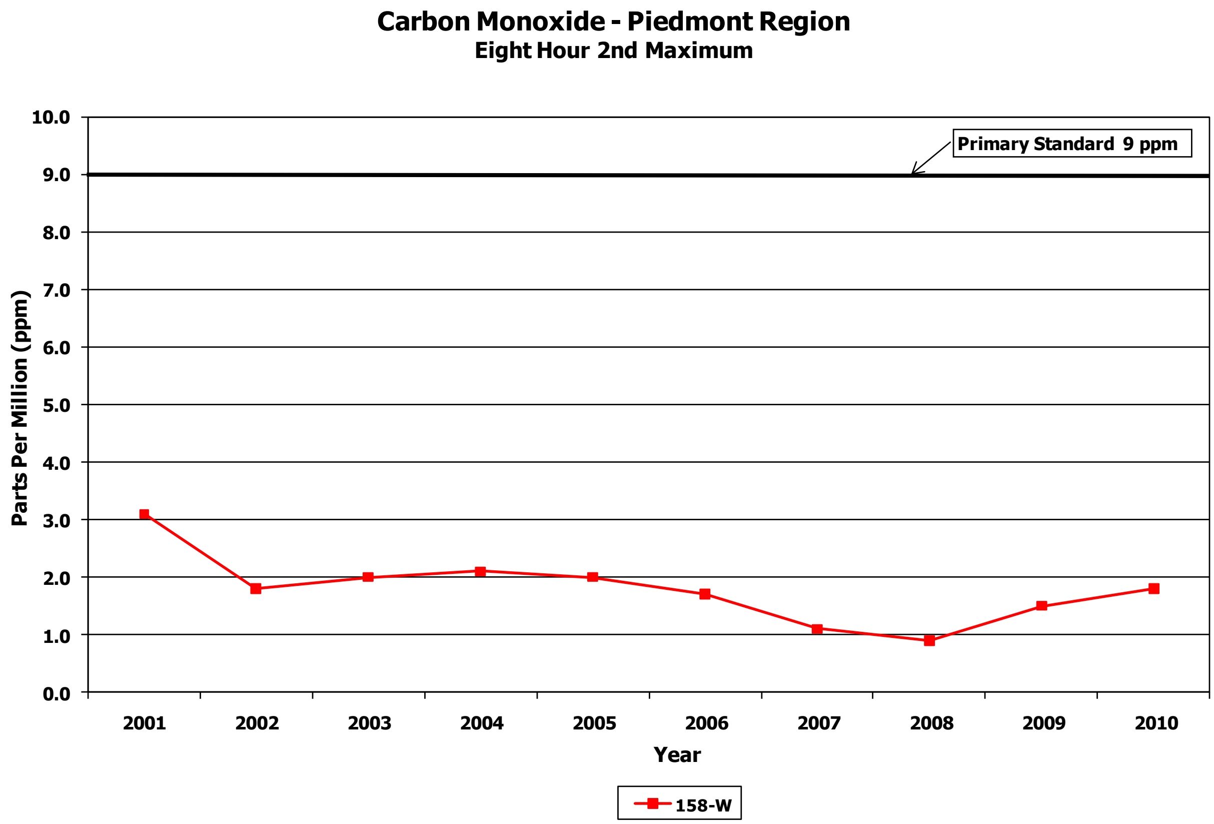
National Ambient Air Quality Standards (NAAQS)

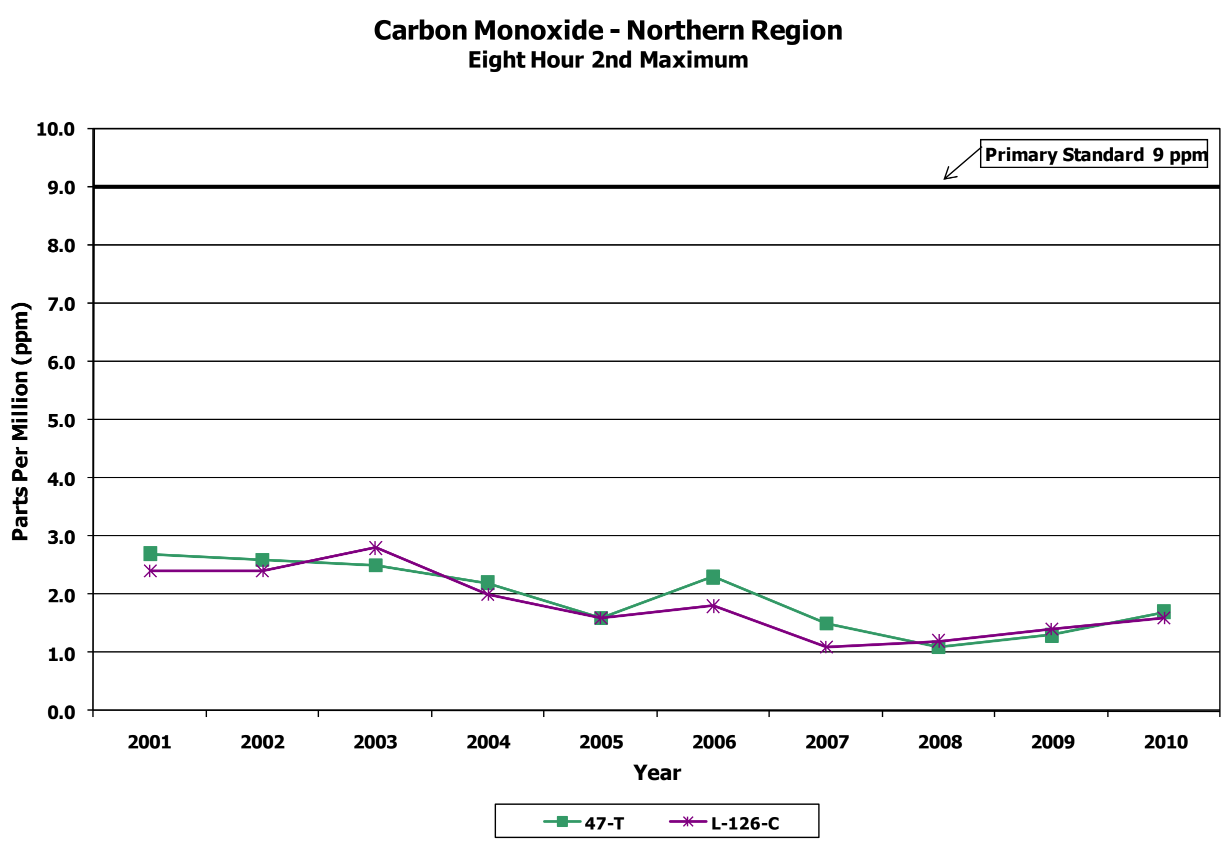
Primary Standard for CO:
- 8-hour average not to exceed 9 ppm (10 mg/m^3) more than once per year.
- 1-hour average not to exceed 35 ppm (40 mg/m^3) more than once per year.

There are no Secondary Standards for CO because it does not harm vegetation or buildings.

Site	2010			
	1-Hour Avg. (ppm)		8-Hour Avg. (ppm)	
	1st Max.	2nd Max.	1st Max.	2nd Max.
(109-M) **Roanoke**	1.7	1.7	1.3	1.3
(158-W) **Richmond**	2.4	2.4	2.3	1.8
(179-K) **Hampton**	1.4	1.4	1.2	1.2
(47-T) **Arlington Co.**	2.3	2.2	1.8	1.7
(L-126-C) **Alexandria**	2.3	2.0	1.8	1.6
(184-J) **Virginia Beach**	2.3	2.3	1.7	1.7

* Eight Hour Averages stated as Ending Hour


Carbon Monoxide - Piedmont Region
Eight Hour 2nd Maximum
Primary Standard 9 ppm
Parts Per Million (ppm)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
Year
158-W

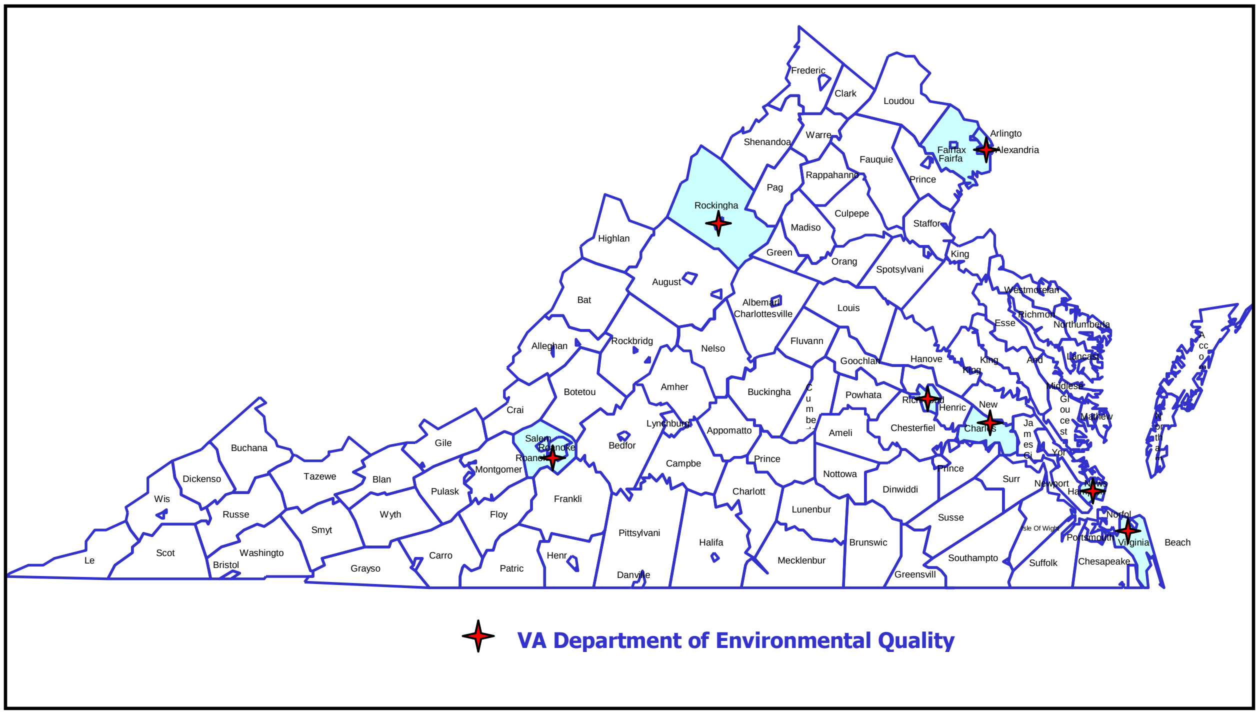

Carbon Monoxide - Northern Region
Eight Hour 2nd Maximum
Primary Standard 9 ppm
Parts Per Million (ppm)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
Year
47-T
L-126-C

Sulfur Dioxide (SO_2) is a colorless gas that has a strong odor. It results from burning of fuels containing sulfur (such as coal and oil), petroleum refining, and smelting (extracting metals from ore), and it also occurs naturally from volcanic eruptions. SO_2 can dissolve in water vapor to produce sulfuric acid, and it can also interact with other gases and particles in the air to produce sulfate aerosols that are capable of traveling long distances in the atmosphere.

EPA has developed primary and secondary air quality standards for SO_2. The primary standards are designed to protect people from the health effects of sulfur dioxide gas, which include respiratory problems for people with asthma and for those who are active outdoors. Long-term exposure to high concentrations of sulfur dioxide gas can cause respiratory illness and aggravate existing heart conditions. Sulfate particles that are formed from SO_2 gas can be inhaled, and are associated with increased respiratory symptoms and disease.

Secondary standards for sulfur dioxide protect against damage to vegetation and buildings, and against decreased visibility. The acids that can form from SO_2 and water vapor contribute to acid deposition (commonly called "acid rain") which causes damage to the leaves of plants and trees, making them vulnerable to disease, and can increase the acidity of lakes and streams, making them unsuitable for aquatic life. Acid deposition also causes deterioration of materials on buildings, monuments, and sculptures. Finally, small sulfate particles, formed when SO_2 gas reacts with other gases and particles in the air, contribute to haze that causes decreased visibility in many areas of the country.

Sulfur dioxide is monitored continuously with an electronic instrument using ultraviolet fluorescence detection. The instrument has a pump that pulls outside air into a sample chamber containing a high intensity ultraviolet (UV) light. Any SO_2 molecules in the sample air absorb some of the UV light, become excited, and then fluoresce, releasing light characteristic of SO_2. The fluorescence is detected with a photomultiplier tube (a tube that detects very small amounts of light and multiplies the signal many times), and the resulting signal, which corresponds to the amount of SO_2 in the sample, is converted to an SO_2 concentration by the instrument computer.



National Ambient Air Quality Standards (NAAQS)

Primary Standards for SO_2:

- 3-year average of the 99th percentile 1-hour daily maximum values not to exceed 75 ppb.

Secondary Standard for SO_2:

- 3-Hour concentration not to exceed 0.5 ppm (500 ppb) more than once per year.

Sulfur Dioxide 99th Percentile 1-Hour Daily Maximum Values (ppb)											
State ID	City/County	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	3-Yr Avg Design Value 2008-2010
75-B	Charles City Co.	80	92	84	79	94	78	94	58	47	44	50
19-A6	Roanoke Co.	18	19	17	16	15	22	Inc	12	10	10	11
26-F	Rockingham Co.				Inc	19	14	11	11	13	8	11
L126-C	Alexandria	86	92	103	71	78	46	42	31	36	17	28
*179-C	Hampton	61	69	56	63	57	72	63	47	Inc		NA
158-W	Richmond	71	87	93	50	79	54	53	38	39	39	39
**184-J	Virginia Beach										41	NA

Inc - Incomplete
NA – Not available

* Terminated in 2009 due to sale of the property. The monitor was relocated to a new site in Hampton in the second quarter of 2010.
** Temporarily removed in 2009 due to a major construction project in the area. The SO2 monitor was briefly relocated to Virginia Beach in 2010, then returned to Norfolk in January 2011.

National Ambient Air Quality Standards (NAAQS)

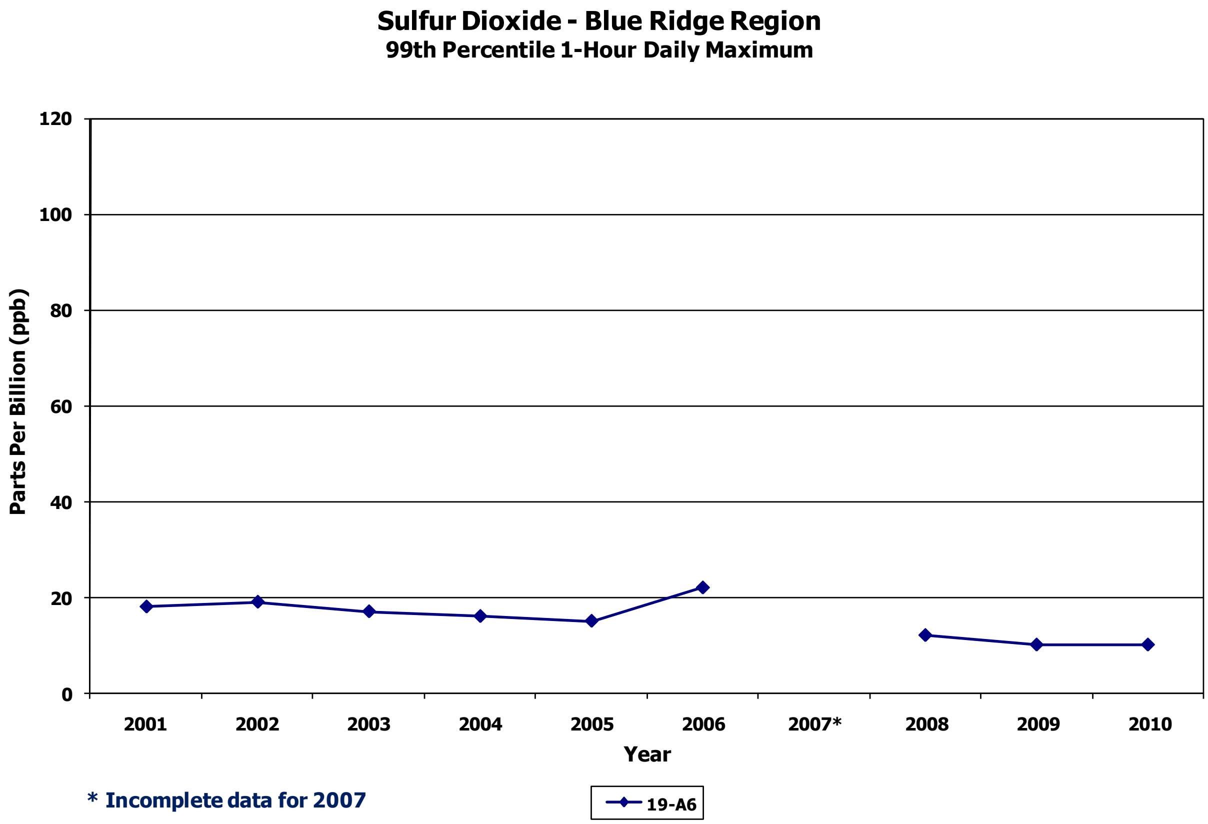
Primary Standards for SO_2:
- 3-year average of the 99th percentile 1-hour daily maximum values not to exceed 75 ppb.

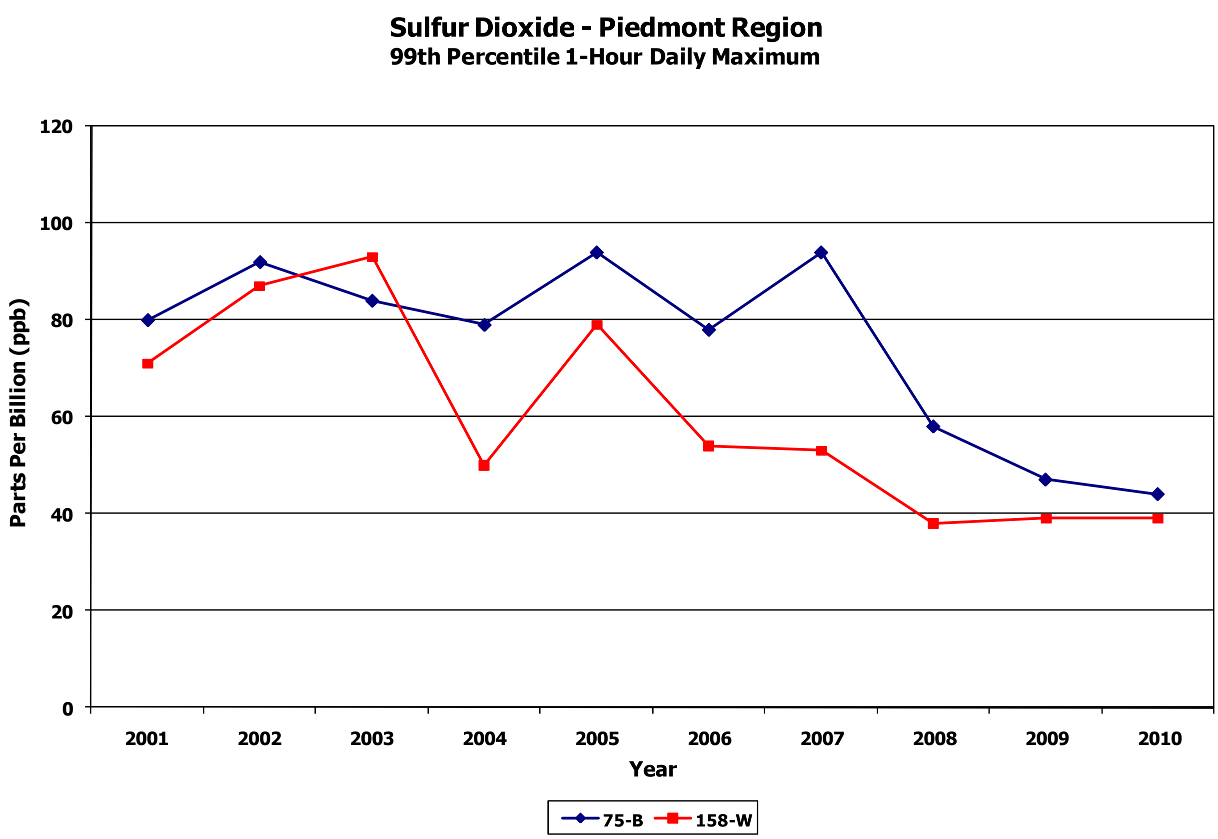
Secondary Standard for SO_2:
- 3-Hour concentration not to exceed 0.5 ppm (500 ppb) more than once per year.

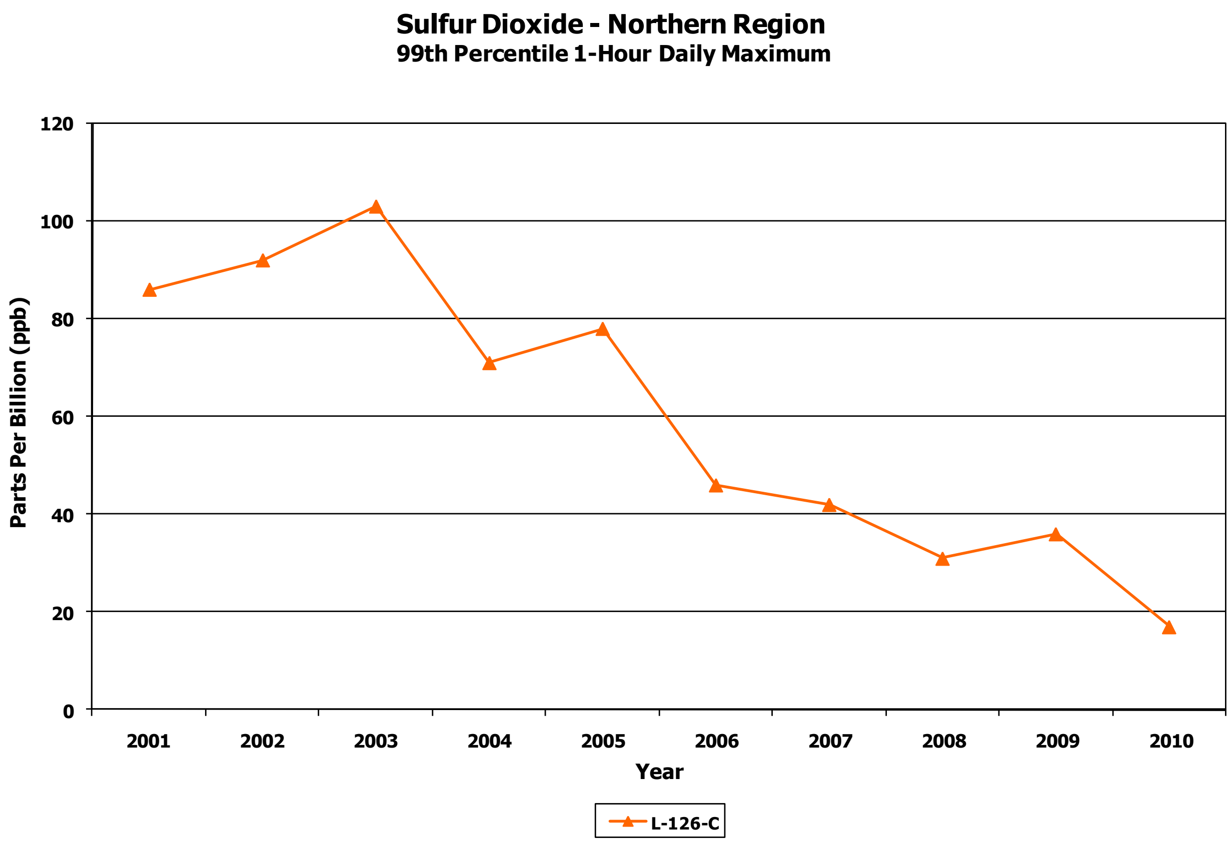
Sulfur Dioxide 3-Hour Block Average Maximum Values (ppb)												
State ID	**City/County**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**Number Obs. > 500 ppb**
75-B	Charles City Co.	65	84	110	70	66	75	68	41	67	37	0
19-A6	Roanoke Co.	18	23	17	22	23	23	Inc	14	14	14	0
26-F	Rockingham Co.				Inc	21	20	16	14	16	9	0
L126-C	Alexandria	93	96	113	61	77	67	48	42	55	17	0
*179-C	Hampton	46	47	41	48	44	61	58	63	Inc		0
158-W	Richmond	83	92	79	48	54	42	38	27	32	40	0
**184-J	Virginia Beach										35	0

Inc - Incomplete
NA – Not available

* Terminated in 2009 due to sale of the property. The monitor was relocated to a new site in Hampton in the second quarter of 2010.
** Temporarily removed in 2009 due to a major construction project in the area. The SO2 monitor was briefly relocated to Virginia Beach in 2010, and then returned to Norfolk in January 2011.


Sulfur Dioxide - Blue Ridge Region
99th Percentile 1-Hour Daily Maximum
120
100
80
60
40
20
0
Parts Per Billion (ppb)
2001
2002
2003
2004
2005
2006
2007*
2008
2009
2010
Year
* Incomplete data for 2007
19-A6


Sulfur Dioxide - Piedmont Region
99th Percentile 1-Hour Daily Maximum
120
100
80
60
40
20
0
Parts Per Billion (ppb)
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
Year
75-B
158-W

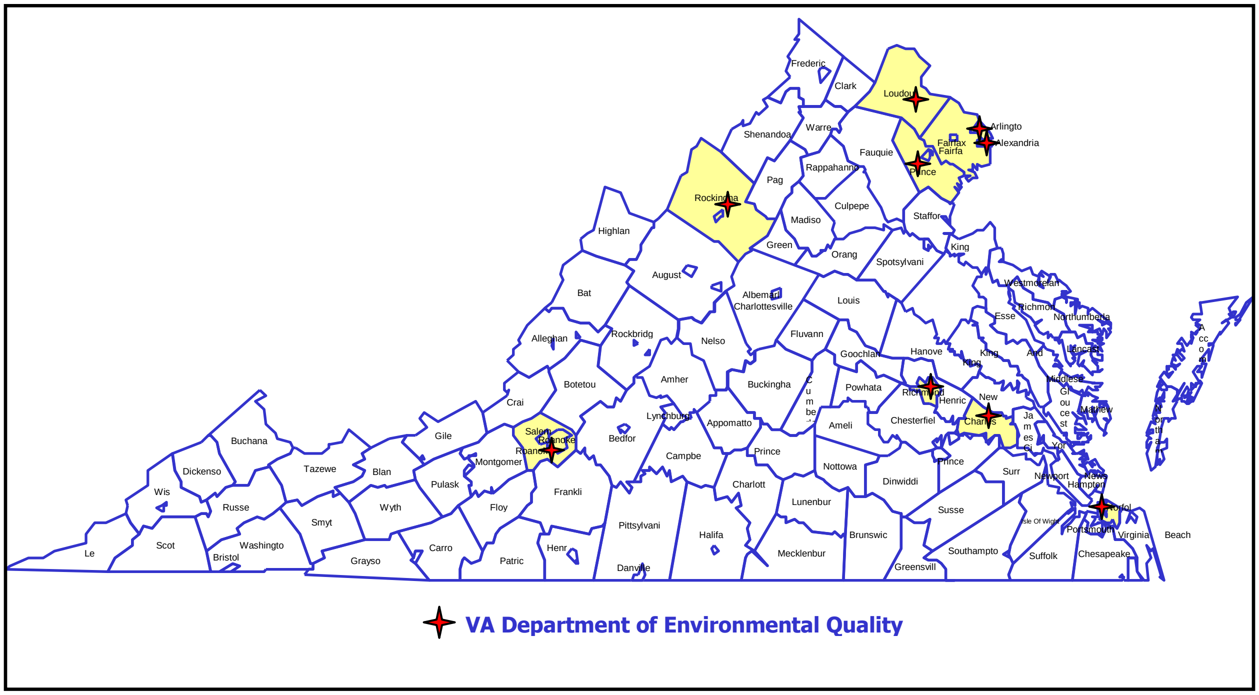

Sulfur Dioxide - Northern Region
99th Percentile 1-Hour Daily Maximum
Parts Per Billion (ppb)
120
100
80
60
40
20
0
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
Year
L-126-C

Nitrogen dioxide (NO_2) is one in a group of gases referred to as oxides of nitrogen (NO_X). Nitrogen dioxide, which is characterized by a reddish-brown color and pungent odor, along with the other NO_X gases, results from high-temperature burning of fossil fuels in automobiles, power plants, and other industrial, commercial, and residential sources. NO_X can occur naturally from lightning, forest fires, and bacterial processes that take place in soil.

NO_X pollution contributes to a wide range of problems in the environment. Ground-level ozone, a major component of "smog", forms when NO_X and volatile organic compounds (VOCs) react in the presence of sunlight. NO_X also reacts with other gases and particles in the air to form acids that contribute to acid deposition, and to form small particles that can be inhaled into the lungs. NO_X contributes to water quality deterioration by depositing nitrogen into water bodies, upsetting the nutrient balance and causing oxygen depletion in the water so that fish and other aquatic life cannot survive. Nitrate particles and nitrogen dioxide also contribute to visibility impairment by blocking light transmission.

EPA has established primary and secondary air quality standards for NO_2 because it can cause lung irritation and respiratory problems in humans. Small particles formed from reaction of NO_X gases with other compounds can be inhaled deep into the lungs and cause or worsen respiratory conditions such as emphysema and bronchitis, and can aggravate existing heart conditions.

Nitrogen oxides are measured continuously with electronic instruments using the "gas phase chemiluminescence" method. The instrument has a pump that draws ambient air into a reaction chamber. Inside the chamber, the air is mixed with a high concentration of ozone (O_3). Any nitric oxide (NO) present in the sample air reacts with O_3 to produce NO_2. The NO_2 molecules created by the reaction are in an excited state, and emit light characteristic of NO_2 – this is called "chemiluminescence." The light produced in the reaction is detected with a photomultiplier tube, and the resulting signal is converted to a number reflecting the concentration of NO in the ambient air by the instrument computer. The instrument then activates a valve that diverts incoming ambient air into a "converter", which converts any NO_2 in the ambient air to NO by reduction reaction. After the air passes through the converter, it is sent to the reaction chamber where the NO and O_3 react to produce NO_2. The chemiluminescence produced by the reaction is converted to a signal that reflects the concentration of NO_X in the ambient air. The instrument then calculates the NO_2 concentration using the difference between the measured NOx and NO concentrations.



National Ambient Air Quality Standards (NAAQS)

Primary Standard for NO_2:

- 3-year average of the 98th percentile 1-hour daily maximum values not to exceed 100 ppb.
- Annual Arithmetic Mean not to exceed 53 ppb (100 $\mu g/m^3$).

Secondary Standard for NO_2:

- Same as primary.

Nitrogen Dioxide 98th Percentile 1-Hour Daily Maximum Values (ppb)					
State ID	**City/County**	**2008**	**2009**	**2010**	**3-Yr Avg Design Value 2008-2010**
75-B	Charles City Co.	60	55	56	57
19-A6	Roanoke Co.	37	37	41	38
26-F	Rockingham Co.	40	40	44	41
L126-C	Alexandria	53	53	57	54
158-W	Richmond	52	53	57	54
38-I	Loudoun Co.	37	40	44	40
45-L	Prince William Co.	35	26	30	30
47-T	Arlington Co.	49	49	52	50

National Ambient Air Quality Standards (NAAQS)

Primary Standard for NO_2:

- 3-year average of the 98th percentile 1-hour daily maximum values not to exceed 100 ppb.
- Annual Arithmetic Mean not to exceed 53 ppb (100 $\mu g/m^3$).

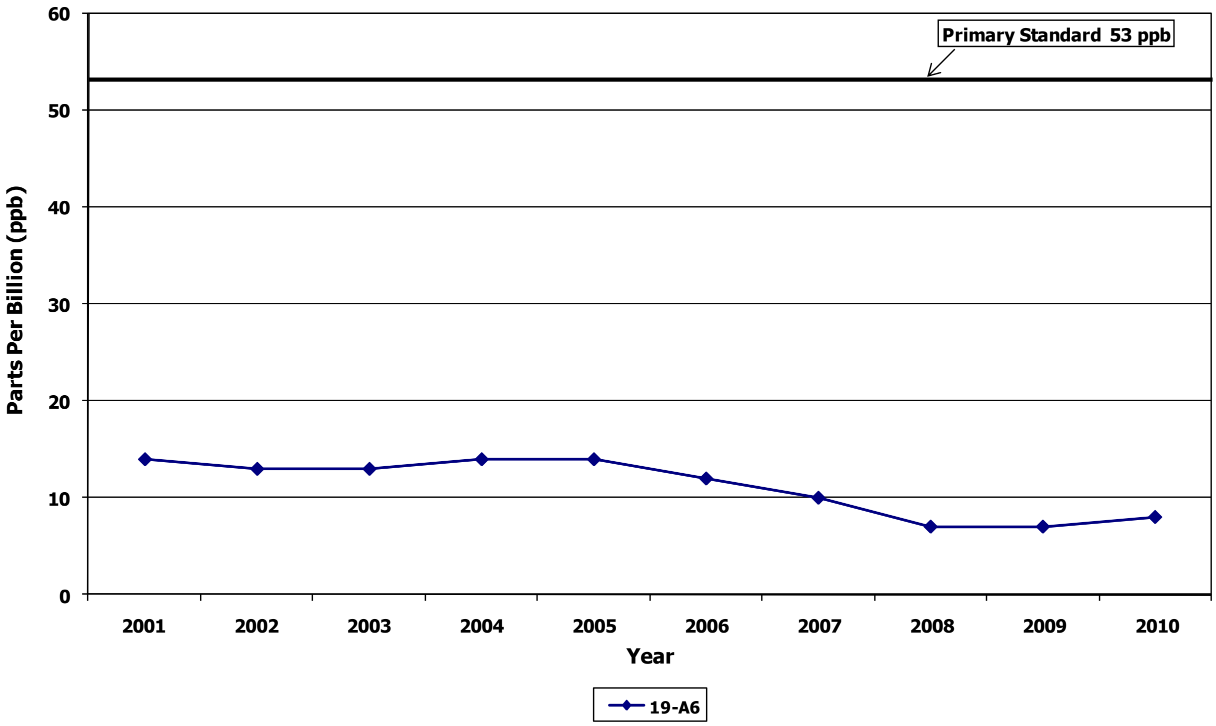
Secondary Standard for NO_2:

- Same as primary.

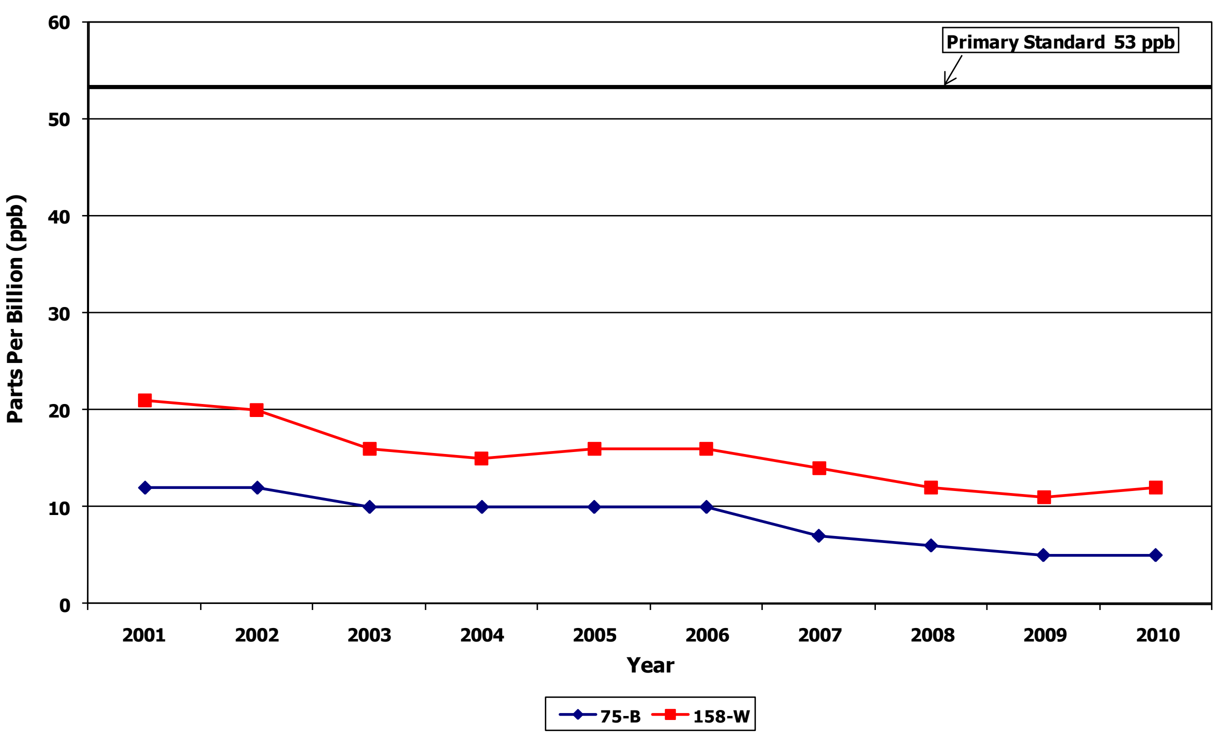
Site	Annual Arithmetic Mean (ppb)									
	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
(26-F) **Rockingham Co.**				Inc	14	12	11	11	9	10
(19-A6) **Roanoke Co.**	14	13	13	14	14	12	10	7	7	8
(75-B) **Charles City Co.**	12	12	10	10	10	10	7	6	5	5
(158-W) **Richmond**	21	20	16	15	16	16	14	12	11	12
*(181-A1) **Norfolk**							12	10	Inc	NA
(38-I) **Loudoun Co.**	14	14	16	15	14	13	11	8	7	8
(45-L) **Prince William Co.**	11	11	12	10	9	7	7	6	5	5
(47-T) **Arlington Co.**	22	22	26	22	21	18	16	13	13	13
(L-126-C) **Alexandria**	23	25	23	24	24	20	18	16	15	16

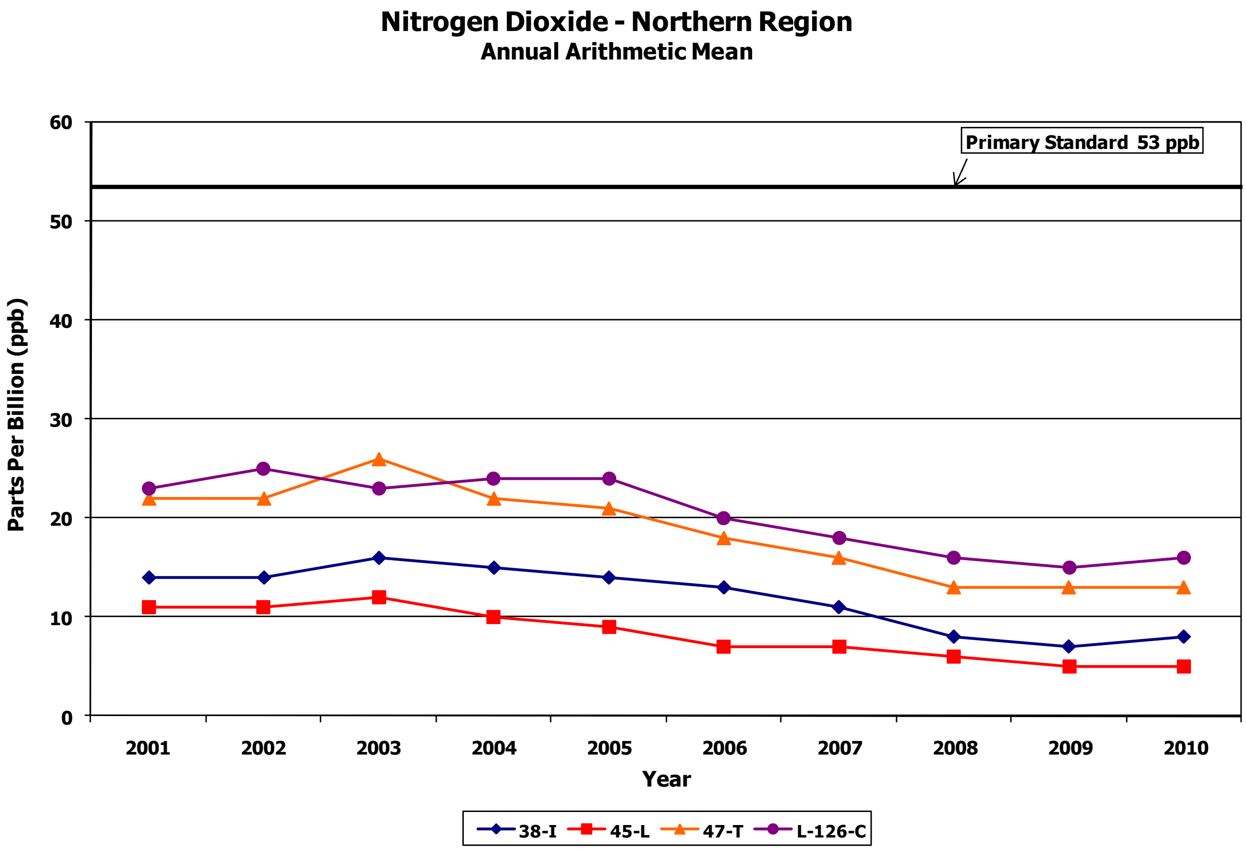
* Monitor temporarily removed in 2009 due to a major construction project in the area. The NO2 monitor was briefly relocated to Newport News in 2010, and then returned to Norfolk in January 2011.

Nitrogen Dioxide - Blue Ridge Region
Annual Arithmetic Mean



Nitrogen Dioxide - Piedmont Region
Annual Arithmetic Mean




Nitrogen Dioxide - Northern Region
Annual Arithmetic Mean
Primary Standard 53 ppb
Parts Per Billion (ppb)
60
50
40
30
20
10
0
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
Year
38-I
45-L
47-T
L-126-C

Ozone (O_3) is a gas comprised of three oxygen atoms. It is unstable, and a strong oxidizing agent, and will react readily with other compounds to decay to the more stable diatomic oxygen (O_2).

Ozone can be good or bad, depending on its location in the atmosphere. "Good" ozone occurs naturally in the stratosphere, about 10-30 miles above the earth's surface, where it forms a layer that filters the sun's ultraviolet rays before they reach the surface where they can cause harm to animals and plants. "Bad" ozone, or ground-level ozone, occurs when chemicals found in the atmosphere at earth's surface react in the presence of intense sunlight. Ozone at ground level is harmful because it can cause a variety of health problems, as well as damage to plants and materials. Since ground-level ozone is not emitted directly, it is called a "secondary" pollutant. The chemicals needed to form ozone, NOx and hydrocarbons (also called volatile organic compounds, or VOCs), can come from motor vehicle exhaust, power plants, industrial emissions, gasoline vapors, chemical solvents, as well as natural sources such as lightning, forest fires, and plant decomposition. Ozone, and the chemicals that produce ozone, can travel hundreds of miles from their sources, so that even rural areas with few pollutant emissions can occasionally experience high ozone levels. Efforts to control ground-level ozone involve limiting emissions of NOx and VOCs, or "ozone precursors," that are necessary for ozone production.

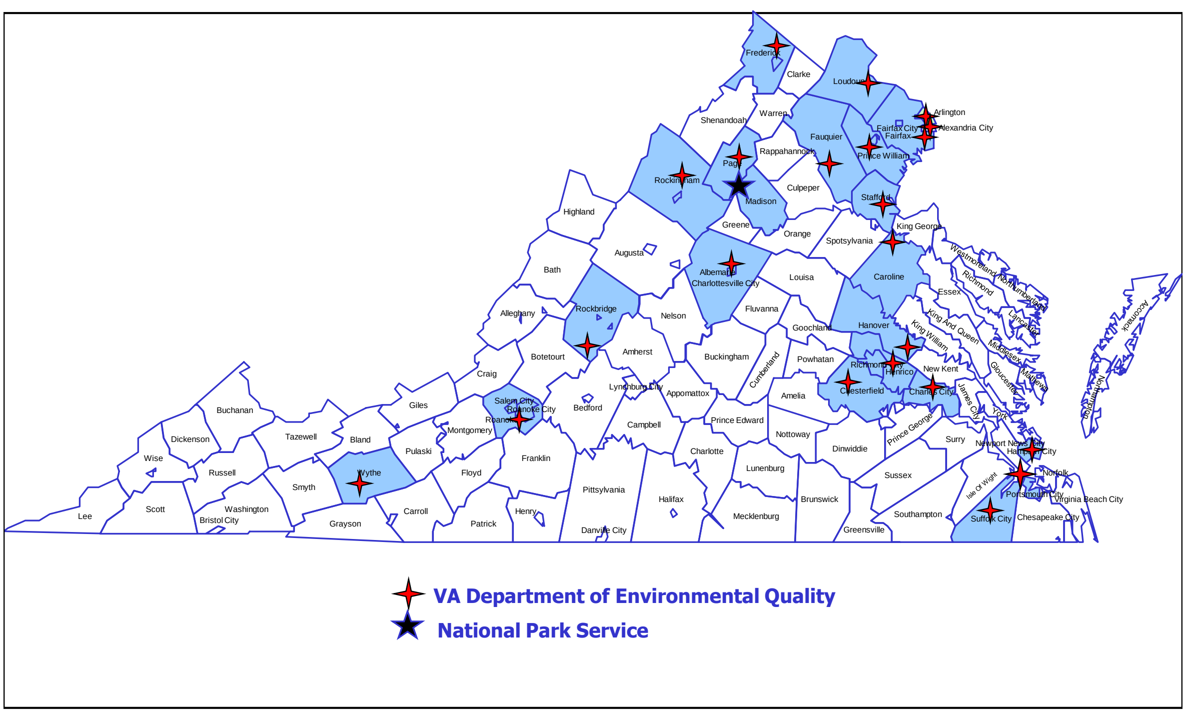
Ground-level ozone is a seasonal pollutant, and the length of the ozone season varies across the country. In some areas, the season may last most of the year, but in Virginia it is usually only a problem during the late spring to summer months when the sunlight is most intense. For 2010, Virginia is required to operate its ozone monitors from the months of April to October. In addition to the seasonal pattern, ozone also has a strong diurnal (daily) pattern at low altitudes, so that it is usually depressed at night, but begins to build during the day after the sun rises.

EPA has created primary and secondary air quality standards for ground-level ozone because of its adverse affects on public health and welfare. In humans, ozone can irritate lung airways, causing sunburn-like inflammation, and can induce symptoms such as wheezing, coughing, and pain when taking a deep breath. Although people with existing respiratory problems, such as asthma and emphysema, are most vulnerable, young children and otherwise healthy people can also suffer respiratory problems from ozone exposure. Scientific studies have shown that even at low levels, ozone can trigger breathing problems for sensitive individuals. In addition to human health problems, ozone can damage the leaves of plants and trees, making them susceptible to disease, insects, and harsh weather. Ozone can also cause rubber to harden and crack, and some painted surfaces to fade more quickly.

Ozone is measured continuously with electronic instruments using “ultraviolet (UV) absorption photometry.” The method is based on the principle that ozone strongly absorbs UV light at 254 nanometers (a nanometer is equal to a distance of one billionth of a meter). The ozone monitor has a sample pump that draws ambient air into it and splits the air into two gas streams. In one stream, the air passes through an “ozone scrubber”, which cleanses the sample air of any ozone. Then the clean air passes through a sample cell that contains a UV light source and a detector. The detector measures the intensity of the light in the sample cell, providing a zero reference. The second air stream is sent straight into the sample cell, bypassing the scrubber. Any ozone present in the incoming air will absorb some of the UV light in the sample cell, reducing the amount of light reaching the detector. The instrument then calculates the ozone concentration of the ambient air from the difference in the light intensities measured between the scrubbed, or “zero” air, and the unscrubbed air.

Daily ozone forecasts for selected metropolitan areas and hourly ozone values for all Virginia ozone monitoring sites can be viewed for the months of April to October on the DEQ web page at http://www.deq.virginia.gov/airquality/homepage. In addition, animated ozone maps for Virginia and other parts of the United States are available at http://www.airnow.gov/ .

The National Park Service operated one ozone monitor at Big Meadows in Shenandoah National Park in 2009. Daily data from this site are available at the DEQ website, and historical data may be obtained from the National Park Service, or by internet at http://12.45.109.6/



National Ambient Air Quality Standards (NAAQS)

Primary Standard for O_3:

- Maximum 8-hour average concentration of 0.075 ppm (157 $\mu g/m^3$), effective May 27, 2008, based on 3-year average of the annual fourth highest daily maximum 8-hour averages.

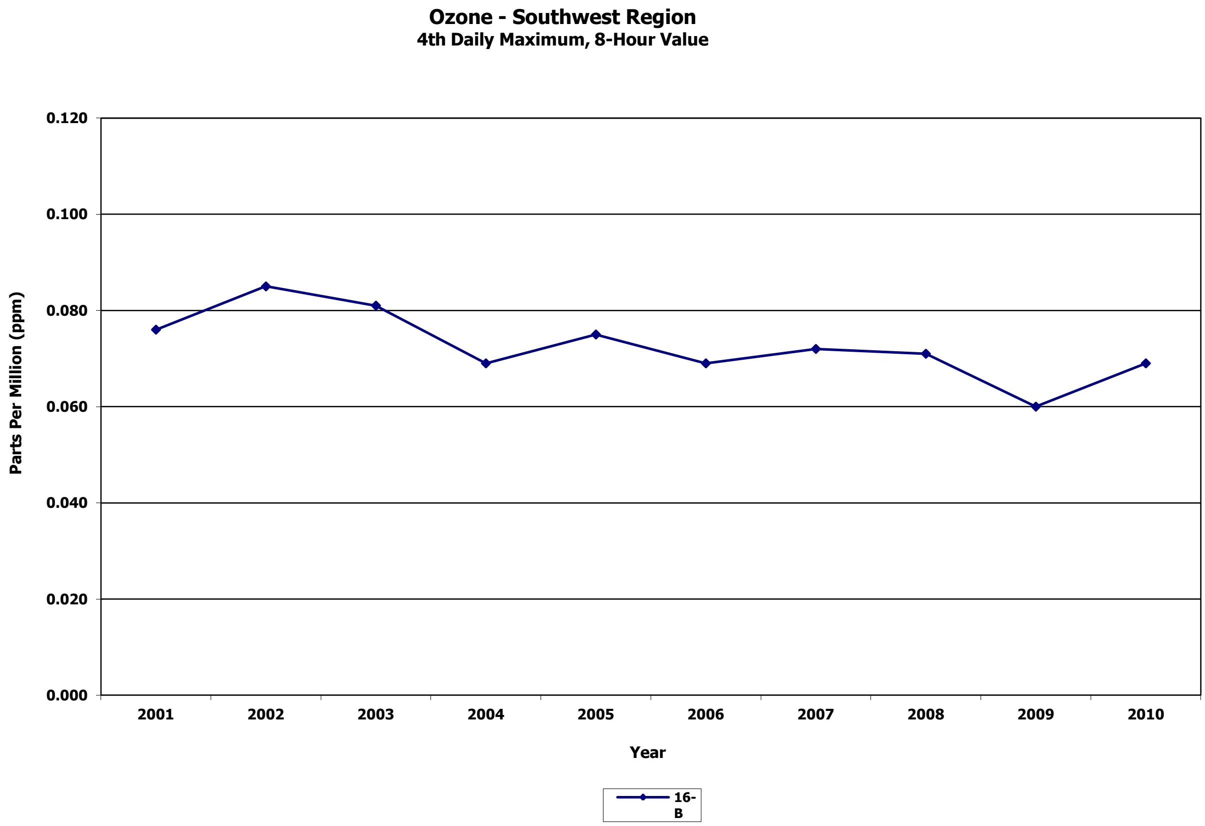
Secondary Standard for O_3:
Same as primary

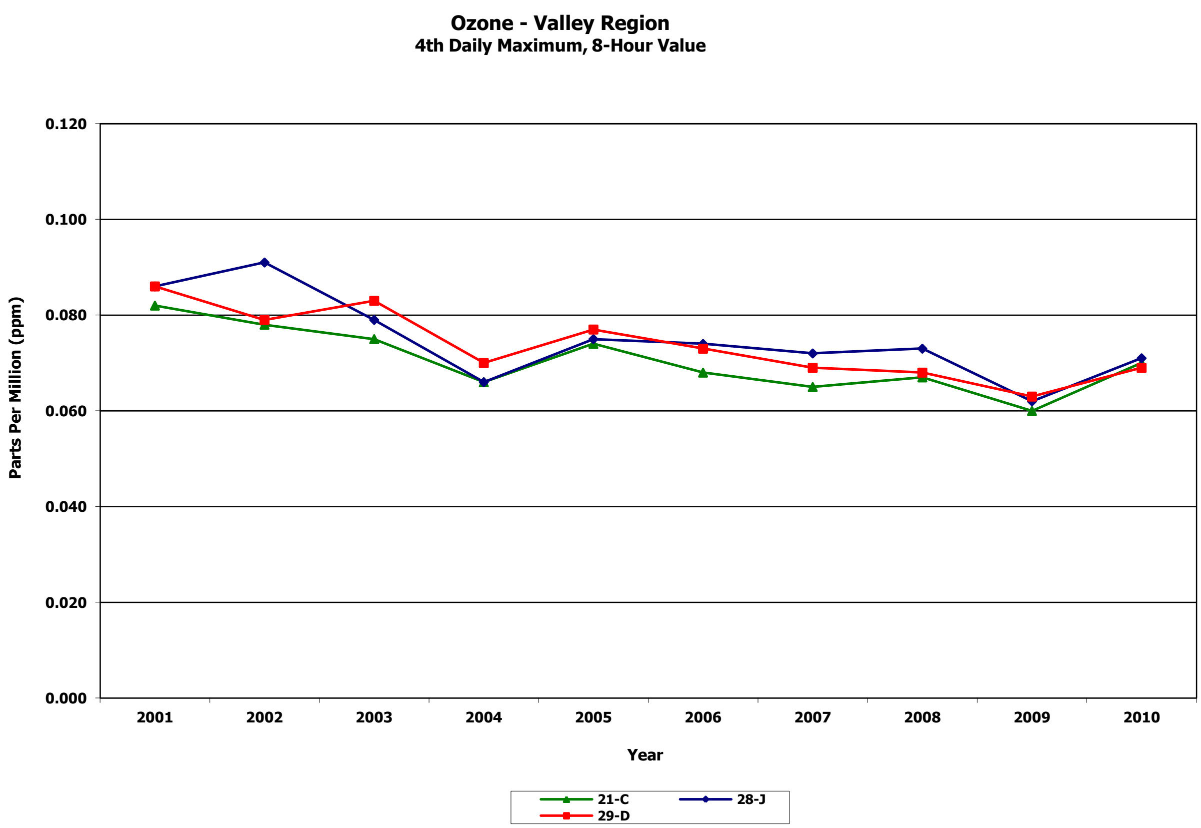
The standard is attained at a monitoring site when the 3-year average of the fourth highest daily maximum 8-hour average for each of the three most recent years is less than or equal to 0.075 ppm.

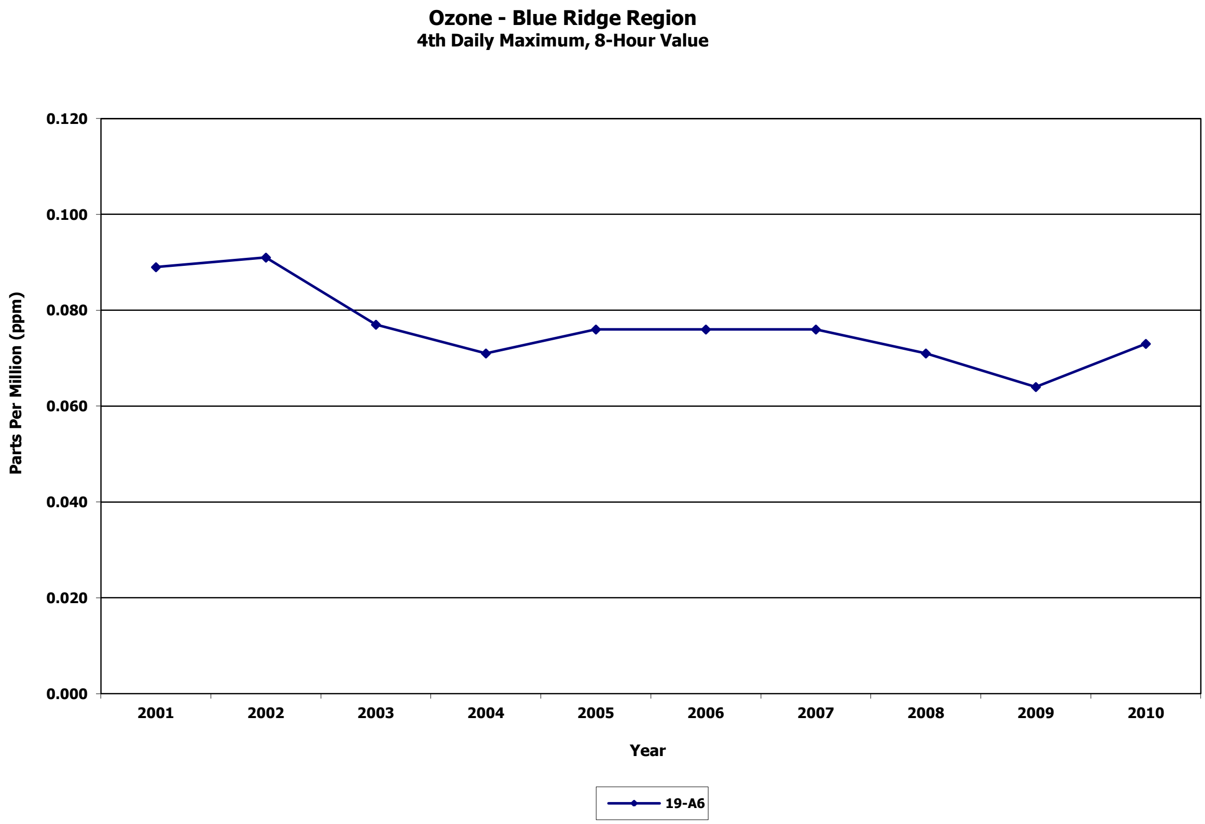
Site	Days Exceeded 0.075 ppm	2010 Highest Daily Maximum 8-Hour Avg.			
		1st Max.	2nd Max.	3rd Max.	4th Max.
(16-B) **Wythe Co.**	0	.072	.071	.069	.069
(26-F) **Rockingham Co.**	1	.079	.075	.069	.068
(28-J) **Frederick Co.**	1	.089	.074	.073	.071
(29-D) **Page Co.**	0	.075	.074	.070	.069
(33-A) **Albemarle Co.**	3	.079	.078	.078	.071
(19-A6) **Roanoke Co.**	1	.076	.075	.075	.073
(21-C) **Rockbridge Co.**	0	.075	.073	.071	.070
(71-H) **Chesterfield Co.**	4	.098	.096	.088	.081
(72-M) **Henrico Co.**	6	.084	.081	.081	.079
(73-E) **Hanover Co.**	5	.087	.083	.078	.078
(75-B) **Charles City Co.**	4	.084	.082	.078	.078
(179-K) **Hampton**	5	.097	.091	.086	.078
(183-E) **Suffolk**	3	.090	.087	.080	.072
(183-F) **Suffolk**	3	.085	.084	.083	.075
(37-B) **Fauquier Co.**	0	.072	.071	.069	.066
(38-I) **Loudoun Co.**	5	.092	.084	.083	.078
(44-A) **Stafford Co.**	5	.088	.086	.080	.078
(45-L) **Prince William Co.**	2	.093	.079	.075	.073
(46-B9) **Fairfax Co.**	13	.095	.091	.089	.089
(47-T) **Arlington Co.**	13	.092	.089	.088	.087
(48-A) **Caroline Co.**	3	.083	.080	.077	.074
(L-126-C) **Alexandria**	10	.092	.085	.082	.081

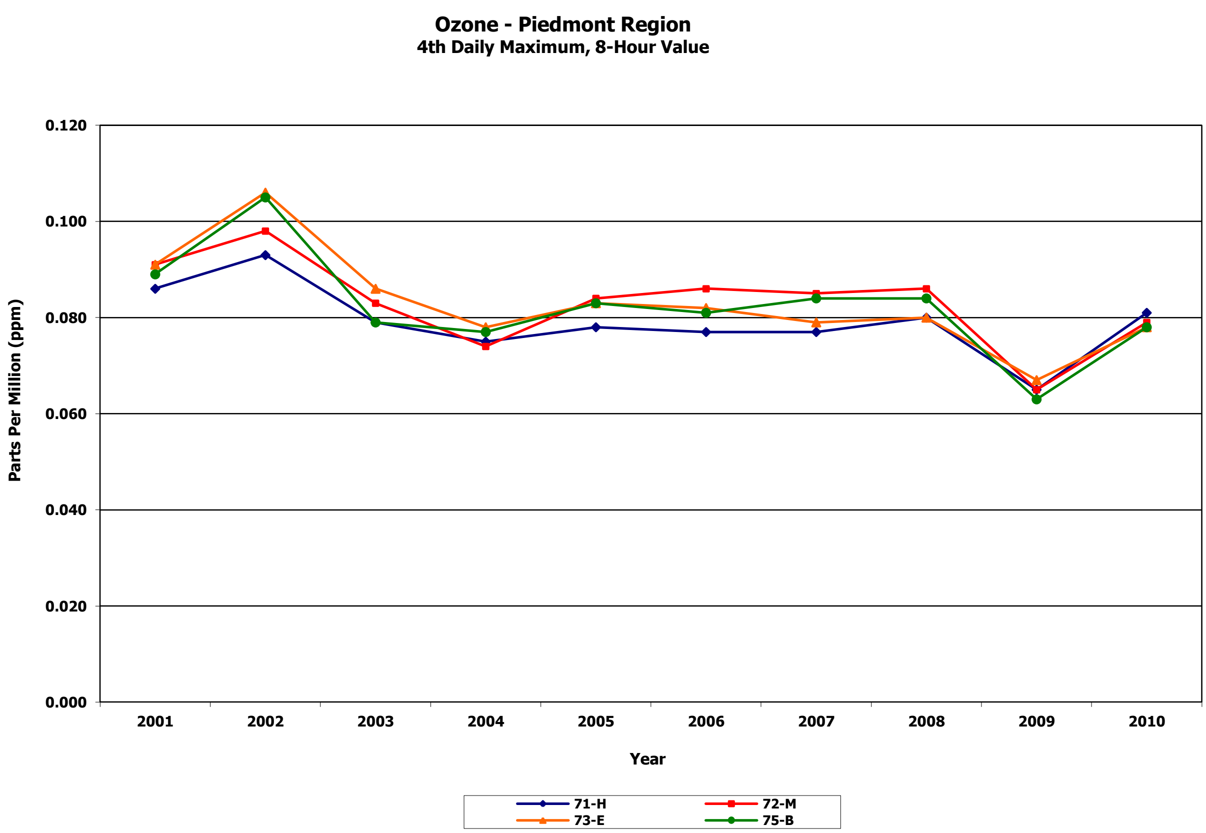
2008-2010 Fourth-Highest Daily Maximum 8-Hour Ozone Averages (units parts per million)					
	Monitor Location (County/City)	2008	2009	2010	3-Year Average (NAAQS = .075 ppm)
Richmond Maintenance Area	Chesterfield Co.	.080	.065	.081	.075
	Henrico Co.	.086	.065	.079	.076
	Hanover Co.	.080	.067	.078	.075
	Charles City Co.	.084	.063	.078	.075
Hampton Roads Maintenance Area	Suffolk City (TCC)	.077	.065	.072	.071
	Suffolk City (Holland)	.078	.064	.075	.072
Fredericksburg Maintenance Area	Stafford Co.	.069	.064	.078	.070
Northern Virginia Nonattainment Area	Loudoun Co.	.079	.068	.078	.075
	Prince William Co.	.074	.064	.073	.070
	Arlington Co.	.084	.067	.087	.079
	Alexandria City	.075	.066	.081	.074
	Fairfax Co. (Lee Park)	.085	.070	.089	.081
Shenandoah National Park Maintenance Area	Madison Co. (Big Meadows)	.078	.069	.074	.073
Areas Currently Designated Attainment	Wythe Co.	.071	.060	.069	.066
	Rockbridge Co.	.067	.060	.070	.065
	Rockingham Co.	.069	.063	.068	.066
	Page Co.	.068	.063	.069	.066
	Fauquier Co.	.068	.063	.066	.065
	Caroline Co.	.080	.066	.074	.073
	Albemarle Co.	.073	.065	.071	.069
	Roanoke Co.	.071	.064	.073	.069
	Frederick Co.	.073	.062	.071	.068

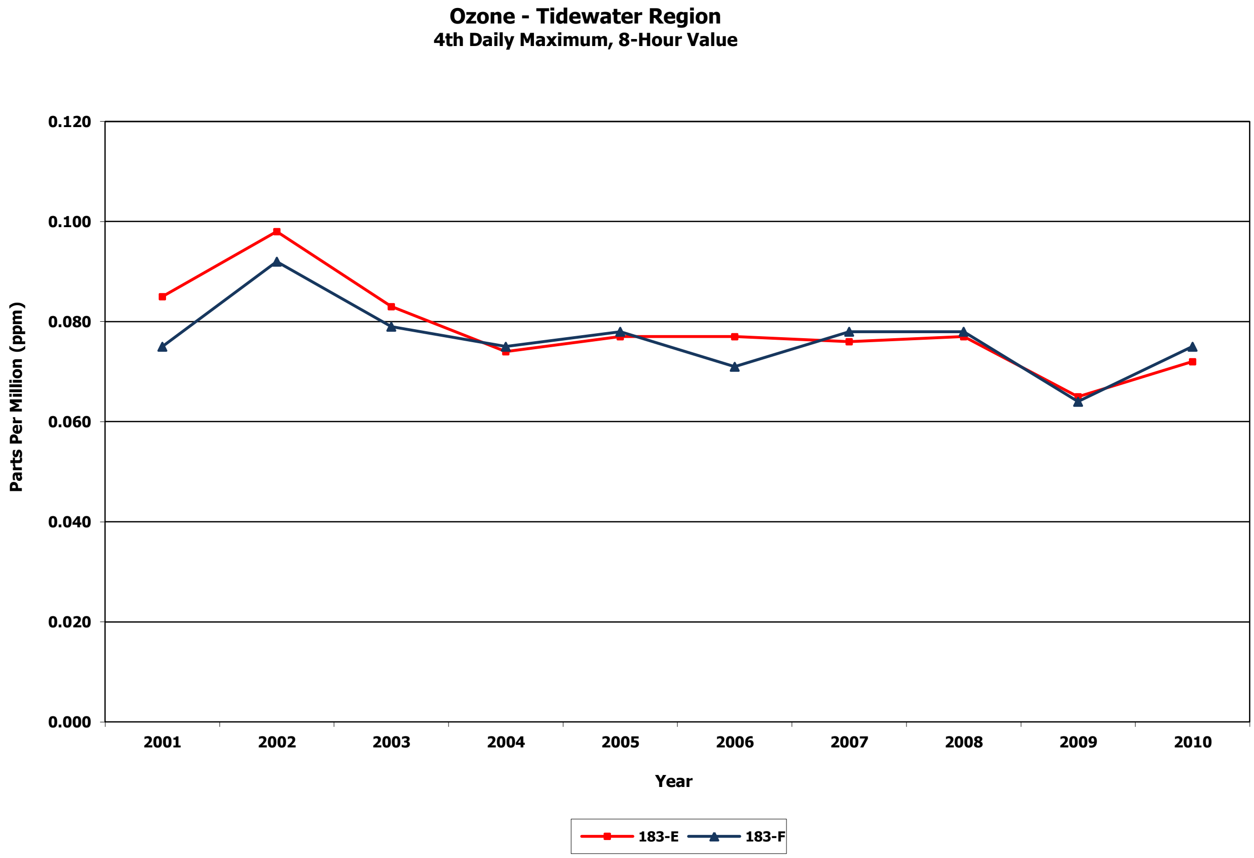
A 3-year average greater than .075 ppm exceeds the 8-hour NAAQS for ozone


Ozone - Southwest Region
4th Daily Maximum, 8-Hour Value
Parts Per Million (ppm)
0.120
0.100
0.080
0.060
0.040
0.020
0.000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
Year
16-B

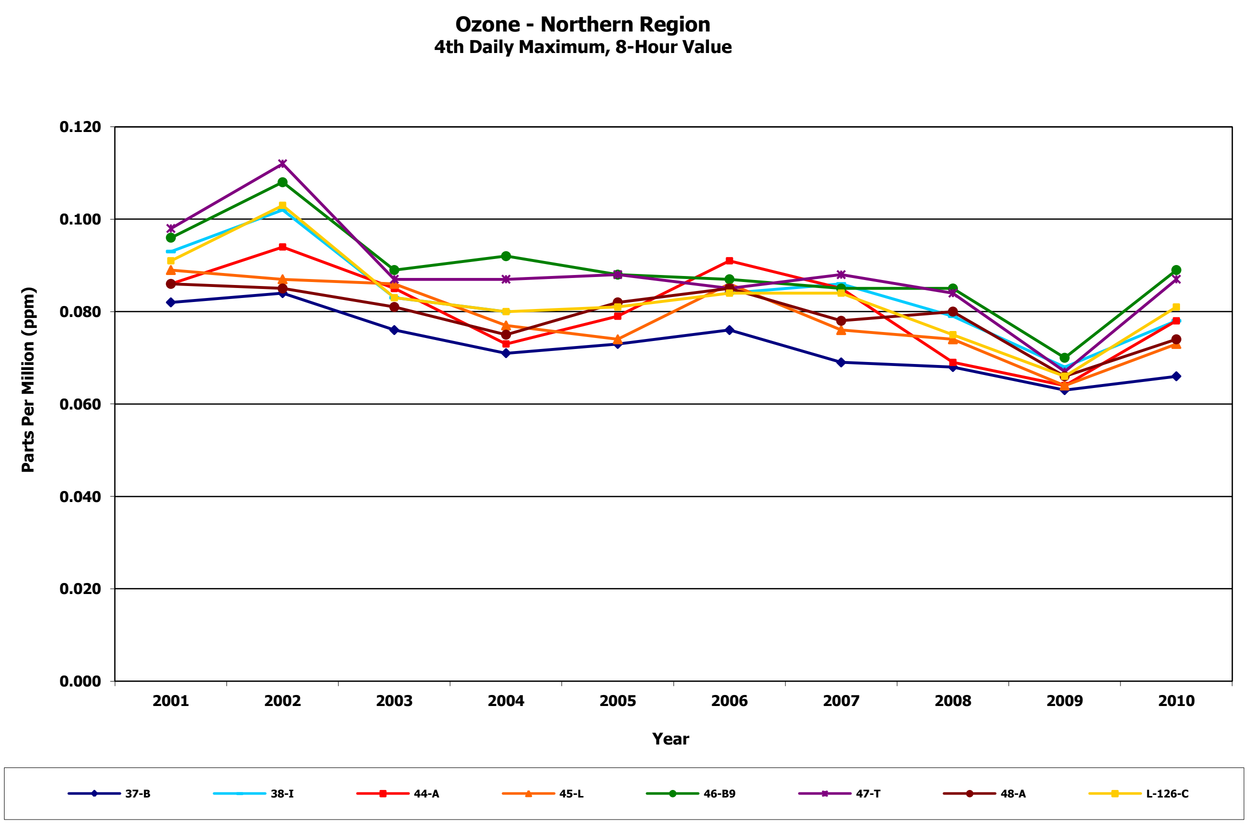

Ozone - Valley Region
4th Daily Maximum, 8-Hour Value
Parts Per Million (ppm)
0.120
0.100
0.080
0.060
0.040
0.020
0.000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
Year
21-C
28-J
29-D


Ozone - Blue Ridge Region
4th Daily Maximum, 8-Hour Value
Parts Per Million (ppm)
0.120
0.100
0.080
0.060
0.040
0.020
0.000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
Year
19-A6


Ozone - Piedmont Region
4th Daily Maximum, 8-Hour Value
Parts Per Million (ppm)
0.120
0.100
0.080
0.060
0.040
0.020
0.000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
Year
71-H
72-M
73-E
75-B



Ozone - Tidewater Region
4th Daily Maximum, 8-Hour Value
0.120
0.100
0.080
0.060
0.040
0.020
0.000
Parts Per Million (ppm)
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
Year
183-E
183-F



Ozone - Northern Region
4th Daily Maximum, 8-Hour Value
0.120
0.100
0.080
0.060
0.040
0.020
0.000
Parts Per Million (ppm)
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
Year
37-B
38-I
44-A
45-L
46-B9
47-T
48-A
L-126-C

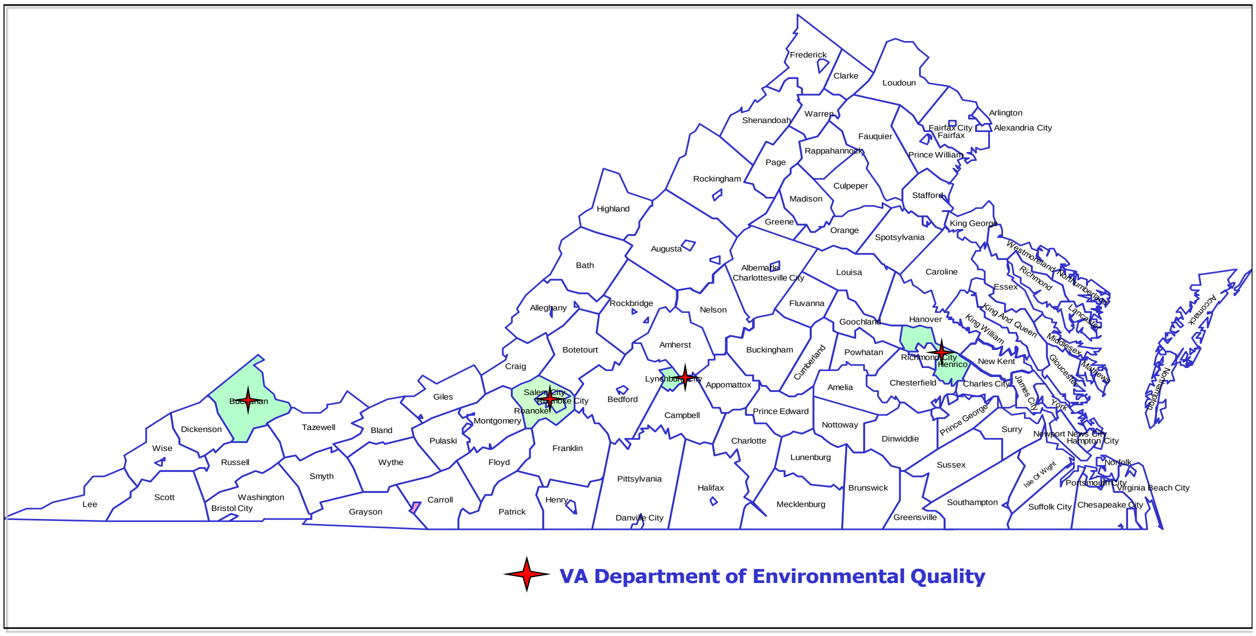
Lead (Pb) is a metal found naturally in the environment as well as in manufactured products. In the past, emissions from cars and trucks using leaded gasoline were the primary sources of lead in the atmosphere. Efforts by EPA to remove lead from motor vehicle gasoline resulted in dramatic reductions of lead in the ambient air from 1980 to 1999. Now the major sources of lead in the air are ore and metals processing and piston-engine aircraft operating on leaded aviation gasoline.

Particles containing lead can be inhaled, or lead can be ingested from drinking water or through contaminated food as a result of deposition of leaded particles onto the ground or in the water. In the body, lead can accumulate in the bones; affect the nervous system, kidney function, immune system, reproductive and developmental systems and the cardiovascular system. Young children are particularly vulnerable to the effects of lead, where it can contribute to behavioral problems, learning deficits and lowered IQ. Lead can stay in the environment for a long time, causing adverse effects to plants and animals.

The National Ambient Air Quality Standards, or NAAQS, for lead were revised in October 2008. At that time, EPA reduced the level of the standard from 1.5 micrograms per cubic meter to 0.15 micrograms per cubic meter. The secondary standard was also reduced to the level of the new primary standard. Virginia DEQ received a waiver from EPA in 1997 to discontinue lead monitoring because Virginia had no major lead sources. However, when the new standards were promulgated, the emission threshold that agencies were required to use for determining if a lead monitor was needed near a source also changed. As a result, Virginia had to resume monitoring for lead in a few areas, and AQM began installing the lead monitors in late 2009 and completed installation in October 2010. For additional information on the revised lead standards, see http://www.epa.gov/ttn/naaqs/standards/pb/s_pb_index.html.

To measure lead, ambient air is drawn into a high volume sampler. The sample air flows across an 8 x 10 inch glass fiber filter at a rate of 39-60 cubic feet per minute for a 24-hour period. The filter is sent to the Division of Consolidated Laboratories, where a small portion of it is analyzed using inductively coupled plasma – mass spectrometry (ICP-MS). The resulting lead concentration is reported as micrograms per cubic meter ($\mu g/m^3$). The normal sampling schedule is once every sixth day from midnight to midnight. The lead sampling schedule for 2010 can be found at http://www.epa.gov/ttn/amtic/calendar.html.

Lead Monitoring Sites



National Ambient Air Quality Standards (NAAQS)

Primary Standard for Pb:

- 0.15 µg/m^3 three-month rolling average

Secondary Standard for Pb:

- Same as Primary

2010 Pb 3-Month Averages (units in µg/m^3)				
Site	**No. 24-Hour Observations**	**1st Max**	**2nd Max**	**>0.15 µg/m^3**
*(4-G) **Buchanan Co.**	10	NA	NA	NA
(109-H) **Roanoke**	59	0.11	0.11	0
(53-G) **Amherst Co.**	14	NA	NA	NA
(72-M) **Henrico Co.**	36	0.04	0.01	0

*Site installed October 2010

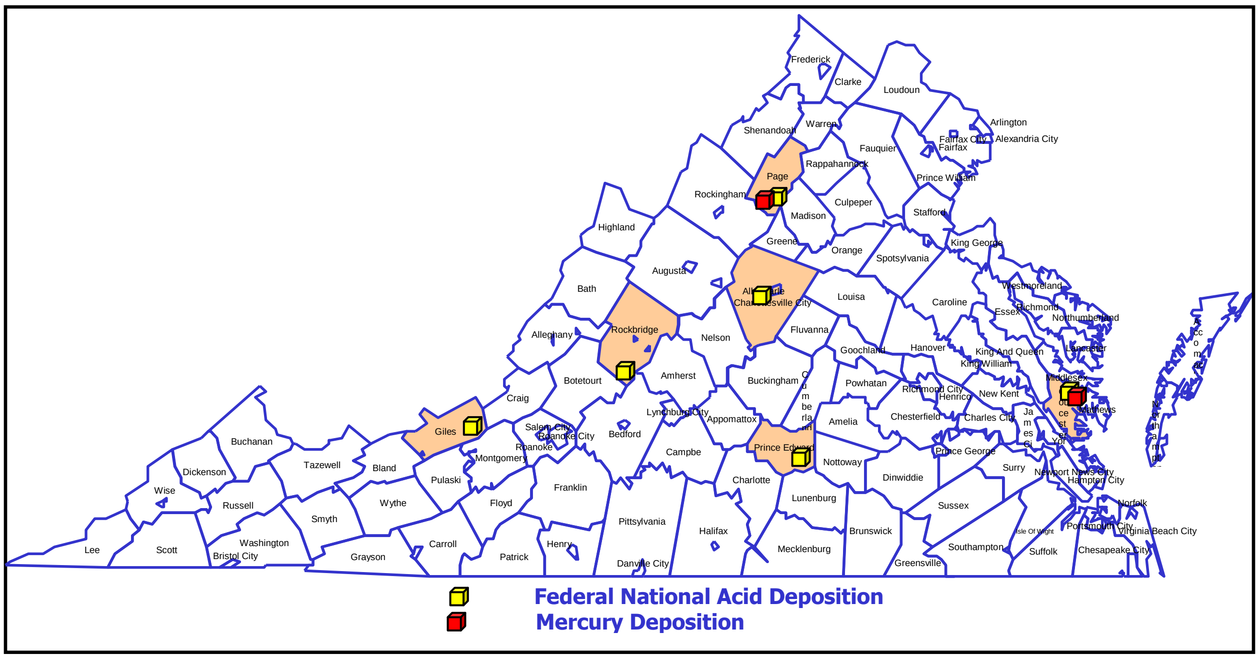
Acid Deposition Program

Photochemical Assessment Monitoring Stations

Air Toxics Monitoring Network

The National Acid Deposition Program (NADP) had six monitoring sites in Virginia in 2010: Big Meadows (Shenandoah National Park), Hortons Station (Giles County), Charlottesville, Prince Edward County, Harcum (Gloucester County), and Natural Bridge Station (Rockbridge County). The Virginia Department of Environmental Quality sponsored the NADP site at Harcum in Gloucester County in 2010. NADP site information and data are available on-line at http://nadp.sws.uiuc.edu/ntn in the NTN (National Trends Network) section.

In addition to the six acid deposition monitors, there were two NADP Mercury Deposition Network (MDN) sites in Virginia: Harcum (Gloucester County) and Big Meadows (Shenandoah National Park). MDN site information and data are available on-line at http://nadp.sws.uiuc.edu/MDN/.

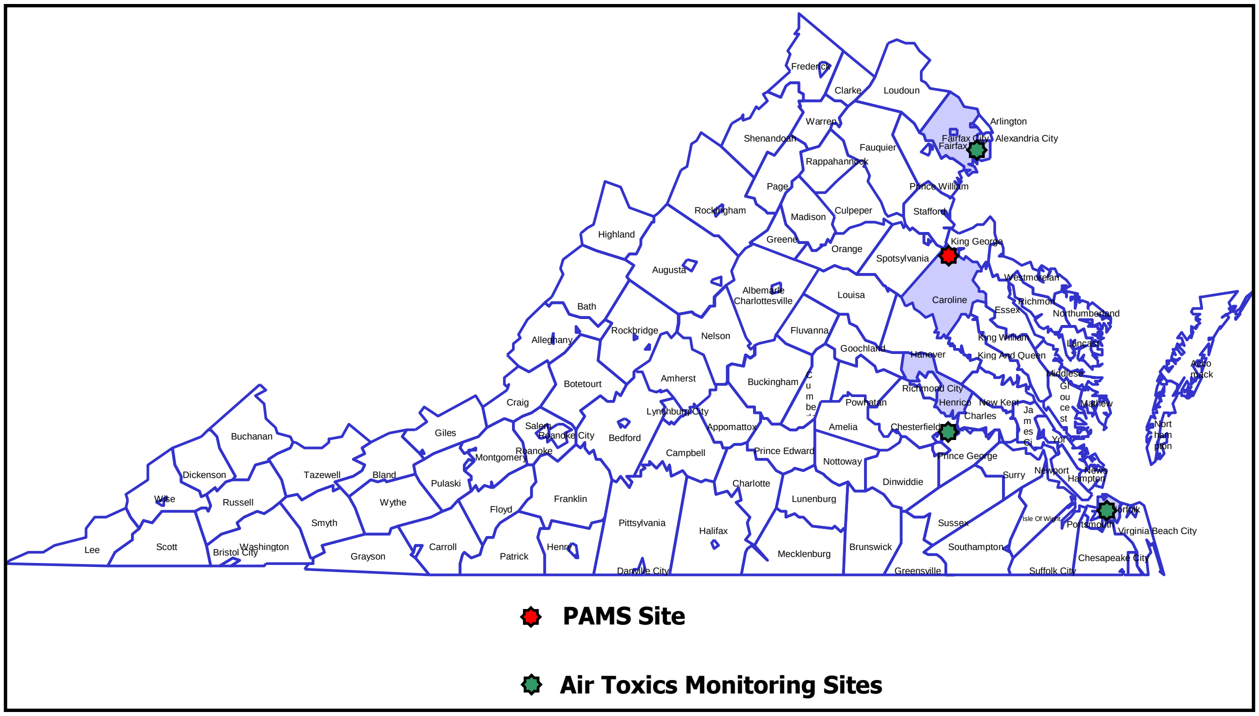


In 2010, the Office of Air Quality Monitoring (AQM) program of the Department of Environmental Quality operated one Photochemical Assessment Monitoring station (PAMS) at the Fredericksburg Geomagnetic Center at Corbin in Caroline County. Additionally, 24-hour PAMS Volatile Organic Compounds (VOC) samples were collected from three core Air Toxics Monitoring Network (ATMN) sites located at Carter G. Woodson Middle School (Woodson) in the City of Hopewell, the DEQ Tidewater Regional Office (TRO) in Virginia Beach, and Lee District Park (LDP) in Fairfax County, using a one-in-six day sampling schedule.

The Corbin site is considered at Type I PAMS site. A Type I site measures background ozone precursor concentrations at a location that is considered an upwind site for an ozone non-attainment area. Corbin collected 24-hour VOC samples on an every six day schedule all year long. Hourly samples were collected using an Automatic Gas Chromatograph (Auto GC) during the peak ozone season which is considered to be the months of June, July, and August.

AQM used the manual method for collecting ambient air samples. This method involves the collection of integrated, whole samples by using evacuated Summa[T] or Silco[T] canisters and RMESI (RM Environmental Systems, Inc.) air samplers. Each VOC sample from Corbin was analyzed by the Division of Consolidated Laboratory Services using a Gas Chromatograph/Flame Ionization Detector. Samples from Woodson, TRO, and Lee District Park, were analyzed by the Maryland Department of the Environment, Air and Radiation Management Administration, using a Gas Chromatograph/Flame Ionization Detector. All VOC samples were analyzed for the presence of fifty-six target volatile organic precursors, and the measured concentration of Total Nonmethane Organic Compounds (TNMOC).

Detailed PAMS data are available upon written request to the Virginia Department of Environmental Quality, Office of Air Quality Monitoring.


Frederick
Clarke
Loudoun
Arlington
Alexandria City
Fairfax
Warren
Shenandoah
Fauquier
Rappahannock
Page
Prince William
Rockingham
Madison
Culpeper
Stafford
Highland
Greene
Orange
King George
Spotsylvania
Augusta
Albemarle
Charlottesville
Louisa
Caroline
Westmoreland
Richmond
Essex
Northumberland
Bath
Rockbridge
Nelson
Fluvanna
Alleghany
Goochland
Hanover
King William
King And Queen
Lancaster
Botetourt
Amherst
Buckingham
Richmond City
Craig
Powhatan
Henrico
New Kent
Charles
Mathews
Salem
Giles
Lynchburg City
Appomattox
Amelia
Chesterfield
Roanoke City
Bedford
Buchanan
Montgomery
Roanoke
Campbell
Prince Edward
Prince George
Nottoway
Dickenson
Tazewell
Bland
Pulaski
Charlotte
Dinwiddie
Surry
Newport
Wise
Russell
Wythe
Floyd
Franklin
Lunenburg
Sussex
Norfolk
Portsmouth
Virginia Beach City
Smyth
Pittsylvania
Halifax
Lee
Scott
Bristol City
Washington
Carroll
Henry
Brunswick
Southampton
Grayson
Patrick
Mecklenburg
Chesapeake City
Danville City
Greensville
Suffolk City
PAMS Site
Air Toxics Monitoring Sites

2010 Average Concentration of Detectable Volatile Ozone Precursors Photochemical Assessment Monitoring Station (PAMS) Type I - Corbin

Concentrations are in ppbC

(non detects are counted as zeros for statistical purposes)

Parameter #	Compound Name	Num	Minimum	Maximum	Median	Average	StDev
43141	n-dodecane	60	0.00	6.71	0.00	0.455	1.487
43202	Ethane	60	0.77	12.30	4.17	4.504	2.223
43203	Ethylene	60	0.06	2.02	0.58	0.679	0.399
43204	Propane	60	0.87	9.97	2.95	3.257	1.793
43205	Propylene	60	0.00	1.24	0.35	0.379	0.204
43206	Acetylene	60	0.00	7.81	0.99	1.322	1.326
43212	n-butane	60	0.00	4.53	1.29	1.413	0.899
43214	Isobutane	60	0.00	2.02	0.55	0.611	0.353
43216	t-2-butene	60	0.00	1.39	0.00	0.025	0.180
43217	c-2-butene	60	0.00	1.80	0.00	0.046	0.246
43220	n-pentane	60	0.26	3.05	0.80	0.924	0.576
43221	Isopentane	60	0.44	3.03	0.97	1.152	0.614
43224	1-pentene	60	0.00	9.87	0.00	0.561	1.641
43226	t-2-pentene	60	0.00	1.07	0.00	0.057	0.193
43227	c-2-pentene	60	0.00	1.47	0.00	0.057	0.238
43230	3-methylpentane	60	0.00	3.09	0.19	0.221	0.396
43231	n-hexane	60	0.00	0.73	0.22	0.240	0.157
43232	n-heptane	60	0.00	0.89	0.16	0.181	0.207
43233	n-octane	60	0.00	0.85	0.00	0.075	0.196
43235	n-nonane	60	0.00	2.89	0.00	0.302	0.551
43238	n-decane	60	0.00	9.54	0.31	0.719	1.591
43242	Cyclopentane	60	0.00	0.96	0.00	0.069	0.182
43243	Isoprene	60	0.00	31.46	0.43	4.698	7.257
43244	2,2-dimethylbutane	60	0.00	0.35	0.00	0.058	0.083
43245	1-Hexene	60	0.00	1.14	0.28	0.312	0.319
43247	2,4-dimethylpentane	60	0.00	0.30	0.00	0.016	0.050
43248	Cyclohexane	60	0.00	0.27	0.00	0.047	0.071
43249	3-methylhexane	60	0.00	7.43	0.13	0.570	1.609
43250	2,2,4-trimethylpentane	60	0.00	0.62	0.20	0.223	0.125
43252	2,3,4-trimethylpentane	60	0.00	0.36	0.00	0.024	0.061
43253	3-methylheptane	60	0.00	0.58	0.00	0.040	0.125
43261	Methylcyclohexane	60	0.00	0.25	0.00	0.022	0.057
43262	Methylcyclopentane	60	0.00	0.47	0.08	0.088	0.104
43263	2-methylhexane	60	0.00	0.30	0.00	0.077	0.093
43280	1-butene	60	0.00	1.15	0.19	0.232	0.175
43284	2,3-dimethylbutane	60	0.00	0.54	0.00	0.057	0.108
43285	2-methylpentane	60	0.00	0.72	0.24	0.235	0.162
43291	2,3-dimethylpentane	60	0.00	0.28	0.00	0.041	0.070
43954	n-undecane	60	0.00	9.14	0.00	0.583	1.779
43960	2-methylheptane	60	0.00	0.37	0.00	0.011	0.056
45109	m/p-xylene	60	0.00	9.29	0.23	1.000	2.127
45201	Benzene	60	0.21	1.05	0.53	0.549	0.215
45202	Toluene	60	0.25	18.28	0.57	0.960	2.297
45203	Ethylbenzene	60	0.00	3.12	0.00	0.309	0.688
45204	o-xylene	60	0.00	7.58	0.43	0.842	1.542
45207	1,3,5-trimethylbenzene	60	0.00	5.56	0.00	0.141	0.729
45208	1,2,4-trimethylbenzene	60	0.00	2.71	0.00	0.206	0.531
45209	n-propylbenzene	60	0.00	2.10	0.00	0.148	0.430
45210	Isopropylbenzene	60	0.00	0.36	0.00	0.024	0.082
45211	o-ethyltoluene	60	0.00	3.09	0.09	0.353	0.662
45212	m-ethyltoluene	60	0.00	0.98	0.16	0.221	0.264
45213	p-ethyltoluene	60	0.00	1.04	0.00	0.114	0.232
45218	m-diethylbenzene	60	0.00	3.24	0.00	0.261	0.636
45219	p-diethylbenzene	60	0.00	0.00	0.00	0.000	0.000
45220	Styrene	60	0.00	1.47	0.08	0.251	0.407
45225	1,2,3-trimethylbenzene	60	0.00	10.52	0.64	1.385	1.781
43000	PAMHC	60	12.17	114.85	25.11	30.573	20.337
43102	TNMOC	59	17.42	308.23	41.55	61.525	59.567

2010 Average Concentration of Detectable Volatile Ozone Precursors Photochemical Assessment Monitoring Station Additional VOC PAMS Sampling – Carter G. Woodson Middle School, Hopewell

(Concentrations are in ppbC)

(non detects are counted as zeros for statistical purposes)

Parameter #	Compound Name	Num	Minimum	Maximum	Median	Average	StDev
43141	n-dodecane	60	0.04	0.62	0.14	0.182	0.130
43202	Ethane	60	2.53	38.99	8.20	9.977	7.533
43203	Ethylene	60	0.61	12.44	1.70	2.653	2.655
43204	Propane	60	1.52	20.77	5.09	6.260	4.531
43205	Propylene	60	0.20	5.11	0.63	1.029	0.988
43206	Acetylene	60	0.41	7.71	1.16	1.659	1.451
43212	n-butane	60	0.72	15.49	2.75	3.874	3.338
43214	Isobutane	60	0.37	5.47	1.28	1.508	1.082
43216	t-2-butene	60	0.03	0.55	0.07	0.120	0.115
43217	c-2-butene	60	0.02	0.50	0.07	0.112	0.109
43220	n-pentane	60	0.69	6.81	1.80	2.103	1.284
43221	Isopentane	60	0.65	12.86	2.71	3.526	2.460
43224	1-pentene	60	0.08	0.64	0.20	0.229	0.122
43226	t-2-pentene	60	0.00	1.21	0.21	0.309	0.250
43227	c-2-pentene	60	0.03	0.60	0.09	0.146	0.124
43230	3-methylpentane	60	0.19	3.27	0.65	0.888	0.644
43231	n-hexane	60	0.21	3.64	0.71	0.996	0.721
43232	n-heptane	60	0.14	3.82	0.48	0.621	0.546
43233	n-octane	60	0.07	0.73	0.18	0.241	0.151
43235	n-nonane	60	0.06	0.57	0.14	0.186	0.110
43238	n-decane	60	0.05	0.64	0.14	0.186	0.126
43242	Cyclopentane	60	0.06	0.65	0.17	0.221	0.141
43243	Isoprene	60	0.04	19.96	0.85	3.747	5.384
43244	2,2-dimethylbutane	60	0.09	0.77	0.19	0.258	0.166
43245	1-Hexene	60	0.00	0.98	0.06	0.093	0.131
43247	2,4-dimethylpentane	60	0.05	0.74	0.16	0.225	0.162
43248	Cyclohexane	60	0.00	0.73	0.15	0.193	0.148
43249	3-methylhexane	60	0.16	1.62	0.45	0.481	0.251
43250	2,2,4-trimethylpentane	60	0.16	3.73	0.63	1.013	0.773
43252	2,3,4-trimethylpentane	60	0.07	1.43	0.28	0.416	0.308
43253	3-methylheptane	60	0.05	0.69	0.13	0.189	0.137
43261	Methylcyclohexane	60	0.00	1.18	0.21	0.285	0.215
43262	Methylcyclopentane	60	0.15	2.15	0.41	0.595	0.405
43263	2-methylhexane	60	0.19	2.51	0.53	0.656	0.439
43280	1-butene	60	0.00	5.01	0.14	0.362	0.826
43284	2,3-dimethylbutane	60	0.07	1.25	0.25	0.372	0.278
43285	2-methylpentane	60	0.26	5.32	1.43	1.740	1.038
43291	2,3-dimethylpentane	60	0.08	0.99	0.21	0.291	0.203
43954	n-undecane	60	0.06	0.50	0.17	0.194	0.109
43960	2-methylheptane	60	0.05	0.70	0.15	0.215	0.144
45109	m/p-xylene	60	0.25	4.49	1.01	1.365	0.869
45201	Benzene	60	0.47	5.59	1.26	1.488	0.936
45202	Toluene	60	0.61	9.10	2.16	2.725	1.682
45203	Ethylbenzene	60	0.09	1.51	0.36	0.460	0.286
45204	o-xylene	60	0.08	1.58	0.39	0.506	0.327
45207	1,3,5-trimethylbenzene	60	0.05	0.64	0.18	0.219	0.147
45208	1,2,4-trimethylbenzene	60	0.11	1.63	0.40	0.529	0.350
45209	n-propylbenzene	60	0.00	0.48	0.10	0.140	0.100
45210	Isopropylbenzene	60	0.02	0.53	0.05	0.071	0.071
45211	o-ethyltoluene	60	0.03	0.72	0.11	0.141	0.122
45212	m-ethyltoluene	60	0.08	1.05	0.25	0.337	0.230
45213	p-ethyltoluene	60	0.08	1.03	0.37	0.394	0.229
45218	m-diethylbenzene	60	0.02	0.49	0.04	0.073	0.099
45219	p-diethylbenzene	60	0.04	0.50	0.09	0.107	0.089
45220	Styrene	60	0.05	1.39	0.29	0.344	0.276
45225	1,2,3-trimethylbenzene	60	0.00	0.59	0.12	0.153	0.118
43000	PAMHC	60	16.74	194.03	45.33	57.396	34.306
43102	TNMOC	60	30.44	270.48	82.29	92.988	45.135

2010 Average Concentration of Detectable Volatile Ozone Precursors Photochemical Assessment Monitoring Station Additional VOC PAMS Sampling - Tidewater Regional Office (TRO)

Concentrations are in ppbC

(non detects are counted as zeros for statistical purposes)

Parameter #	Compound Name	Num	Minimum	Maximum	Median	Average	StDev
43141	n-dodecane	58	0.00	0.61	0.13	0.160	0.117
43202	Ethane	58	3.04	47.53	7.58	10.646	8.113
43203	Ethylene	58	0.64	16.27	1.64	2.568	2.629
43204	Propane	58	1.43	50.24	7.22	10.530	10.158
43205	Propylene	58	0.29	7.13	0.91	1.211	1.065
43206	Acetylene	58	0.36	8.62	1.23	1.647	1.477
43212	n-butane	58	0.68	19.54	2.38	3.730	3.664
43214	Isobutane	58	0.29	5.70	1.25	1.522	1.085
43216	t-2-butene	58	0.03	0.91	0.09	0.135	0.141
43217	c-2-butene	58	0.03	0.70	0.08	0.119	0.114
43220	n-pentane	58	0.59	7.56	1.72	2.091	1.268
43221	Isopentane	58	0.95	15.49	3.23	3.956	2.614
43224	1-pentene	58	0.09	1.06	0.23	0.293	0.185
43226	t-2-pentene	58	0.04	1.76	0.25	0.338	0.279
43227	c-2-pentene	58	0.03	0.81	0.10	0.153	0.129
43230	3-methylpentane	58	0.20	3.47	0.72	0.904	0.585
43231	n-hexane	58	0.25	4.33	0.89	1.168	0.825
43232	n-heptane	58	0.17	2.92	0.66	0.724	0.459
43233	n-octane	58	0.08	1.12	0.24	0.295	0.180
43235	n-nonane	58	0.08	3.75	0.24	0.392	0.603
43238	n-decane	58	0.06	4.44	0.24	0.416	0.677
43242	Cyclopentane	58	0.07	0.77	0.15	0.198	0.129
43243	Isoprene	58	0.02	7.69	0.61	1.509	1.858
43244	2,2-dimethylbutane	58	0.07	0.77	0.19	0.223	0.122
43245	1-Hexene	58	0.04	0.37	0.10	0.112	0.064
43247	2,4-dimethylpentane	58	0.05	0.83	0.19	0.225	0.135
43248	Cyclohexane	58	0.06	0.93	0.18	0.219	0.149
43249	3-methylhexane	58	0.28	4.86	0.78	0.842	0.602
43250	2,2,4-trimethylpentane	58	0.20	4.92	0.89	1.064	0.757
43252	2,3,4-trimethylpentane	58	0.09	1.89	0.35	0.422	0.300
43253	3-methylheptane	58	0.04	0.88	0.16	0.195	0.137
43261	Methylcyclohexane	58	0.00	1.46	0.25	0.300	0.219
43262	Methylcyclopentane	58	0.15	2.82	0.58	0.722	0.457
43263	2-methylhexane	58	0.34	6.03	1.03	1.128	0.792
43280	1-butene	58	0.00	5.09	0.16	0.282	0.656
43284	2,3-dimethylbutane	58	0.07	1.58	0.30	0.364	0.255
43285	2-methylpentane	58	0.30	5.99	1.93	2.018	1.023
43291	2,3-dimethylpentane	58	0.11	2.57	0.35	0.407	0.340
43954	n-undecane	58	0.05	0.77	0.18	0.228	0.166
43960	2-methylheptane	58	0.07	1.05	0.20	0.250	0.163
45109	m/p-xylene	58	0.44	10.27	1.53	1.926	1.493
45201	Benzene	58	0.46	7.18	1.20	1.441	1.035
45202	Toluene	58	0.79	14.69	2.87	3.524	2.322
45203	Ethylbenzene	58	0.13	3.33	0.47	0.609	0.475
45204	o-xylene	58	0.13	3.17	0.49	0.634	0.487
45207	1,3,5-trimethylbenzene	58	0.08	1.73	0.23	0.318	0.301
45208	1,2,4-trimethylbenzene	58	0.16	2.82	0.58	0.740	0.557
45209	n-propylbenzene	58	0.05	0.83	0.15	0.178	0.144
45210	Isopropylbenzene	58	0.00	0.59	0.06	0.071	0.075
45211	o-ethyltoluene	58	0.03	0.34	0.10	0.114	0.073
45212	m-ethyltoluene	58	0.10	1.80	0.37	0.427	0.294
45213	p-ethyltoluene	58	0.08	1.71	0.34	0.396	0.293
45218	m-diethylbenzene	58	0.02	0.38	0.06	0.087	0.067
45219	p-diethylbenzene	58	0.03	0.64	0.09	0.111	0.102
45220	Styrene	58	0.04	1.19	0.43	0.425	0.258
45225	1,2,3-trimethylbenzene	58	0.04	0.80	0.15	0.191	0.148
43000	PAMHC	58	20.10	281.96	53.62	64.900	41.809
43102	TNMOC	58	29.22	375.22	98.11	105.598	54.337

2010 Average Concentration of Detectable Volatile Ozone Precursors Photochemical Assessment Monitoring Station Additional VOC PAMS Sampling - Lee District Park, Fairfax Co.

Concentrations are in ppbC

(non detects are counted as zeros for statistical purposes)

Parameter #	Compound Name	Num	Minimum	Maximum	Median	Average	StDev
43141	n-dodecane	59	0.00	1.36	0.15	0.218	0.210
43202	Ethane	59	3.01	22.23	7.89	8.719	4.024
43203	Ethylene	59	0.59	5.80	1.43	1.616	0.988
43204	Propane	59	1.60	20.05	4.26	4.868	2.843
43205	Propylene	59	0.32	2.33	0.58	0.750	0.459
43206	Acetylene	59	0.37	4.53	1.05	1.156	0.645
43212	n-butane	59	0.68	7.81	2.18	2.415	1.509
43214	Isobutane	59	0.36	6.19	1.02	1.157	0.860
43216	t-2-butene	59	0.03	0.24	0.05	0.060	0.039
43217	c-2-butene	59	0.03	0.19	0.05	0.061	0.035
43220	n-pentane	59	0.48	3.25	1.34	1.380	0.608
43221	Isopentane	59	0.85	70.12	1.86	4.779	12.282
43224	1-pentene	59	0.08	2.62	0.20	0.351	0.558
43226	t-2-pentene	59	0.03	0.41	0.11	0.126	0.077
43227	c-2-pentene	59	0.00	0.26	0.06	0.068	0.039
43230	3-methylpentane	59	0.20	1.12	0.46	0.515	0.225
43231	n-hexane	59	0.22	1.94	0.55	0.669	0.360
43232	n-heptane	59	0.16	1.31	0.32	0.389	0.241
43233	n-octane	59	0.07	0.84	0.17	0.211	0.158
43235	n-nonane	59	0.06	0.69	0.17	0.193	0.127
43238	n-decane	59	0.06	0.73	0.18	0.223	0.169
43242	Cyclopentane	59	0.05	0.35	0.10	0.113	0.056
43243	Isoprene	59	0.03	19.80	0.30	3.146	5.078
43244	2,2-dimethylbutane	59	0.08	0.40	0.14	0.161	0.068
43245	1-Hexene	59	0.00	0.53	0.06	0.089	0.089
43247	2,4-dimethylpentane	59	0.06	0.29	0.14	0.143	0.057
43248	Cyclohexane	59	0.00	0.38	0.10	0.114	0.087
43249	3-methylhexane	59	0.00	3.36	0.38	0.499	0.541
43250	2,2,4-trimethylpentane	59	0.14	1.54	0.54	0.609	0.332
43252	2,3,4-trimethylpentane	59	0.07	0.63	0.25	0.268	0.146
43253	3-methylheptane	59	0.03	0.29	0.10	0.114	0.053
43261	Methylcyclohexane	59	0.00	0.40	0.14	0.164	0.089
43262	Methylcyclopentane	59	0.16	0.91	0.35	0.411	0.162
43263	2-methylhexane	59	0.00	4.19	0.45	0.604	0.660
43280	1-butene	59	0.00	0.62	0.10	0.135	0.095
43284	2,3-dimethylbutane	59	0.07	0.47	0.19	0.204	0.102
43285	2-methylpentane	59	0.35	3.09	1.33	1.381	0.638
43291	2,3-dimethylpentane	59	0.06	0.40	0.15	0.170	0.076
43954	n-undecane	59	0.06	1.97	0.28	0.334	0.278
43960	2-methylheptane	59	0.07	0.68	0.14	0.165	0.095
45109	m/p-xylene	59	0.24	3.69	0.92	1.077	0.596
45201	Benzene	59	0.00	4.43	1.01	1.079	0.628
45202	Toluene	59	0.65	4.96	2.10	2.211	1.000
45203	Ethylbenzene	59	0.10	1.12	0.32	0.368	0.195
45204	o-xylene	59	0.09	1.14	0.29	0.351	0.199
45207	1,3,5-trimethylbenzene	59	0.04	0.62	0.15	0.177	0.120
45208	1,2,4-trimethylbenzene	59	0.09	1.15	0.33	0.399	0.225
45209	n-propylbenzene	59	0.04	0.49	0.10	0.124	0.092
45210	Isopropylbenzene	59	0.00	0.21	0.05	0.063	0.042
45211	o-ethyltoluene	59	0.02	0.35	0.06	0.088	0.069
45212	m-ethyltoluene	59	0.07	0.73	0.24	0.277	0.164
45213	p-ethyltoluene	59	0.00	0.67	0.22	0.258	0.148
45218	m-diethylbenzene	59	0.03	1.28	0.05	0.109	0.249
45219	p-diethylbenzene	59	0.04	0.54	0.07	0.090	0.085
45220	Styrene	59	0.04	3.05	0.27	0.399	0.591
45225	1,2,3-trimethylbenzene	59	0.00	0.58	0.12	0.137	0.112
43000	PAMHC	59	22.48	143.41	41.76	45.955	25.248
43102	TNMOC	59	33.19	907.49	82.59	128.874	162.224

In 2010, the Office of Air Quality Monitoring (AQM) of the Department of Environmental Quality (DEQ) operated an Air Toxics Monitoring Network (ATMN). The ATMN consists of three separate monitoring programs. The Urban Air Toxics Monitoring Program (UATM), The National Air Toxics Trend Stations Program (NATTS), and The Community Air Toxics Assessment Monitoring Program.

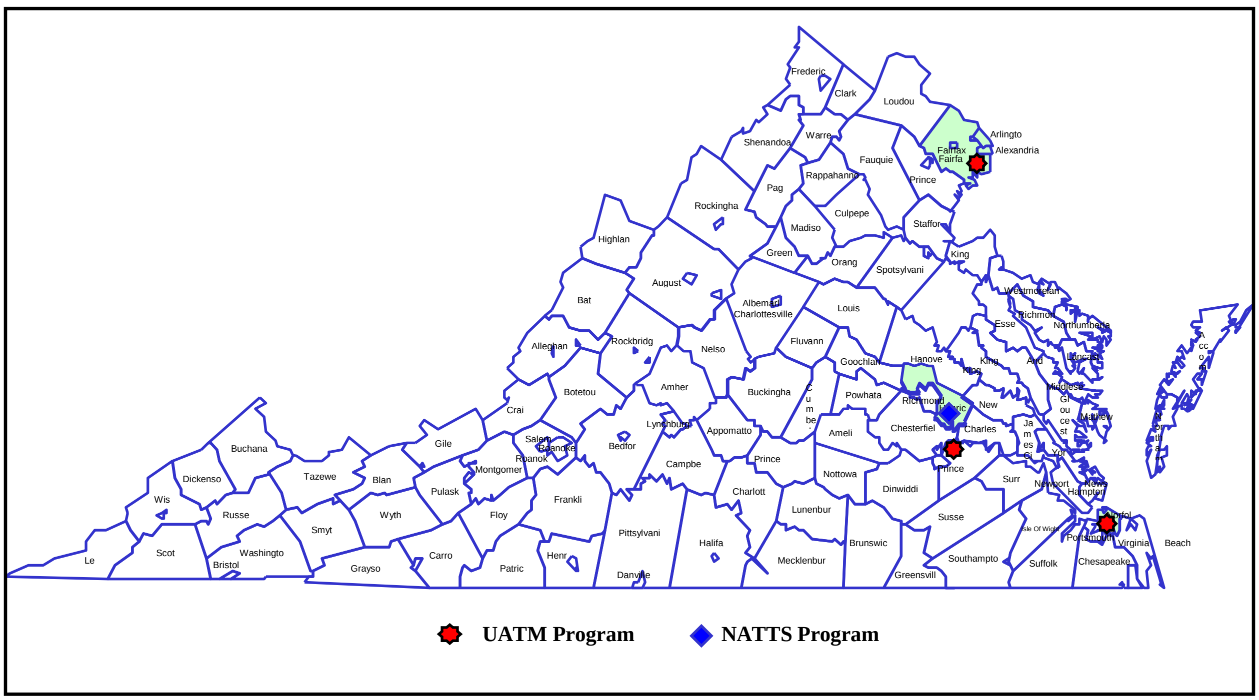
The UATM program consisted of three sites that were located at: the Carter G. Woodson Middle School in Hopewell; DEQ Tidewater Regional Office (TRO) in Virginia Beach; and Lee District Park in Fairfax County. Sampling at these sites consisted of Volatile Organic Compounds (VOC), Carbonyls, and Total Suspended Particulate (TSP) Metals. Each of the UATM sites had a sampling schedule consisting of 24-hour samples collected every 6th day. Data from these sites will be used to characterize air toxics concentrations in the respective urban areas.

AQM used the manual method for collecting ambient air samples for VOC analysis. Whole air samples were collected using evacuated Silco^{T} or SUMMA^{T} canisters and RMESI (RM Environmental Systems, Inc.) air samplers. Each sample was analyzed by the Maryland Department of the Environment, Air and Radiation Management Administration, using a Gas Chromatograph equipped with a Mass Selective Detector, using method TO15. Carbonyls were collected on DNPH (2,4-Dinitrophenylhydrazine) treated sorbent tubes using ATEC 8000 cartridge samplers. Samples were analyzed by the Philadelphia Health Department using a Liquid Chromatographic procedure designated as method TO11A. Metals were collected using a high volume Total Suspended Particulate (TSP) sampler. Samples were analyzed by the Division of Consolidated Laboratory Services (DCLS). Analysis utilized inductively coupled plasma mass spectrometry (ICP-MS) using method IO-3.1 and IO-3.5.

The NATTS program operated one station located at the MathScience Innovation Center (MSIC) in Henrico County. The NATTS site had a sampling schedule consisting of 24-hour samples collected every 6th day. Data from this site will be evaluated along with data from all of the NATTS sites nationally. AQM used the manual method for collecting ambient air samples for VOC analysis. Whole air samples were collected using evacuated Silco^{T} canisters and RMESI (RM Environmental Systems, Inc.) air samplers. Each sample was analyzed by the Division of Consolidated Laboratory Services (DCLS), using a Gas Chromatograph equipped with a Mass Selective Detector, utilizing method TO15. Carbonyls were collected on DNPH (2,4-Dinitrophenylhydrazine) treated sorbent tubes using ATEC 8000 cartridge samplers. Samples were analyzed by DCLS using a Liquid Chromatographic procedure, and the TO11A method. The Metals were collected using a high volume 10 micron Particulate Matter (PM10) sampler. Samples were analyzed by the DCLS. Analysis utilized Inductively Coupled Plasma Mass Spectrometry (ICP-MS) using method IO-3.1 and IO-3.5.

Detailed data collected from the UATM sites and the NATTS site for 2010 are available upon written request to the Virginia Department of Environmental Quality, Office of Air Quality Monitoring.

The Community Air Toxics Assessment Monitoring Program consists of special studies undertaken when conditions warrant. The locations and target compounds monitored are based on specific conditions and needs. The reports from these studies are published independently of this annual report. The most recent completed study was performed in the City of Hopewell. The final risk assessment report for this study was presented to the public in February of 2010 and is available on the DEQ website at http://www.deq.virginia.gov/air/pdf/air/monitoring/HOPEWELL_riskasse_080910.pdf.



Detectable VOC in 24-Hour Canister Samples
GC/MSD - MathScience Innovation Center NATTS Site - Henrico County, VA
January 1 to December 31, 2010- Concentrations are in ppbV

(non detects are counted as zeros for statistical purposes)

Parameter #	Compound Name	Num	Minimum	Maximum	Median	Average	StDev
43205	Propylene	61	0.00	0.44	0.00	0.007	0.056
43207	Freon 113	61	0.00	0.18	0.09	0.094	0.030
43208	Freon 114	61	0.00	0.17	0.00	0.005	0.026
43209	Ethyl Acetate	61	0.00	0.50	0.00	0.016	0.072
43218	1,3-Butadiene	61	0.00	0.00	0.00	0.000	0.000
43231	Hexane	61	0.00	0.53	0.10	0.115	0.133
43232	Heptane	61	0.00	0.41	0.00	0.030	0.072
43248	Cyclohexane	61	0.00	0.19	0.00	0.005	0.027
43372	MTBE	61	0.00	0.20	0.00	0.005	0.029
43441	Methyl Methacrylate	61	0.00	0.12	0.00	0.002	0.015
43505	Acrolein	61	0.00	1.22	0.12	0.188	0.286
43702	Acetonitrile	61	0.00	0.51	0.00	0.066	0.133
43704	Acrylonitrile	61	0.00	0.00	0.00	0.000	0.000
43801	Chloromethane	61	0.06	0.88	0.58	0.594	0.115
43802	Dichloromethane	61	0.00	0.61	0.12	0.150	0.094
43803	Chloroform	61	0.00	0.19	0.00	0.005	0.030
43804	Carbon Tetrachloride	61	0.00	0.23	0.09	0.090	0.031
43806	Bromoform (Tribromomethane)	61	0.00	0.14	0.00	0.002	0.018
43811	Trichlorofluoromethane	61	0.21	1.12	0.30	0.319	0.119
43812	Chloroethane	61	0.00	0.18	0.00	0.005	0.026
43813	1,1-Dichloroethane	61	0.00	0.20	0.00	0.005	0.029
43814	Methyl chloroform	61	0.00	0.18	0.00	0.005	0.027
43815	Ethylene dichloride	61	0.00	0.19	0.00	0.005	0.028
43817	Tetrachloroethylene	61	0.00	0.21	0.00	0.010	0.037
43818	1,1,2,2-Tetrachloroethane	61	0.00	0.19	0.00	0.005	0.027
43819	Bromomethane	61	0.00	0.18	0.00	0.005	0.027
43820	1,1,2-Trichloroethane	61	0.00	0.18	0.00	0.005	0.026
43823	Dichlorodifluoromethane	61	0.36	0.73	0.52	0.520	0.088
43824	Trichloroethylene	61	0.00	0.19	0.00	0.005	0.029
43826	1,1-Dichloroethylene	61	0.00	0.14	0.00	0.004	0.022
43828	Bromodichloromethane	61	0.00	0.20	0.00	0.005	0.028
43829	1,2-Dichloropropane	61	0.00	0.21	0.00	0.003	0.027
43830	trans-1,3-Dichlopropylene	61	0.00	0.17	0.00	0.003	0.022
43831	cis-1,3-Dichlopropylene	61	0.00	0.19	0.00	0.003	0.024
43832	Dibromochloromethane	61	0.00	0.17	0.00	0.003	0.022
43838	Trans-1,2-Dichloroethene	61	0.00	0.24	0.00	0.006	0.033
43839	cis-1,2-Dichloroethene	61	0.00	0.19	0.00	0.005	0.028
43843	Ethylene Dibromide	61	0.00	0.18	0.00	0.005	0.027
43844	Hexachlorobutadiene	61	0.00	0.18	0.00	0.003	0.023
43860	Vinyl Chloride	61	0.00	0.18	0.00	0.004	0.026
45109	m/p-Xylene	61	0.00	0.41	0.09	0.111	0.114
45201	Benzene	61	0.00	0.65	0.17	0.202	0.138
45202	Toluene	61	0.08	1.17	0.25	0.333	0.230
45203	Ethylbenzene	61	0.00	0.19	0.00	0.026	0.052
45204	o-Xylene	61	0.00	0.17	0.00	0.022	0.051
45207	1,3,5-Trimethylbenzene	61	0.00	0.11	0.00	0.006	0.022
45208	1,2,4-Trimethylbenzene	61	0.00	0.39	0.00	0.050	0.079
45213	p-Ethyltoluene	61	0.00	0.16	0.00	0.008	0.029
45220	Styrene	61	0.00	0.22	0.00	0.018	0.055
45801	Chlorobenzene	61	0.00	0.18	0.00	0.005	0.029
45805	1,2-Dichlorobenzene	61	0.00	0.16	0.00	0.007	0.030
45806	1,3-Dichlorobenzene	61	0.00	0.20	0.00	0.008	0.035
45807	1,4-Dichlorobenzene	61	0.00	0.25	0.00	0.040	0.067
45810	1,2,4-Trichlorobenzene	61	0.00	0.30	0.00	0.028	0.071
46401	Tetrahydrofuran	61	0.00	0.00	0.00	0.000	0.000

Detectable VOC in 24-Hour Canister Samples
GC/MSD - Carter G. Woodson Middle School, Hopewell, VA
January 1 to December 31, 2010 - Concentrations are in ppbV

(non detects are counted as zeros for statistical purposes)

Parameter #	Compound Name	Num	Minimum	Maximum	Median	Average	StDev
42153	Carbon Disulfide	61	0.00	0.16	0.02	0.023	0.023
43207	Freon 113	61	0.08	0.18	0.10	0.102	0.018
43208	Freon 114	61	0.02	0.03	0.02	0.022	0.004
43209	Ethyl Acetate	61	0.00	0.23	0.01	0.030	0.041
43218	1,3-Butadiene	61	0.00	0.32	0.03	0.051	0.066
43231	Hexane	61	0.03	0.72	0.10	0.156	0.125
43232	Heptane	61	0.01	0.49	0.05	0.071	0.069
43248	Cyclohexane	61	0.00	0.14	0.02	0.031	0.031
43312	Isopropyl Alcohol	61	0.01	11.23	0.45	0.915	1.718
43372	MTBE	61	0.00	0.03	0.00	0.003	0.006
43505	Acrolein	61	0.00	0.37	0.11	0.109	0.072
43551	Acetone	61	1.23	8.01	2.84	3.117	1.484
43552	Methyl ethyl Ketone (2-butanone)	61	0.03	0.64	0.22	0.252	0.144
43559	Methyl butyl Ketone (2-hexanone)	61	0.00	0.05	0.00	0.004	0.009
43560	Methyl isobutyl Ketone	61	0.00	0.02	0.00	0.001	0.004
43702	Acetonitrile	61	0.00	11.58	0.71	2.614	2.853
43704	Acrylonitrile	61	0.00	0.11	0.01	0.015	0.022
43801	Chloromethane	61	0.52	0.74	0.62	0.619	0.048
43802	Dichloromethane	61	0.10	0.35	0.16	0.177	0.062
43803	Chloroform	61	0.01	0.05	0.03	0.025	0.009
43804	Carbon Tetrachloride	61	0.07	0.12	0.10	0.098	0.012
43806	Bromoform (Tribromomethane)	61	0.00	0.01	0.00	0.002	0.004
43811	Trichlorofluoromethane	61	0.24	0.31	0.27	0.276	0.014
43812	Chloroethane	61	0.00	0.40	0.11	0.113	0.068
43813	1,1-Dichloroethane	61	0.00	0.01	0.00	0.002	0.004
43814	Methyl chloroform	61	0.01	0.02	0.01	0.012	0.004
43815	Ethylene dichloride	61	0.01	0.03	0.02	0.017	0.007
43817	Tetrachloroethylene	61	0.00	0.05	0.01	0.017	0.012
43818	1,1,2,2-Tetrachloroethane	61	0.00	0.01	0.00	0.003	0.005
43819	Bromomethane	61	0.00	0.03	0.01	0.011	0.005
43820	1,1,2-Trichloroethane	61	0.00	0.01	0.00	0.002	0.004
43823	Dichlorodifluoromethane	61	0.49	0.68	0.56	0.572	0.053
43824	Trichloroethylene	61	0.00	0.02	0.00	0.006	0.006
43826	1,1-Dichloroethylene	61	0.00	0.03	0.00	0.003	0.006
43828	Bromodichloromethane	61	0.00	0.04	0.00	0.005	0.008
43829	1,2-Dichloropropane	61	0.00	0.02	0.00	0.005	0.006
43830	trans-1,3-Dichlopropylene	61	0.00	0.03	0.00	0.002	0.005
43831	cis-1,3-Dichlopropylene	61	0.00	0.06	0.00	0.003	0.010
43832	Dibromochloromethane	61	0.00	0.01	0.00	0.002	0.004
43838	Trans-1,2-Dichloroethene	61	0.00	0.04	0.00	0.002	0.006
43839	cis-1,2-Dichloroethene	61	0.00	0.01	0.00	0.001	0.003
43843	Ethylene Dibromide	61	0.00	0.04	0.00	0.002	0.006
43844	Hexachlorobutadiene	61	0.00	0.03	0.00	0.004	0.006
43860	Vinyl Chloride	61	0.00	0.02	0.00	0.002	0.005
45109	m/p-Xylene	61	0.01	0.43	0.06	0.097	0.082
45201	Benzene	61	0.07	0.92	0.16	0.225	0.181
45202	Toluene	61	0.04	1.07	0.19	0.252	0.209
45203	Ethylbenzene	61	0.01	0.16	0.03	0.040	0.029
45204	o-Xylene	61	0.00	0.17	0.03	0.039	0.034
45207	1,3,5-Trimethylbenzene	61	0.00	5.91	0.01	0.219	0.914
45208	1,2,4-Trimethylbenzene	61	0.01	0.22	0.04	0.050	0.044
45213	p-Ethyltoluene	61	0.00	0.12	0.01	0.021	0.022
45220	Styrene	61	0.00	0.23	0.01	0.027	0.041
45801	Chlorobenzene	61	0.00	0.05	0.00	0.007	0.009
45805	1,2-Dichlorobenzene	61	0.00	0.06	0.00	0.007	0.012
45806	1,3-Dichlorobenzene	61	0.00	0.06	0.00	0.006	0.013
45807	1,4-Dichlorobenzene	61	0.00	0.10	0.01	0.021	0.020
45809	Benzyl Chloride	61	0.00	0.24	0.00	0.014	0.041
45810	1,2,4-Trichlorobenzene	61	0.00	0.10	0.00	0.008	0.017
46401	Tetrahydrofuran	61	0.00	0.19	0.00	0.013	0.032

Detectable VOC in 24-Hour Canister Samples
GC/MSD - Tidewater Regional Office (TRO) – Va. Beach, VA
January 1 to December 31, 2010– Concentrations are in ppbV

(non detects are counted as zeros for statistical purposes)

Parameter #	Compound Name	Num	Minimum	Maximum	Median	Average	StDev
42153	Carbon Disulfide	58	0.01	0.34	0.04	0.062	0.067
43207	Freon 113	58	0.08	0.13	0.09	0.092	0.009
43208	Freon 114	58	0.02	0.04	0.02	0.022	0.004
43209	Ethyl Acetate	58	0.00	0.25	0.01	0.031	0.052
43218	1,3-Butadiene	58	0.00	0.41	0.03	0.053	0.065
43231	Hexane	58	0.03	0.66	0.15	0.172	0.122
43232	Heptane	58	0.01	0.32	0.06	0.073	0.050
43248	Cyclohexane	58	0.00	0.13	0.02	0.029	0.025
43312	Isopropyl Alcohol	58	0.00	1.59	0.22	0.336	0.370
43372	MTBE	58	0.00	0.03	0.00	0.004	0.007
43505	Acrolein	58	0.02	0.85	0.15	0.176	0.129
43551	Acetone	58	1.32	7.98	4.03	4.280	1.739
43552	Methyl ethyl Ketone (2-butanone)	58	0.05	0.89	0.31	0.354	0.172
43559	Methyl butyl Ketone (2-hexanone)	58	0.00	0.07	0.01	0.017	0.019
43560	Methyl isobutyl Ketone	58	0.00	0.08	0.01	0.015	0.019
43702	Acetonitrile	58	0.17	7.04	0.69	0.863	0.976
43704	Acrylonitrile	58	0.00	0.11	0.01	0.018	0.029
43801	Chloromethane	58	0.53	1.01	0.65	0.653	0.068
43802	Dichloromethane	58	0.18	1.70	0.25	0.326	0.297
43803	Chloroform	58	0.01	0.06	0.02	0.026	0.010
43804	Carbon Tetrachloride	58	0.06	0.13	0.10	0.095	0.012
43806	Bromoform (Tribromomethane)	58	0.00	0.01	0.00	0.002	0.004
43811	Trichlorofluoromethane	58	0.25	0.38	0.28	0.277	0.021
43812	Chloroethane	58	0.00	0.17	0.10	0.095	0.044
43813	1,1-Dichloroethane	58	0.00	0.02	0.00	0.002	0.004
43814	Methyl chloroform	58	0.01	0.02	0.01	0.011	0.003
43815	Ethylene dichloride	58	0.01	0.04	0.02	0.017	0.006
43817	Tetrachloroethylene	58	0.01	1.01	0.06	0.129	0.188
43818	1,1,2,2-Tetrachloroethane	58	0.00	0.02	0.00	0.002	0.005
43819	Bromomethane	58	0.00	0.03	0.01	0.012	0.006
43820	1,1,2-Trichloroethane	58	0.00	0.01	0.00	0.002	0.004
43823	Dichlorodifluoromethane	58	0.39	0.86	0.57	0.583	0.064
43824	Trichloroethylene	58	0.00	0.02	0.00	0.005	0.006
43826	1,1-Dichloroethylene	58	0.00	0.02	0.00	0.003	0.005
43828	Bromodichloromethane	58	0.00	0.03	0.00	0.004	0.007
43829	1,2-Dichloropropane	58	0.00	0.02	0.00	0.005	0.007
43830	trans-1,3-Dichlopropylene	58	0.00	0.01	0.00	0.001	0.003
43831	cis-1,3-Dichlopropylene	58	0.00	0.01	0.00	0.001	0.003
43832	Dibromochloromethane	58	0.00	0.01	0.00	0.001	0.003
43838	Trans-1,2-Dichloroethene	58	0.00	0.01	0.00	0.002	0.004
43839	cis-1,2-Dichloroethene	58	0.00	0.01	0.00	0.001	0.003
43843	Ethylene Dibromide	58	0.00	0.01	0.00	0.001	0.003
43844	Hexachlorobutadiene	58	0.00	0.01	0.00	0.004	0.005
43860	Vinyl Chloride	58	0.00	0.01	0.00	0.001	0.003
45109	m/p-Xylene	58	0.02	0.88	0.10	0.120	0.121
45201	Benzene	58	0.07	1.26	0.19	0.228	0.189
45202	Toluene	58	0.05	1.96	0.22	0.319	0.294
45203	Ethylbenzene	58	0.01	0.30	0.04	0.046	0.041
45204	o-Xylene	58	0.01	0.25	0.03	0.044	0.038
45207	1,3,5-Trimethylbenzene	58	0.00	12.56	0.01	0.387	1.779
45208	1,2,4-Trimethylbenzene	58	0.01	0.26	0.04	0.050	0.041
45213	p-Ethyltoluene	58	0.00	0.16	0.01	0.020	0.023
45220	Styrene	58	0.00	0.07	0.01	0.017	0.014
45801	Chlorobenzene	58	0.00	0.02	0.00	0.002	0.005
45805	1,2-Dichlorobenzene	58	0.00	0.01	0.00	0.003	0.005
45806	1,3-Dichlorobenzene	58	0.00	0.01	0.00	0.002	0.004
45807	1,4-Dichlorobenzene	58	0.00	0.03	0.01	0.011	0.008
45809	Benzyl Chloride	58	0.00	0.17	0.00	0.008	0.024
45810	1,2,4-Trichlorobenzene	58	0.00	0.02	0.00	0.004	0.006
46401	Tetrahydrofuran	58	0.00	0.22	0.00	0.010	0.030

Detectable VOC in 24-Hour Canister Samples

GC/MSD - Lee District Park - Fairfax County, VA

January 1 to December 31, 2010 - Concentrations are in ppbV

(non detects are counted as zeros for statistical purposes)

Parameter #	Compound Name	Num	Minimum	Maximum	Median	Average	StDev
42153	Carbon Disulfide	60	0.01	0.11	0.02	0.029	0.023
43207	Freon 113	60	0.08	0.10	0.09	0.090	0.007
43208	Freon 114	60	0.02	0.03	0.02	0.021	0.003
43209	Ethyl Acetate	60	0.00	0.27	0.02	0.034	0.050
43218	1,3-Butadiene	60	0.00	0.10	0.02	0.027	0.023
43231	Hexane	60	0.03	0.24	0.08	0.099	0.049
43232	Heptane	60	0.01	0.13	0.03	0.039	0.025
43248	Cyclohexane	60	0.00	0.11	0.01	0.020	0.025
43312	Isopropyl Alcohol*	50	0.09	34.82	2.10	6.191	8.247
43372	MTBE	60	0.00	0.01	0.00	0.001	0.003
43505	Acrolein	60	0.00	0.92	0.12	0.156	0.185
43551	Acetone*	50	0.88	7.52	3.35	3.286	1.598
43552	Methyl ethyl Ketone (2-butanone)	60	0.04	2.76	0.22	0.376	0.523
43559	Methyl butyl Ketone (2-hexanone)	60	0.00	0.45	0.00	0.025	0.084
43560	Methyl isobutyl Ketone	60	0.00	0.06	0.00	0.006	0.013
43702	Acetonitrile*	50	0.05	1.57	0.36	0.466	0.396
43704	Acrylonitrile	60	0.00	0.21	0.00	0.017	0.039
43801	Chloromethane	60	0.51	0.73	0.63	0.623	0.043
43802	Dichloromethane	60	0.17	0.32	0.24	0.243	0.035
43803	Chloroform	60	0.01	0.05	0.02	0.025	0.008
43804	Carbon Tetrachloride	60	0.06	0.12	0.10	0.094	0.013
43806	Bromoform (Tribromomethane)	60	0.00	0.01	0.00	0.001	0.002
43811	Trichlorofluoromethane	60	0.24	0.30	0.28	0.274	0.014
43812	Chloroethane	60	0.00	0.18	0.10	0.092	0.042
43813	1,1-Dichloroethane	60	0.00	0.01	0.00	0.001	0.003
43814	Methyl chloroform	60	0.01	0.02	0.01	0.011	0.002
43815	Ethylene dichloride	60	0.01	0.03	0.02	0.016	0.006
43817	Tetrachloroethylene	60	0.01	0.06	0.02	0.026	0.016
43818	1,1,2,2-Tetrachloroethane	60	0.00	0.02	0.00	0.002	0.005
43819	Bromomethane	60	0.00	0.02	0.01	0.011	0.004
43820	1,1,2-Trichloroethane	60	0.00	0.01	0.00	0.001	0.003
43823	Dichlorodifluoromethane	60	0.49	0.66	0.57	0.575	0.044
43824	Trichloroethylene	60	0.00	0.02	0.01	0.007	0.006
43826	1,1-Dichloroethylene	60	0.00	0.01	0.00	0.001	0.003
43828	Bromodichloromethane	60	0.00	0.02	0.00	0.003	0.005
43829	1,2-Dichloropropane	60	0.00	0.02	0.00	0.003	0.005
43830	trans-1,3-Dichlopropylene	60	0.00	0.00	0.00	0.000	0.000
43831	cis-1,3-Dichlopropylene	60	0.00	0.01	0.00	0.001	0.002
43832	Dibromochloromethane	60	0.00	0.01	0.00	0.000	0.002
43838	Trans-1,2-Dichloroethene	60	0.00	0.01	0.00	0.001	0.003
43839	cis-1,2-Dichloroethene	60	0.00	0.01	0.00	0.001	0.002
43843	Ethylene Dibromide	60	0.00	0.01	0.00	0.001	0.002
43844	Hexachlorobutadiene	60	0.00	0.02	0.00	0.003	0.005
43860	Vinyl Chloride	60	0.00	0.01	0.00	0.001	0.003
45109	m/p-Xylene	60	0.02	0.16	0.05	0.060	0.035
45201	Benzene	60	0.08	0.46	0.16	0.165	0.077
45202	Toluene	60	0.05	0.38	0.15	0.173	0.087
45203	Ethylbenzene	60	0.01	0.06	0.02	0.026	0.012
45204	o-Xylene	60	0.01	0.06	0.02	0.024	0.014
45207	1,3,5-Trimethylbenzene	60	0.00	2.44	0.01	0.080	0.363
45208	1,2,4-Trimethylbenzene	60	0.01	0.10	0.02	0.029	0.016
45213	p-Ethyltoluene	60	0.00	0.04	0.01	0.014	0.008
45220	Styrene	60	0.00	0.10	0.01	0.013	0.018
45801	Chlorobenzene	60	0.00	0.01	0.00	0.002	0.004
45805	1,2-Dichlorobenzene	60	0.00	0.01	0.00	0.002	0.004
45806	1,3-Dichlorobenzene	60	0.00	0.01	0.00	0.001	0.003
45807	1,4-Dichlorobenzene	60	0.00	0.02	0.01	0.008	0.006
45809	Benzyl Chloride	60	0.00	0.13	0.00	0.005	0.019
45810	1,2,4-Trichlorobenzene	60	0.00	0.05	0.00	0.006	0.008
46401	Tetrahydrofuran	60	0.00	1.01	0.00	0.042	0.149

* Equipment issues and possible contamination caused 10 determinations to be deleted from statistical consideration.

24 Hour Carbonyl Sampling 2010 Summary Statistical Analysis

Concentrations are in ug/m^3

(non detects are counted as zeros for statistical purposes)

Site	Parameter	Compound Name	Num	Minimum	Maximum	Median	Average	StDev
Carter G. Woodson Middle School	43502	Formaldehyde	60	1.44	13.13	3.32	3.960	2.444
	43503	Acetaldehyde	60	0.43	4.72	1.76	1.965	0.858
	43504	Propionaldehyde	60	0.17	1.04	0.46	0.498	0.198
	43551	Acetone	60	0.22	12.43	4.31	4.844	2.605
	43552	Methyl Ethyl Ketone	60	0.11	1.83	0.74	0.768	0.358
	43560	Methyl Isobutyl Ketone	60	0.00	0.24	0.00	0.050	0.067

Site	Parameter	Compound Name	Num	Minimum	Maximum	Median	Average	StDev
Tidewater Regional Office	43502	Formaldehyde	61	0.05	17.30	3.06	3.555	2.580
	43503	Acetaldehyde	61	0.16	5.89	1.54	1.759	1.064
	43504	Propionaldehyde	61	0.11	1.17	0.49	0.531	0.216
	43551	Acetone	61	0.43	11.37	3.43	3.861	2.354
	43552	Methyl Ethyl Ketone	61	0.14	2.42	0.63	0.691	0.386
	43560	Methyl Isobutyl Ketone	61	0.00	0.42	0.06	0.078	0.097

Site	Parameter	Compound Name	Num	Minimum	Maximum	Median	Average	StDev
Lee Park	43502	Formaldehyde	61	0.08	12.66	2.83	3.172	2.049
	43503	Acetaldehyde	61	0.15	3.81	1.50	1.568	0.626
	43504	Propionaldehyde	61	0.07	0.80	0.38	0.380	0.131
	43551	Acetone	61	0.71	8.21	3.52	3.667	1.655
	43552	Methyl Ethyl Ketone	61	0.10	1.29	0.62	0.604	0.225
	43560	Methyl Isobutyl Ketone	61	0.00	0.21	0.00	0.023	0.046

NATTS Carbonyl Sampling 2010 Summary Statistical Analysis

Concentrations are in ug/m^3

(non detects are counted as zeros for statistical purposes)

Site	Parameter	Compound Name	Num	Minimum	Maximum	Median	Average	StDev
MathScience Innovation Center	43502	Formaldehyde	61	0.89	13.50	2.87	3.544	2.247
	43503	Acetaldehyde	61	0.68	4.26	1.48	1.598	0.654
	43504	Propionaldehyde	61	0.00	1.00	0.30	0.247	0.249
	43551	Acetone	61	1.82	9.66	3.44	4.202	1.907
	43552	Methyl Ethyl Ketone	61	0.00	1.20	0.48	0.490	0.250
	43560	Methyl Isobutyl Ketone	61	0.00	0.44	0.00	0.007	0.056

TSP Metals Sampling 2010 Summary Statistical Analysis

Concentrations are in ng/m^3

(non detects are counted as zeros for statistical purposes)

Site	Parameter	Compound Name	Num	Minimum	Maximum	Median	Average	StDev
Carter G. Woodson Middle School	12103	Arsenic	61	0.24	2.30	0.74	0.909	0.473
	12105	Beryllium	61	0.00	0.03	0.00	0.005	0.008
	12110	Cadmium	61	0.00	0.67	0.10	0.116	0.099
	12112	Chromium	61	1.81	5.70	2.35	2.546	0.635
	12128	Lead	61	1.12	6.50	2.91	3.132	1.205
	12132	Manganese	61	0.98	30.68	8.37	10.254	6.322
	12136	Nickel	61	0.58	4.46	1.08	1.292	0.677

Site	Parameter	Compound Name	Num	Minimum	Maximum	Median	Average	StDev
Tidewater Regional Office	12103	Arsenic	58	0.29	8.59	1.01	1.349	1.325
	12105	Beryllium	58	0.00	0.05	0.00	0.004	0.008
	12110	Cadmium	58	0.00	0.38	0.08	0.102	0.077
	12112	Chromium	58	1.72	5.71	2.31	2.408	0.647
	12128	Lead	58	1.28	11.65	3.28	3.765	2.137
	12132	Manganese	58	1.93	50.15	7.01	9.339	7.499
	12136	Nickel	58	0.82	4.49	1.62	1.708	0.685

Site	Parameter	Compound Name	Num	Minimum	Maximum	Median	Average	StDev
Lee Park	12103	Arsenic	60	0.15	2.08	0.68	0.768	0.404
	12105	Beryllium	60	0.00	0.02	0.00	0.002	0.005
	12110	Cadmium	60	0.00	0.25	0.11	0.115	0.061
	12112	Chromium	60	1.69	4.08	2.24	2.287	0.411
	12128	Lead	60	0.94	5.90	2.58	2.628	0.989
	12132	Manganese	60	1.30	37.01	6.24	7.895	6.067
	12136	Nickel	60	0.48	4.88	1.09	1.263	0.737

NATTS PM10 Metals Sampling 2010 Summary Statistical Analysis

Concentrations are in ng/m^3

(non detects and negative values are counted as zeros for statistical purposes)

Site	Parameter	Compound Name	Num	Minimum	Maximum	Median	Average	StDev
MathScience Innovation Center	82103	Arsenic	61	0.11	3.55	0.56	0.744	0.525
	82105	Beryllium	61	0.00	0.03	0.00	0.002	0.005
	82110	Cadmium	61	0.02	0.64	0.18	0.191	0.101
	82112	Chromium	61	1.75	3.42	2.23	2.259	0.325
	82128	Lead	61	0.79	70.30	2.29	3.718	8.755
	82132	Manganese	61	0.68	11.90	3.03	3.704	2.394
	82136	Nickel	61	0.47	1.97	0.83	0.917	0.365

AQI (Air Quality Index)

What is the AQI?

The air quality index (AQI) is a measurement designed to indicate how clean the air is in an area, and it also provides information about health effects associated with air pollution. The index is reported daily, or in some cases continuously, and calculated from measured concentrations of five major pollutants regulated by the Clean Air Act: ground-level ozone, particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide. EPA has established national ambient air quality standards (NAAQS) for each of these pollutants to protect public health, and the index is derived from the NAAQS. State and local agencies are required to report the AQI in areas where the population is 350,000 or more, although it is often reported in additional areas as a public service.

How does the AQI work?

The AQI range is from 0 to 500, with the low numbers representing good air quality and the high numbers indicating unhealthy or even hazardous air quality. The index is divided into six categories with coordinating color codes. In addition, each category has a health-related message associated with it, to inform the public of possible health effects that may arise as a result of breathing polluted air.

Generally, an index of 100 corresponds to the national air quality standard for the pollutant, which is the level that EPA has established to protect public health. Levels below 100 are considered satisfactory, while numbers above 100 are considered unhealthy, first for sensitive groups, and then for the general public as the index value increases.

How is the AQI calculated?

The AQI is calculated from air pollution measurements collected at monitoring sites across the country. The reporting agency must calculate an index for each pollutant from the measured concentrations at all monitoring sites in an area using a standard formula developed by EPA. The pollutant with the highest index is reported as the "primary pollutant", and the highest index is reported as the AQI for the area. If the AQI is above 100, then the agency must report which groups may be sensitive to the primary pollutant. If two or more pollutants have indexes above 100, then the agency must report all groups that may be affected by those pollutants.

In Virginia, as well as most of the nation, the pollutants of greatest concern are ground-level ozone, and airborne particulate matter. Currently, the AQI is only reported for those two pollutants in Virginia.

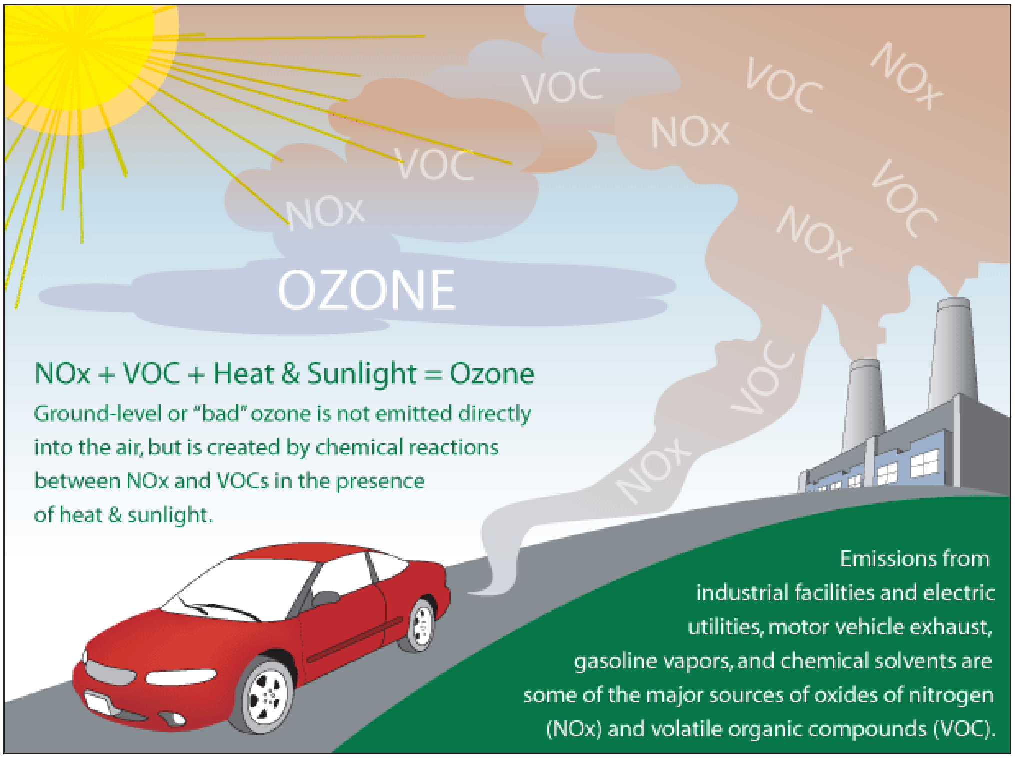
How do I find the AQI for my area?

DEQ reports the air quality index for Roanoke, Winchester, Richmond, Hampton Roads, and Northern Virginia for ozone and particulate matter on the internet at www.deq.virginia.gov/airquality/homepage.html. The AQI for particulate matter is reported year-round and the AQI for ozone is reported during the months of April to October, which is ozone season in Virginia. Air quality forecasts and current ozone data can be obtained at the DEQ site, as well as links to other air quality websites. EPA also reports air quality conditions for the United States at www.airnow.gov.

In addition to the internet, current and forecasted AQI levels are broadcast on local television and radio weather reports in many areas, as well as printed in newspapers. By reaching out to the public using these different media, individuals can plan their activities to reduce exposure during episodes of poor air quality, and they can also take steps to reduce pollution.

For detailed information about the AQI, and on health effects of the pollutants that are included in the AQI, visit www.airnow.gov .

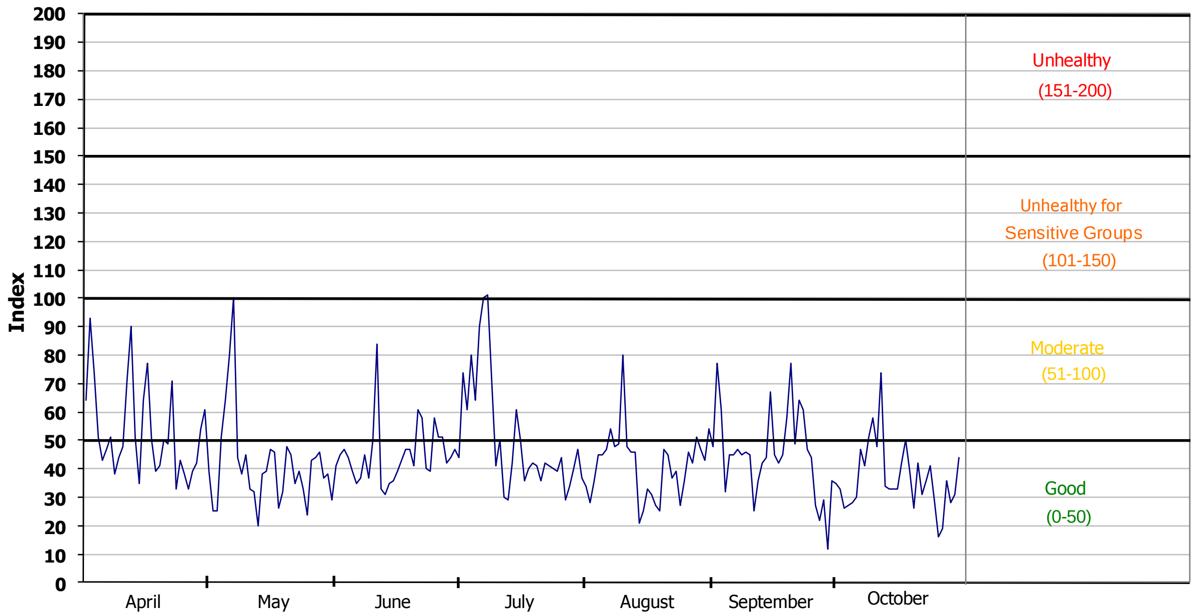
Air Quality Index Levels of Health Concern	Numerical Value	Meaning
Good	0-50	Air quality is considered satisfactory, and air pollution poses little or no risk.
Moderate	51-100	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
Unhealthy for Sensitive Groups	101-150	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
Unhealthy	151-200	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
Very Unhealthy	201-300	Health alert: everyone may experience more serious health effects.
Hazardous	> 300	Health warnings of emergency conditions. The entire population is more likely to be affected.



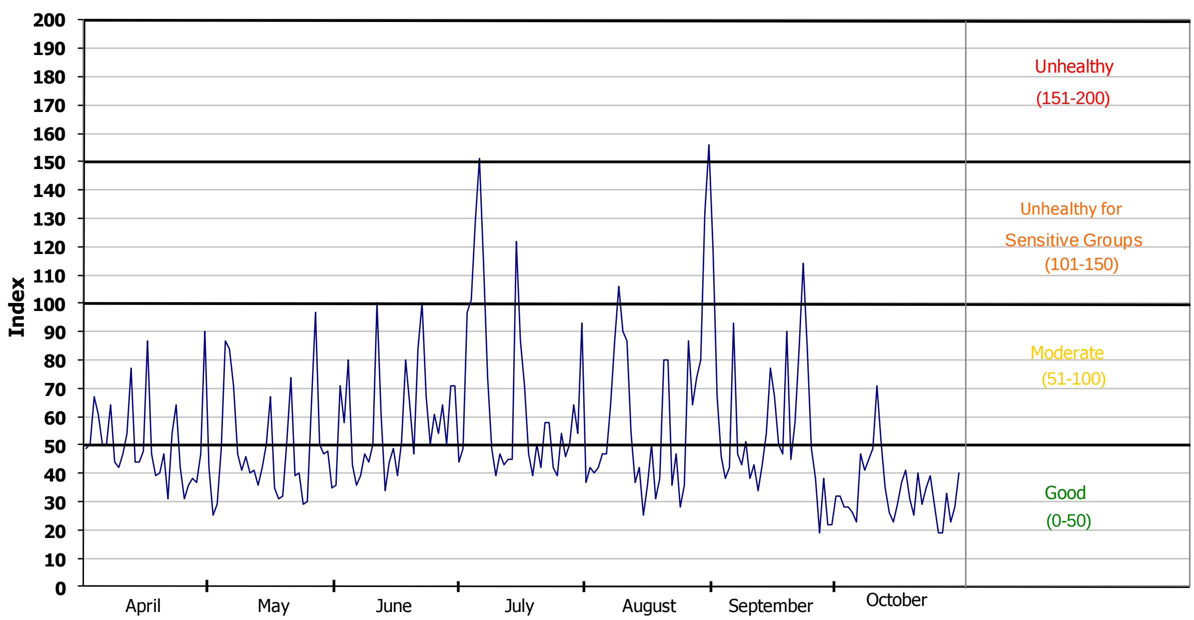
Every day tips:	Ozone Action Day tips:
✚ Conserve energy—at home, at work, everywhere. ✚ Defer use of gasoline-powered lawn and garden equipment. Follow gasoline refueling instructions for efficient vapor recovery. Be careful not to spill fuel and always tighten your gas cap securely. ✚ Keep car, boat, and other engines tuned up according to manufacturers' specification. ✚ Be sure your tires are properly inflated. ✚ Carpool, use public transportation, bike, or walk whenever possible. ✚ Use environmentally safe paints and cleaning products whenever possible. ✚ Some products that you use at your home or office are made with smog-forming chemicals that can evaporate into the air when you use them. Follow manufacturers' recommendations for use and properly seal cleaners, paints, and other chemicals to prevent evaporation into the air.	✚ Conserve electricity and set your air conditioner at a higher temperature. ✚ Choose a cleaner commute—share a ride to work or use public transportation. Bicycle or walk to errands when possible. ✚ Defer use of gasoline-powered lawn and garden equipment. ✚ Refuel cars and trucks after dusk. ✚ Combine errands and reduce trips. ✚ Limit engine idling. ✚ Use household, workshop, and garden chemicals in ways that keep evaporation to a minimum, or try to delay using them when poor air quality is forecast.

For more information, please visit these sites:
http://www.epa.gov/otaq/consumer/18-youdo.pdf
www.airnow.gov/index.cfm?action=resources.whatyoucando

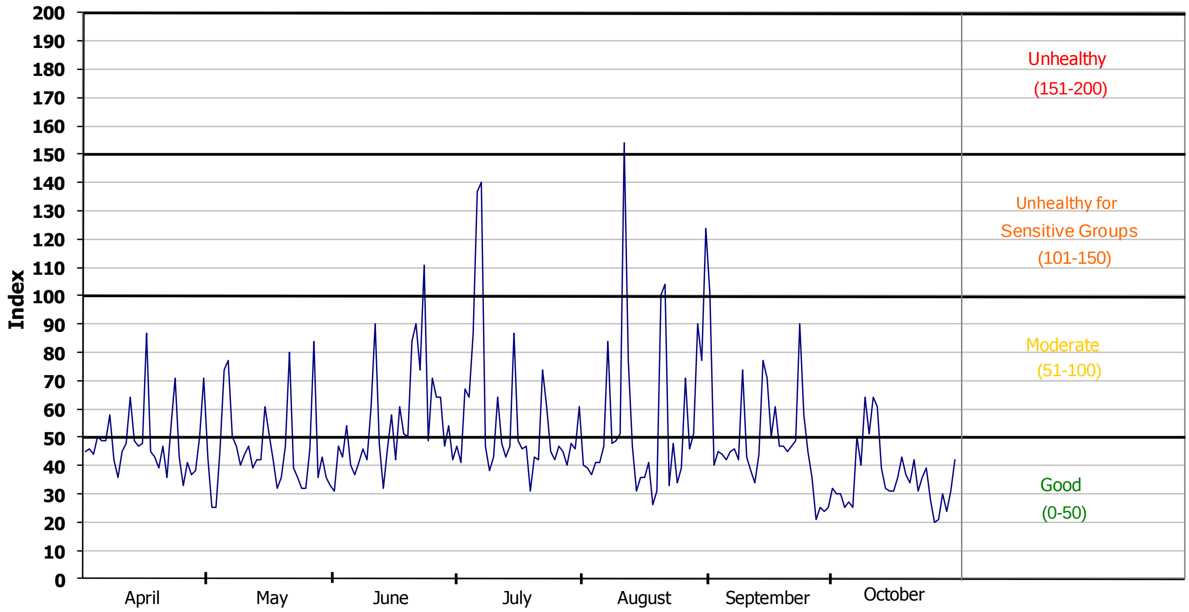
Ozone Air Quality Index
Roanoke Area
2010



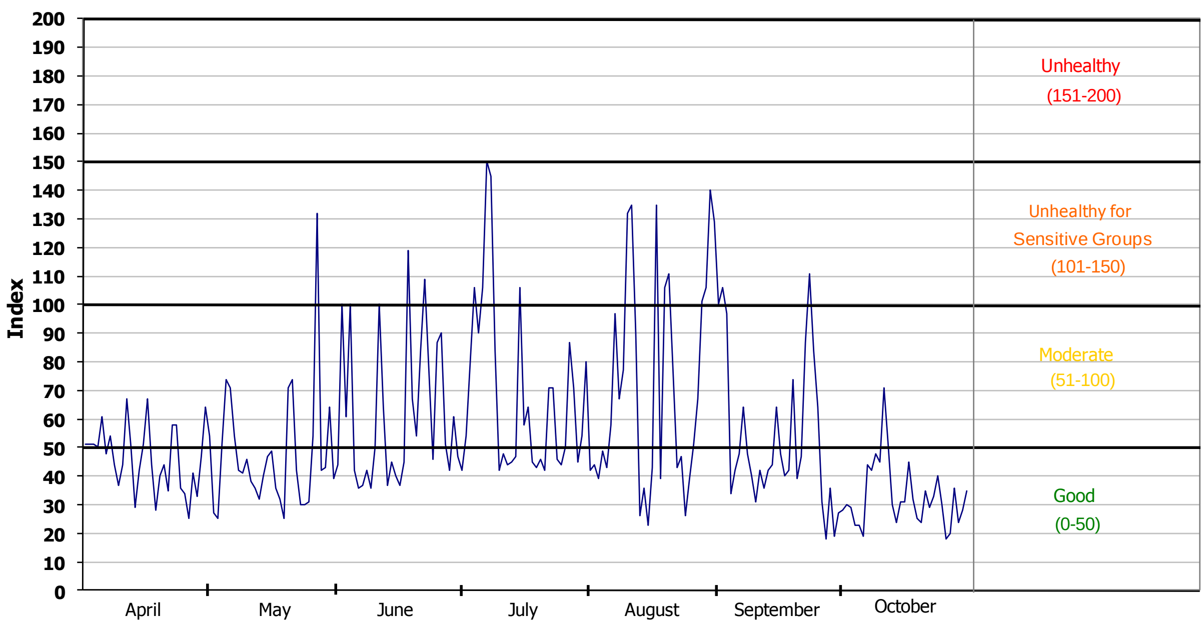
Ozone Air Quality Index
Richmond - Petersburg Areas
2010



Ozone Air Quality Index
Norfolk - Virginia Beach - Newport News Areas
2010



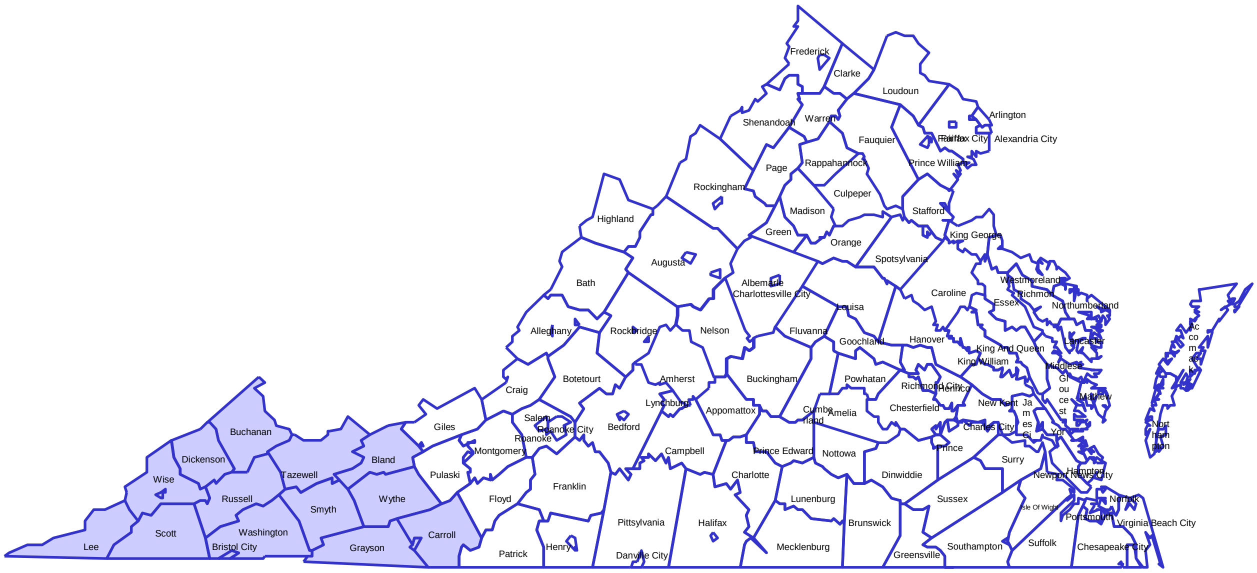
Ozone Air Quality Index
Washington, DC Area
2010



Appendix A

AQM	Air Quality Monitoring
AQCR	Air Quality Control Region
ATMN	Air Toxics Monitoring Network
Avg.	Average
CAMP	Community Assessment Monitoring
CO	Carbon Monoxide
DEQ	Department of Environmental Quality
EPA	Environmental Protection Agency
IMPROVE	Interagency Monitoring of Protected Visual Environments
LAT	Latitude
LONG	Longitude
MARAMA	Mid-Atlantic Regional Air Management Association
MET.	Meteorological Instrumentation
MSA	Metropolitan Statistical Area
NA	Not Available
NAMS	National Air Monitoring Stations
NATTS	National Air Toxics Trend Stations
NMOC	Non-Methane Organic Compounds
NO_2	Nitrogen Dioxide
NUM	Number of Samples
O_3	Ozone
PAMHC	Total PAMS Hydrocarbon
PAMS	Photochemical Assessment Monitoring Station
PM_{10}	Particulate Matter with an aerodynamic diameter less than or equal to 10 microns
$PM_{2.5}$	Particulate Matter with an aerodynamic diameter less than or equal to 2.5 microns
POLLUT.	Pollutant
ppbC	Part Per Billion of Carbon
ppbv	Part Per Billion by volume
ppm	Part Per Million
SLAMS	State and Local Air Monitoring Station
SO_2	Sulfur Dioxide
STD	Standard
STDEV	Standard Deviation
TEOM	Tapered Element Oscillating Microbalance (a method for continuously measuring $PM_{2.5}$ in ambient air)
TNMOC	Total Nonmethane Organic Compound
UATM	Urban Air Toxics Monitoring Program
ug/m^3	Micrograms per cubic meter
VISTAS	Visibility Improvement State and Tribal Association of the Southeast
VOC	Volatile Organic Compounds

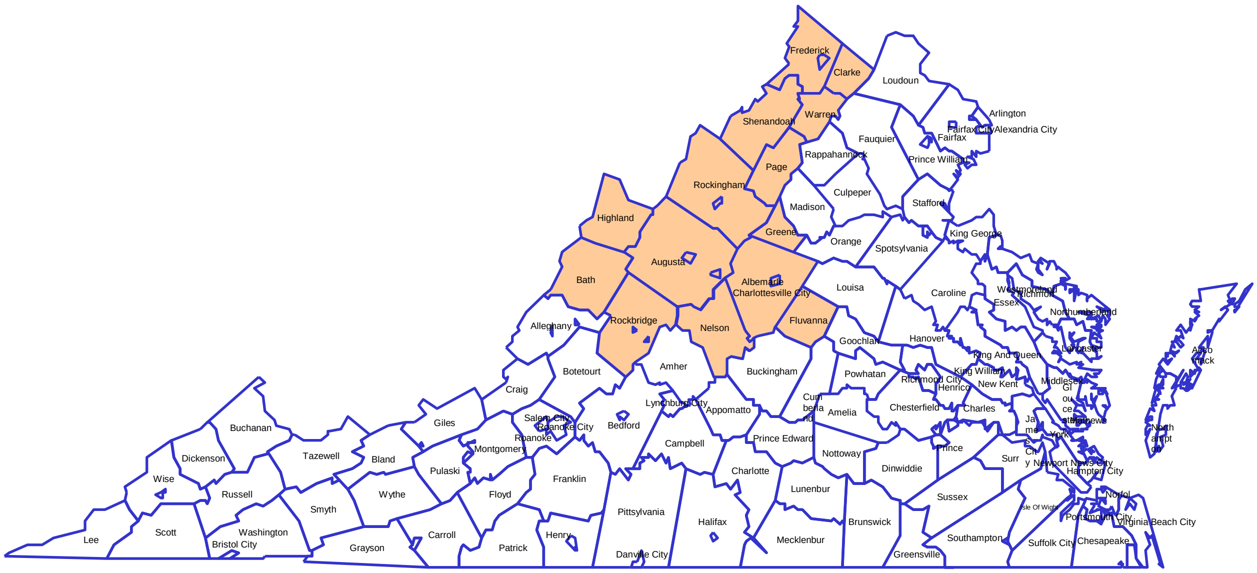
Southwest Monitoring Network 2010



STATION NUMBER	POLLUT.	LOCATION	EPA ID	CITY/COUNTY	LAT/LONG
16-B	O_3	Sewage Disposal Plant	51-197-0002	Rural Retreat Wythe Co.	36.89117 -81.25423
23-A	PM_{10}	Gladeville Elementary School	51-035-0001	Galax Carroll Co.	36.70067 -80.87978
101-E	$PM_{2.5}$	Highland View Elementary School	51-520-0006	Bristol	36.60800 -82.16410
4-G	Lead	VP-1 Upper Stock Pile Area	51-027-0006	Buchanan Co.	37.24778 -82.01806

Contact Information for this Region:
Southwest Regional Office
Dallas Sizemore, Director
P.O. Box 1688
355 Deadmore Street
Abingdon, VA 24212
(276) 676-4800

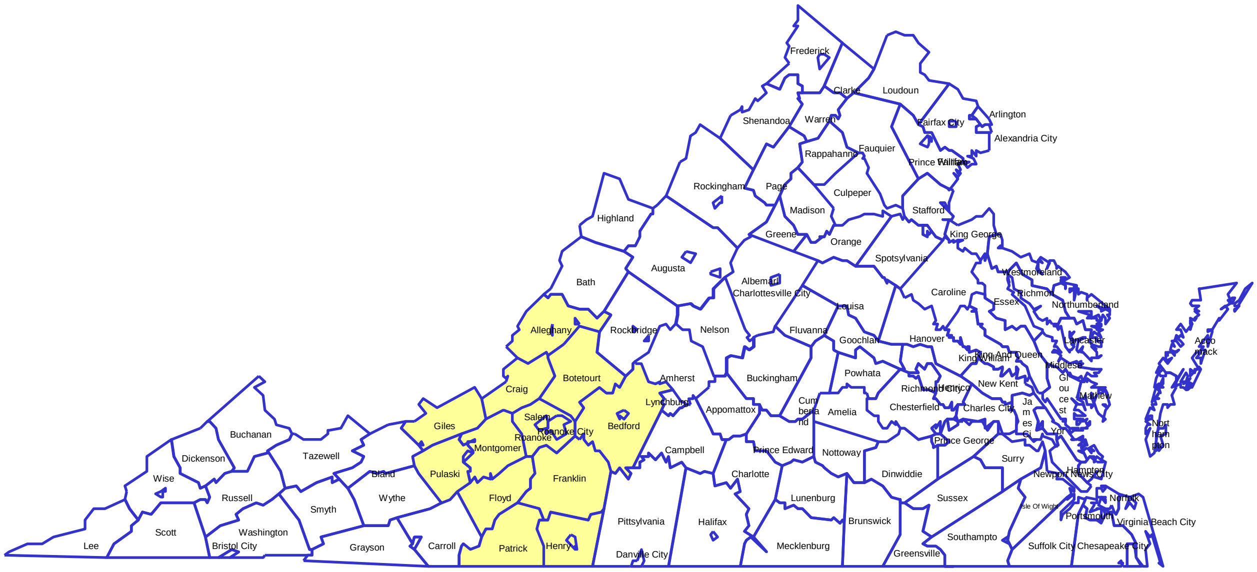
Valley Monitoring Network 2010



STATION NUMBER	POLLUT.	LOCATION	EPA ID	CITY/COUNTY	LAT/LONG
21-C	O_3, IMPROVE	Natural Bridge Ranger Station	51-163-0003	Rockbridge Co.	37.62668 -79.51257
26-F	$PM_{2.5}$, SO_2, NO_2,O_3	Rockingham VDOT	51-165-0003	Harrisonburg Rockingham Co.	38.47753 -78.81952
28-J	O_3, $PM_{2.5}$, TEOM	Woodbine Road Lester Building Systems	51-069-0010	Rest Frederick Co.	39.28102 -78.08157
29-D	O_3, $PM_{2.5}$	Luray Caverns Airport	51-139-0004	Page Co.	38.66373 -78.50442
33-A	O_3, $PM_{2.5}$, TEOM	Albemarle High School	51-003-0001	Albemarle Co.	38.07657 -78.50397
30-E	PM_{10}	Warren Co. Memorial Hospital 1000 Shenandoah Avenue	51-187-0004	Front Royal Warren Co.	38.93095 -78.19847
134-C	PM_{10}	Winchester Courts Building	51-840-0002	Winchester	39.18397 -78.16308

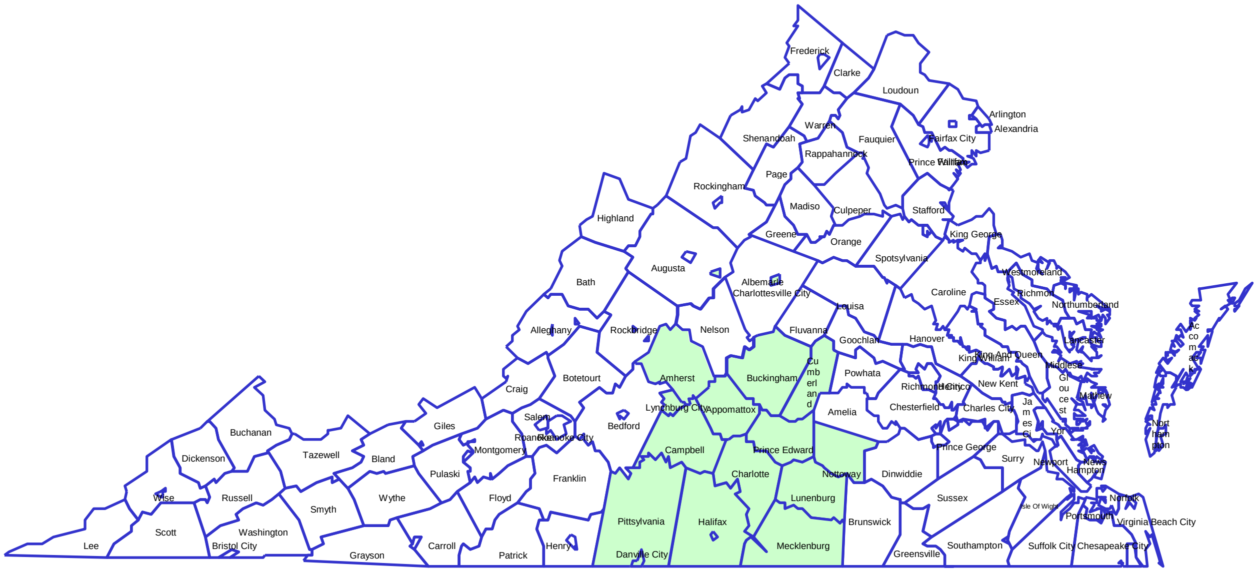
Contact information for this Region:
Valley Regional Office
Amy T. Owens, Director
P.O. Box 3000
4411 Early Road
Harrisonburg, VA 22801
(540) 574-7800

Blue Ridge Monitoring Network 2010



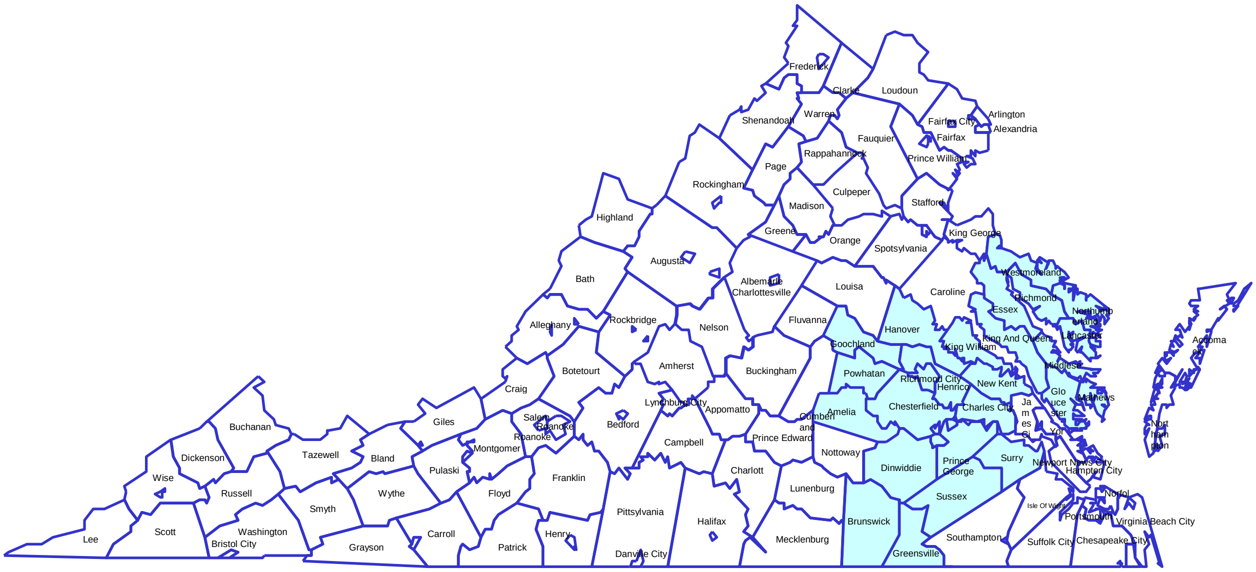
STATION NUMBER	POLLUT.	LOCATION	EPA ID	CITY/COUNTY	LAT/LONG
19-A6	SO_2, NO_2, O_3	East Vinton Elementary School Ruddell Road	51-161-1004	Vinton Roanoke Co.	37.28342 -79.88452
109-H	PM_{10}, Lead	101 Cherry Hill Circle	51-770-0011	Roanoke	37.27399 -79.99945
109-M	CO, TEOM $PM_{2.5}$	2020 Oakland Blvd.	51-770-0015	Roanoke	37.29717 -79.95573
110-C	$PM_{2.5}$	Salem High School	51-775-0011	Salem	37.29788 -80.08102

Contact information for this Region:
Blue Ridge Regional Office
Robert Weld, Director
3019 Peters Creek Road
Roanoke, VA 24019
(540) 562-6700



STATION NUMBER	POLLUT.	LOCATION	EPA ID	CITY/COUNTY	LAT/LONG
155-Q	$PM_{2.5}$	Leesville Hwy. & Greystone Dr.	51-680-0015	Lynchburg	37.33175 -79.21478
53-G	Lead	Central Virginia Training Center	51-009-0007	Madison Heights, Amherst County	37.41222 -79.11623

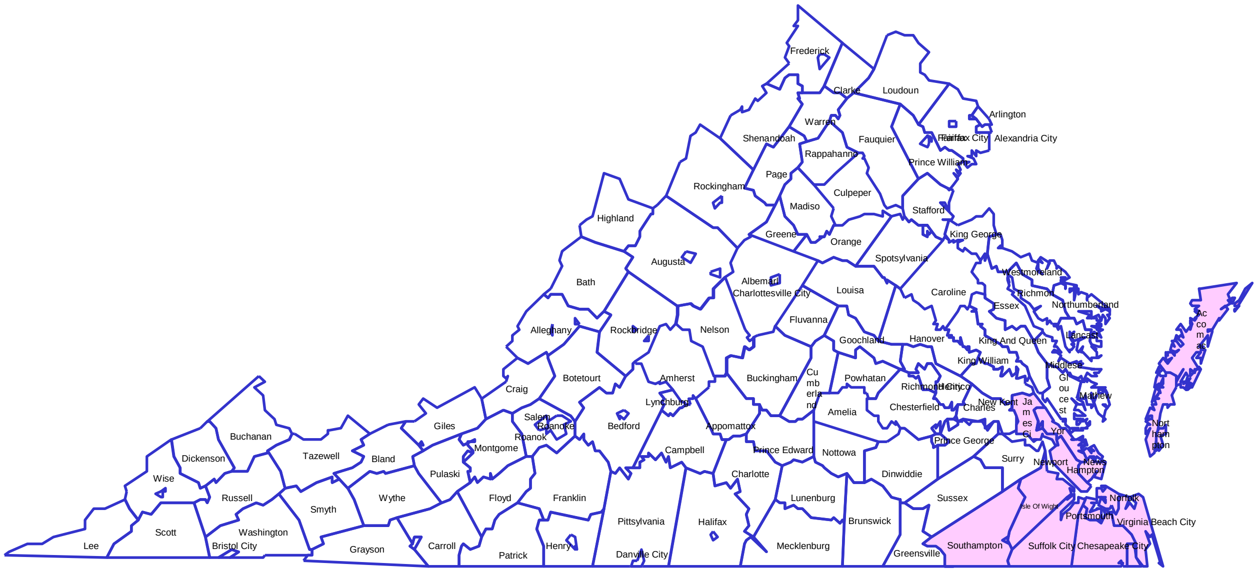
Contact information for this Region:
South Central Regional Office
Robert Weld, Director
7705 Timberlake Road
Lynchburg, VA 24502
(434) 582-5120



STATION NUMBER	POLLUT.	LOCATION	EPA ID	CITY/COUNTY	LAT/LONG
71-D	$PM_{2.5}$	Bensley Armory	51-041-003	Chesterfield Co.	37.43467 -77.45118
71-H	O_3	Beach Road Highway Shop	51-041-0004	Chesterfield Co.	37.35748 -77.59355
72-M	O_3, VOC, $PM_{2.5}$, TEOM, Speciation, Toxics, Lead, Met, NCore, NATTS	MathScience Innovation Center 2401 Hartman Street	51-087-0014	Henrico Co.	37.55652 -77.40027
72-N	$PM_{2.5}$	DEQ-Piedmont Regional Office 4949-A Cox Road	51-087-0015	Henrico Co.	37.67132 -77.56640
73-E	O_3	McClellan Road	51-085-0003	Hanover Co.	37.60613 -77.21880
75-B	O_3, NO_2, SO_2, $PM_{2.5}$	Charles City County Route 608	51-036-0002	Charles City Co.	37.34438 -77.25925
82-C	PM_{10}	West Point Elementary School Thompson Ave. & Chelsea Rd.	51-101-0003	West Point King William Co.	37.55793 -76.79540
154-M	PM_{10}, Toxics	Carter G. Woodson Middle School 1000 Winston Churchill Dr.	51-670-0010	Hopewell	37.28962 -77.29182
158-W	CO, SO2, NO2	Science Museum of Virginia DMV and Leigh Street	51-760-0024	Richmond	37.56260 -77.46500

Contact Information for this Region:
Piedmont Regional Office
Michael Murphy, Director
4949-A Cox Road
Glen Allen, VA 23060
(804) 527-5020

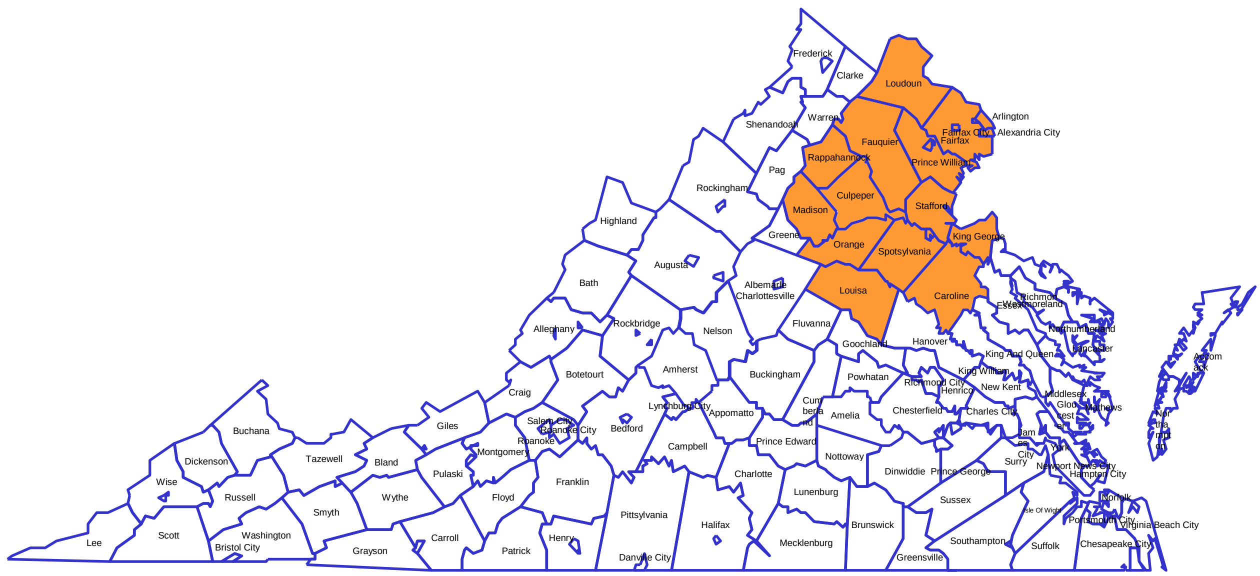
Tidewater Monitoring Network 2010



STATION NUMBER	POLLUT.	LOCATION	EPA ID	CITY/COUNTY	LAT/LONG
179-K	CO, SO_2, NO_2, O_3, $PM_{2.5}$, PM_{10}, TEOM	NASA Langley Research Center	51-650-0008	Hampton	37.10373 -76.38702
181-A1	CO, SO_2, NO_2, PM_{10}, $PM_{2.5}$	NOAA Property 2nd and Woodis Avenue	51-710-0024	Norfolk	36.85555 -76.30135
183-E	O_3	Tidewater Community College Frederick Campus	51-800-0004	Suffolk	36.90118 -76.43808
183-F	O_3	Tidewater Research Station	51-800-0005	Suffolk	36.66525 -76.73078
184-J	$PM_{2.5}$, Toxics	DEQ – Tidewater Regional Office 5636 Southern Blvd.	51-810-0008	Va. Beach	36.84188 -76.18123

Contact information for this Region:
Maria Nold, Director
5636 Southern Blvd.
Virginia Beach, VA 23462
(757) 518-2000

Northern Monitoring Network 2010



STATION NUMBER	POLLUT.	LOCATION	EPA ID	CITY/COUNTY	LAT/LONG
37-B	O_3	Phelps Wildlife Area Route 651	51-061-0002	Sumerduck Fauquier Co.	38.47367 -77.76772
38-I	O_3, NO_2, $PM_{2.5}$	Broad Run High School Route 641	51-107-1005	Ashburn Loudoun Co.	39.02473 -77.48925
42-B	PM_{10}	Farmington Elementary School Sunset Lane	51-047-0002	Culpeper Culpeper Co.	38.45552 -78.01120
44-A	O_3	Widewater Elementary School Den Rich Road	51-179-0001	Widewater Stafford Co.	38.48123 -77.37040″
45-L	O_3, NO_2	Long Park Route 15	51-153-0009	Prince William Co.	38.85287 -77.63462
46-B9	O_3, CO, $PM_{2.5}$, Toxics	Lee District Park Telegraph Road	51-059-0030	Franconia Fairfax Co.	38.77335 -77.10468
47-T	CO, NO_2, O_3, $PM_{2.5}$	Aurora Hills Visitors Center 18th and Hayes Streets	51-013-0020	Arlington Co.	38.85770 -77.05922
48-A	O_3, NO_y, VOC, PAMS	U.S.G.S. Geomagnetic Center	51-033-0001	Corbin Caroline Co.	38.20087 -77.37742
130-E	PM_{10}	Hugh Mercer Elementary School 2100 Cowan Boulevard	51-630-0004	Fredericksburg	38.30225 -77.48712

STATION NUMBER	POLLUT.	LOCATION	EPA ID	CITY/COUNTY	LAT/LONG
L-126-C	CO, SO_2, O_3, NO_2, PM_{10}, PM2.5	Alexandria Health Department 517 North Saint Asaph Street	51-510-0009	Alexandria	38.81040 -77.04435
L-126-H	PM_{10}	435 Ferdinand Day Drive	51-510-0020	Alexandria	38.80493 -77.12687
N-35-A	O_3, TEOM, IMPROVE,	Big Meadows, National Park Service	51-113-0003	Madison Co.	38.52280 -78.43487

Contact Information for this Region:
Northern Regional Office
Thomas Faha, Director
13901 Crown Court
Woodbridge, VA 22193
(703) 583-3800

Minimum Number of Observations	
3-Hour Average	3 Consecutive Hourly Observations
8-Hour	6 Hourly Observations
24-Hour	18 Hourly Observations
Quarterly Averages ($PM_{2.5}$, PM_{10})	75% of Scheduled Samples
Yearly Averages (Continuous Instruments)	75% of Total Possible Observations
Yearly Averages ($PM_{2.5}$, PM_{10})	Four Complete Quarterly Averages

National Ambient Air Quality Standards

POLLUTANT	PRIMARY STANDARD Concentration	PRIMARY STANDARD Averaging Time	SECONDARY STANDARD Concentration	SECONDARY STANDARD Averaging Time
CARBON MONOXIDE	9 ppm	8-hour[a]	None	None
	35 ppm	1-hour[a]		
SULFUR DIOXIDE	0.03 ppm (1971 std)[b]	Annual arithmetic mean	0.5 ppm	3-hour[a]
	0.14 ppm (1971 std)[b]	24-hour[a]		
	75 ppb	1-hour[c]		
NITROGEN DIOXIDE	.053 ppm	Annual arithmetic mean	Same as primary	
	100 ppb	1-hour[d]	None	
OZONE	0.075 ppm (2008 std)	8-hour[e]	Same as primary	
	.08 ppm (1997 std)	8-hour[f]	Same as primary	
LEAD	0.15 $\mu g/m^3$ (2008 std)	3-month rolling average	Same as primary	
	1.5 $\mu g/m^3$ (1978 std)[g]	Quarterly average	Same as primary	
PARTICULATE MATTER $PM_{2.5}$	15.0 $\mu g/m^3$	Weighted annual arithmetic mean[h]	Same as primary	
	35 $\mu g/m^3$	24-hour[i]	Same as primary	
PARTICULATE MATTER PM_{10}	150 $\mu g/m^3$	24-hour[j]	Same as primary	

[a] Not to be exceeded more than once a year
[b] The 1971 SO_2 standards remain in effect until 1 year after an area is designated for the 2010 1-hour standard
[c] 3-year average of 99th percentile of daily maximum 1-hour averages may not exceed 75 ppb
[d] 3-year average of 98th percentile of daily maximum 1-hour averages may not exceed 100 ppb
[e] 3-year average of the 4th highest daily maximum 8-hour concentration may not exceed 0.075 ppm (EPA is in the process of reconsidering these standards)
[f] 3-year average of the 4th highest daily maximum 8-hour concentration may not exceed .08 ppm (the 1997 standard and the implementation rules for that standard will remain in place as EPA addresses the transition from the 1997 to the 2008 ozone standard).
[g] The 1978 lead standard (1.5 $\mu g/m^3$ quarterly avg.) remains in effect until 1 year after an area is designated for the 2008 standard.
[h] 3-year average of the weighted annual mean $PM_{2.5}$ concentration may not exceed 15.0 $\mu g/m^3$
[i] 3-year average of the 98th percentile of 24-hour $PM_{2.5}$ concentrations may not exceed 35 $\mu g/m^3$
[j] Not to be exceeded more than once per year on average over 3 years

Please see www.epa.gov/air/criteria.html for additional information concerning NAAQS.

NAMS/SLAMS 2010

REGION	$PM_{2.5}$	PM_{10}	Pb	CO	SO_2	NO_2	O_3	TOTAL
Southwest	1	1	1	---	---	---	1	4
Valley	4	2	---	---	1	1	5	13
Blue Ridge	3	1	2	1	1	1	1	10
Piedmont	4	3	1	1	2	3	4	18
Tidewater	3	2	---	2	2	2	3	14
***Northern**	4	4	---	2	1	4	9	24
TOTAL	**19**	**13**	**4**	**6**	**7**	**11**	**23**	**83**

* *This region's sites are operated by DEQ, and Alexandria*

8-Hour Ozone Nonattainment Area (1997 Std.)

Northern Virginia
Arlington County
Fairfax County
Loudoun County
Prince William County
City of Alexandria
City of Fairfax
City of Falls Church
City of Manassas
City of Manassas Park

$PM_{2.5}$ Nonattainment Area Designations (1997 Std.)

Northern Virginia
Arlington County
Fairfax County
Loudoun County
Prince William County
City of Alexandria
City of Fairfax
City of Falls Church
City of Manassas
City of Manassas Park

The following are Maintenance Areas (Previously Nonattainment Areas)

Fredericksburg
Spotsylvania County
Stafford County
City of Fredericksburg

Richmond
Charles City County
Chesterfield County
Hanover County
Henrico County
Prince George County
City of Colonial Heights
City of Hopewell
City of Petersburg
City of Richmond

The following are Maintenance Areas (cont.)

Norfolk-Va. Beach-Newport News
Gloucester County
Isle of Wright County
James City County
York County
City of Chesapeake
City of Hampton
City of Newport News
City of Norfolk
City of Poquoson
City of Portsmouth
City of Suffolk
City of Virginia Beach
City of Williamsburg

Shenandoah National Park
Page County
Madison County*
(* the portions in SNP)

Appendix B

AIRSData – Access to national and state air pollution concentrations and emissions data
http://www.epa.gov/air/data

Air Explorer – Collection of user-friendly visualization tools for air quality monitoring
http://www.epa.gov/airexplorer

Air Now – Ozone mapping, AQI, and real time data
http://www.airnow.gov

Air Now – Air Quality Index Information
http://www.airnow.gov/index.cfm?action=aqibasics.aqi

American Lung Association:
http://www.lungusa.org/

AQS Data Mart (AQS data for the scientific and technical community):
http://www.epa.gov/ttn/airs/asqdatamart

Department of Environmental Quality link:
http://www.deq.virginia.gov/

Education for teachers and children:
http://www.epa.gov/kids

IMPROVE
http://vista.cira.colostate.edu/improve

MARAMA
http://www.marama.org/index.html

Nonattainment area descriptions:
http://epa.gov/oar/oaqps/greenbk

U.S. EPA:
http://www.epa.gov

VISTAS:
http://www.vistas-sesarm.org

2010 3-Day Monitoring Schedule for PM2.5 and 6-Day Monitoring Schedule for PM10:
http://www.epa.gov/ttn/amtic/calendar.html

EPA's Technology Transfer Network (TTN) – Ambient Monitoring Technology Information Center (AMTC)
http://www.epa.gov/ttn/amtic

Code of Federal Regulations – 40 CFR 50 & 58
http://www.gpoaccess.gov/cfr/index.html

Virginia Ambient Air Monitoring Data Reports
http://www.deq.virginia.gov/airmon/publications.html

Air Quality System (AQS)
http://www.epa.gov/ttn/airs/airsaqs

References