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To: The Honorable Robert F. McDonnell

Members of the General Assembly

From: David K. Paylor

Date: October 1, 2011

Subject: Report on Air Quality and Air Pollution Control Policies of the Commonwealth of Virginia

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In accordance with 10.1-1307.G of the *Code of Virginia*, the Department of Environmental Quality (DEQ), on behalf of the State Air Pollution Control Board, has completed its annual report on Air Quality and Air Pollution Control Policies of the Commonwealth of Virginia for 2011.

Overall Virginia's air quality continues to gradually improve and DEQ continues to take steps to improve air quality. Indeed, ambient concentrations of fine particulate matter, carbon monoxide, nitrogen dioxide, and sulfur dioxide in Virginia were meeting all of the national ambient air quality standards during calendar year 2010. However, the air quality standards that the Commonwealth must attain are becoming increasingly stringent. In 2010, the U.S. Environmental Protection Agency published lower National Ambient Air Quality Standards (NAAQS) for sulfur dioxide (SO_2) and for nitrogen dioxide (NO_2). Both of these standards reflect new implementation and monitoring strategies as well as more stringent numerical ambient air quality standards.

This report is being made available at http://www.deq.virginia.gov/regulations/reports.html. If you have any questions concerning this report or if you would like a hard copy of this report, please contact Angie Jenkins, Policy Director, at (804) 698-4268.

AIR QUALITY AND AIR POLLUTION CONTROL POLICIES OF THE COMMONWEALTH OF VIRGINIA

A Report to the Honorable Robert F. McDonnell, Governor and the General Assembly of Virginia

Virginia Department of Environmental Quality

October 2011

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Commonly Used Abbreviations

AQI	Air Quality Index
AQM	Office of Air Quality Monitoring
APA	Administrative Process Act
ASM	Acceleration Simulation Mode
BAC	Best Available Controls
BACT	Best Available Control Technology
BART	Best Available Retrofit Technology
CAA	Clean Air Act
CAIR	Clean Air Interstate Rule
CAMR	Clean Air Mercury Rule
CASAC	Clean Air Scientists Advisory Committee
CH_4	Methane
CMS	Compliance Monitoring Strategy
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent Emissions
CPI	Consumer Price Index
CTG	Control Technique Guideline
DMV	Department of Motor Vehicles
ECHO	Enforcement and Compliance History Online
EGU	Electric Generating Unit
ELRP	Emergency Load Response Program
EPA	Environmental Protection Agency
FCE	Full Compliance Evaluation
FOIA	Freedom of Information Act
FRM	Federal Reference Monitor
GHG	Greenhouse Gas
GVWR	Gross Vehicle Weight Rating
GWAQC	George Washington Air Quality Committee
HAP	Hazardous Air Pollutant
HPV	High Priority Violation
HRAQC	Hampton Roads Air Quality Committee
I/M	Motor Vehicle Inspection and Maintenance Program
ISO	Independent Systems Operator
LAER	Lowest Achievable Emissions Rate
LPO	Lead Planning Organization
MACT	Maximum Achievable Control Technology
MANE-VU	Mid Atlantic/Northeast Visibility Union
MARAMA	Mid Atlantic Regional Air Management Association
MJO	Multi-jurisdictional planning organization
MMte	Million Metric Tons of CO_2 equivalent
MSOS	Mobile Source Operations Section
MRAQC	Metropolitan Richmond Air Quality Committee
MW	Megawatt
MWAQC	Metropolitan Washington Air Quality Committee
NAAQS	National Ambient Air Quality Standard
NATA	National Air Toxic Assessments
NATTS	National Air Toxics Trend Site
NCore	National Core Monitoring Site
NH_3	Ammonia
NLEV	National Low Emission Vehicle Program
NO_2	Nitrogen Dioxide
NOIRA	Notice of Intended Regulatory Action
NOV	Notice of Violation
NOX	Nitrogen Oxides
NSR	New Source Review
OCS	Outer Continental Shelf
ORE	On-Road Emissions Program
OTC	Ozone Transport Commission
OTR	Ozone Transport Region
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter not more than 2.5 Angstroms in Diameter
PM_{10}	Particulate Matter no more than 10 Angstroms in Diameter
$PM_{10-2.5}$	Particulate matter with a diameter between 2.5 and 10 Angstroms
ppb	Parts per Billion
ppm	Parts per Million
PSD	Prevention of Significant Deterioration
RACM	Reasonably Available Control Measures
RACT	Reasonably Available Control Technology
RAP	Regulatory Advisory Process
RBIS	Risk Based Inspection System
RFG	Reformulated Gasoline
RFP	Reasonable Further Progress
RIA	Regulatory Impact Analysis
ROP	Rate of Progress
RPO	Regional Planning Organization
SACC	Significant Ambient Air Concentrations
SAPCB	State Air Pollution Control Board
SBA	Small Business Assistance
SHEN-AIR	Shenandoah Valley Air Quality Initiative
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SOP	State Operating Permit
STN	Speciated Trends Network
T&A	Timely and Appropriate
TPY	tons per year
TR	Transport Rule
UATM	Urban Air Toxics Monitoring network
ug/m^3	Micrograms per Cubic Meter
VDH	Virginia Department of Health
VINTAG	Virginia Inhalation Toxicology Advisory Group
VISTAS	Visibility Improvement State and Tribal Association of the Southeast
VPM	Virginia Productivity Measurements

1 Executive Summary

This report was prepared by the Virginia Department of Environmental Quality (VDEQ) on behalf of the State Air Pollution Control Board (SAPCB) for the Governor and General Assembly pursuant to § 10.1-1307 G of the Code of Virginia. This report details the status of Virginia's air quality, provides an overview of the air division programs, and briefly summarizes the federal and state air quality programs being implemented.

1.1 Air Quality in the Commonwealth

Air quality in Virginia continues to improve. However, the air quality standards that the Commonwealth must attain are becoming more stringent. In 2010, the Environmental Protection Agency (EPA) published lower National Ambient Air Quality Standards (NAAQS) for sulfur dioxide (SO_2) and for nitrogen dioxide (NO_2). Both of these standards reflect new implementation and monitoring strategies as well as more stringent numerical ambient air quality standards. The Obama Administration requested, on September 2, 2011, that EPA withdraw a proposed reconsideration of the 2008 ozone NAAQS. That proposed reconsideration contemplated reducing the ozone standard to between 0.060 parts per million (ppm) and 0.070 ppm on an 8-hour average. Federal implementation strategies for the 2008 ozone NAAQS, which was set at 0.075 ppm on an 8-hour average, are currently unknown. The 2008 ozone NAAQS will be challenging for some areas of the Commonwealth to meet.

1.2 Air Quality Policies in the Commonwealth

In response to the decisions of the U.S. Court of Appeals for the D.C. Circuit regarding the Clean Air Interstate Rule (CAIR), EPA finalized the Cross State Air Pollution Rule (CSAPR). This rule requires 27 states to reduce power plant emissions that contribute to ozone and fine particulate pollution in other states. EPA also proposed air toxics standards for coal- and oil-fired electric generating units (EGUs) on March 16, 2011 and expects to finalize this proposal by the end of 2011. These regulations will impact air quality policies in the Commonwealth.

1.3 Summary of Annual Air Division Activities

Monitoring Locations:	43	On Site Inspections :	1,555
Monitoring Instruments:	112	Enforcement Actions:	347
Minor Source Permits Issued:	244	Vehicles Inspected:	821,000
State Major Permits Issued:	1	Vehicles Failed:	40,000
General Permits Issued:	24	Inspection Station Audits:	1,200
State Operating Permits Issued:	31	Covert Audits:	169
Federal Operating Permits Issued:	31	Consent Orders Issued:	28
General Permits Developed:	3	Civil Charges Collected:	$1,203,204
Compliance Inspection Reports:	7,781		

2 Status of Air Quality in the Commonwealth of Virginia

Ambient concentrations of fine particulate matter ($PM_{2.5}$), carbon monoxide (CO), NO_2, and SO_2 in Virginia met EPA's NAAQS in 2010. Virginia's air quality in some regions of the Commonwealth during the summer of 2011 did not comply with the 2008 ozone NAAQS.

2.1 Monitoring Network

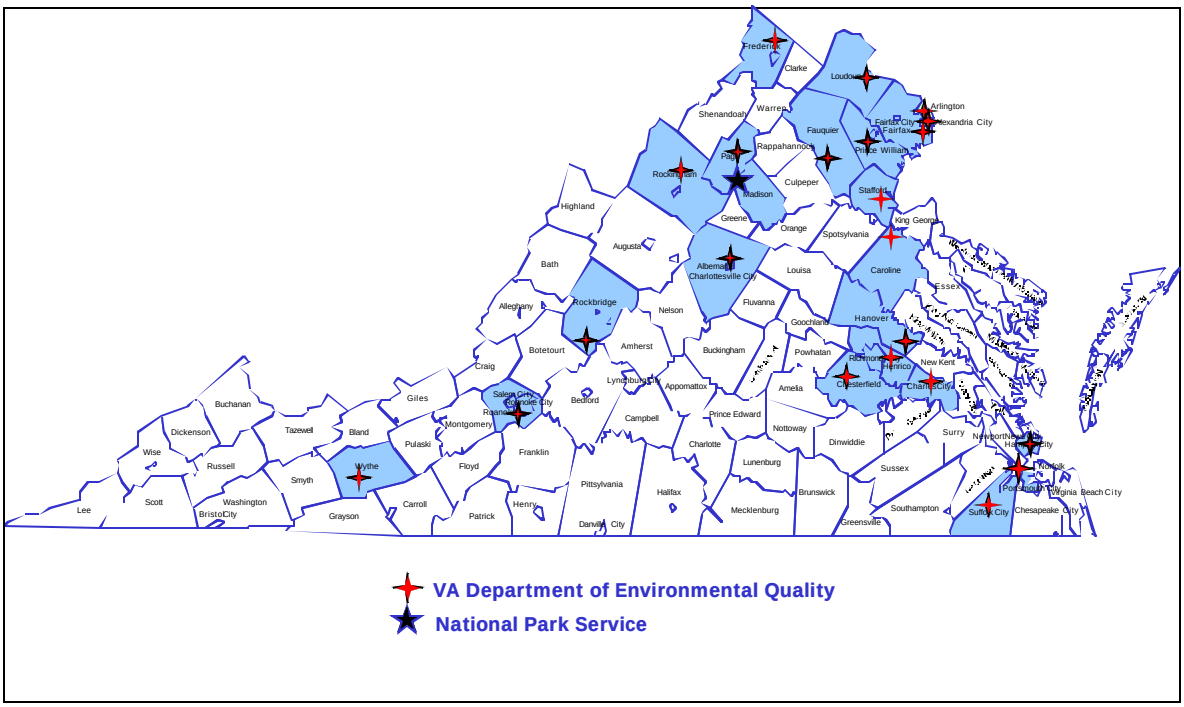

Figure 2-1: Virginia Ozone Monitoring Network

VDEQ's Office of Air Quality Monitoring (AQM) maintains an extensive air quality monitoring network throughout the Commonwealth. Ambient air quality was measured by approximately 112 instruments at 43 sites during 2010 - 2011. Figure 2-1 shows the various ozone monitoring sites in Virginia. All monitoring sites were established in accordance with EPA's siting criteria (40 CFR Part 58, Appendices D and E), and all sites conform to EPA guidance documents and generally accepted air quality monitoring practices. Data reported from the Virginia air quality monitoring network were quality assured in accordance with federal requirements (40 CFR Part 58, Appendix A). The data are published annually in the *Virginia Ambient Air Monitoring Data Report* and are available from the VDEQ website at http://www.deq.virginia.gov/airmon/.

2.1.1 Hopewell Air Toxics Study

Pursuant to a federal grant, AQM completed a study of air toxics in Hopewell. This study commenced in 2006, and the study was completed on November 1, 2008. Additional monitoring was conducted from November 2008 through June 2009 for data validation purposes. Two of the three sites for the study have been dismantled and removed. One site, located at Carter Woodson Middle School, has been retained as a permanent air toxics monitoring site and will be part of Virginia's Urban Air Toxics Monitoring (UATM) network. The study indicates that most airborne chemicals in the city of Hopewell are safely below Virginia's long-term air quality standards. A preliminary report of the Hopewell air quality study was published in February 2009 and is available at: http://www.deq.virginia.gov/air/Air_report. The results of the study have been released to the public, and a public meeting was held to review the results with residents of Hopewell and other interested citizens.

Using this data, VDEQ's Risk Assessment Program developed a risk assessment report that characterizes the level of public health risk due to the concentrations of air toxic pollutants measured during the monitoring phase of the study. The risk assessment was presented to the public in February of 2011 and is available at: http://www.deq.virginia.gov/air/pdf/air/monitoring/HOPEWELL_riskasse_080910.pdf. VDEQ's air division is continuing to evaluate means to reduce risk from air pollutants in Hopewell.

2.1.2 NATTS/NCore Site

VDEQ installed a new National Air Toxics Trend Site (NATTS) at the Math and Science Innovation Center monitoring station in eastern Henrico County using funds received from a federal grant. This addition expands the site's toxic monitoring capabilities, and data from this site are now included in the National Trends report issued annually by EPA. The site has been significantly upgraded with a new state-of-the-art shelter and improved instrumentation. EPA performed an audit of this site during the summer of 2011 and determined that the site is constructed and operated in a manner consistent with all NATTS program requirements.

This site will also house the new National Core (NCore) monitoring equipment. NCore monitoring is a federally required program intended to ensure that every state has a research-level facility that monitors a large suite of pollutants and gathers accompanying meteorological data so that the data generated can be used for trend analysis and long term air quality studies. The NCore site additions were completed November 1, 2010.

Figure 2-2: View of the Henrico County NATTS/NCore Site Looking South

Figure 2-3: Interior View of the Henrico County NATTS/NCore Site

2.1.3 Lead NAAQS and Lead Monitoring

In October 2008, EPA established a new NAAQS for lead. This NAAQS reduced the standard for lead from 1.5 ug/m^3 to 0.15 ug/m^3. The revised lead NAAQS requires additional ambient air quality monitoring, including source-oriented monitors at facilities in Buchanan County, the city of Lynchburg, and the city of Roanoke. The new monitoring requirements also include an additional lead monitor at Virginia's NCore site in Henrico County. EPA initially indicated that other sites within the Commonwealth may need to have lead monitors installed, but VDEQ's analysis showed that EPA's emissions numbers were outdated. VDEQ provided the appropriate analysis, and EPA has agreed to remove these facilities from the list of required lead monitoring sites.

2.2 Data Trends for $PM_{2.5}$ and Ozone

For $PM_{2.5}$, the general trend for the annual average across the Commonwealth shows marked improvement in air quality. Figure 2-4 provides annual $PM_{2.5}$ averages for monitors in the Richmond-Petersburg area. Other areas of the Commonwealth follow a similar trend.

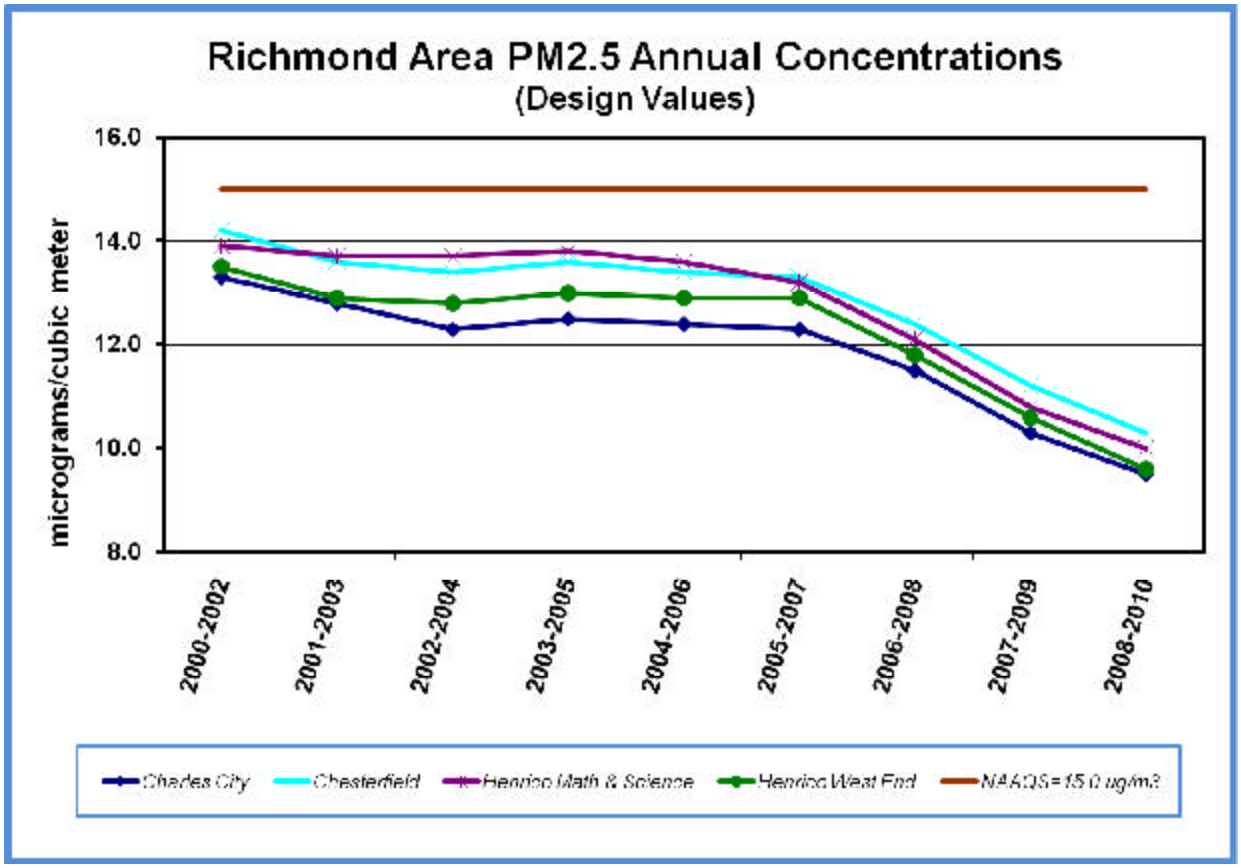

Figure 2-4: Richmond Area $PM_{2.5}$ Air Quality, Annual Basis

For the 24-hour $PM_{2.5}$ data, the monitors across the Commonwealth have registered a pattern of decreasing values, and all monitors are in compliance with the 35 ug/m^3 standard. Figure 2-5 provides data for Northern Virginia air quality $PM_{2.5}$ monitors and shows the values on a 24-hour basis. As denoted by the red line in the chart below, all monitors in Northern Virginia are showing levels below the 2006 NAAQS for $PM_{2.5}$, indicating good air quality for $PM_{2.5}$. Other areas of the Commonwealth follow a similar trend.

Regulations requiring reduced sulfur content in fuels as well as regulations requiring SO_2 reductions from EGUs have contributed to the improvement in $PM_{2.5}$ air quality over the last few years. Figure 2-6 presents $PM_{2.5}$ speciation data, which provide information concerning the various components of $PM_{2.5}$. These data show that the sulfate portion of $PM_{2.5}$, which is associated with SO_2 emissions, has decreased between 2004 and 2010, indicating the efficacy of SO_2 control programs.

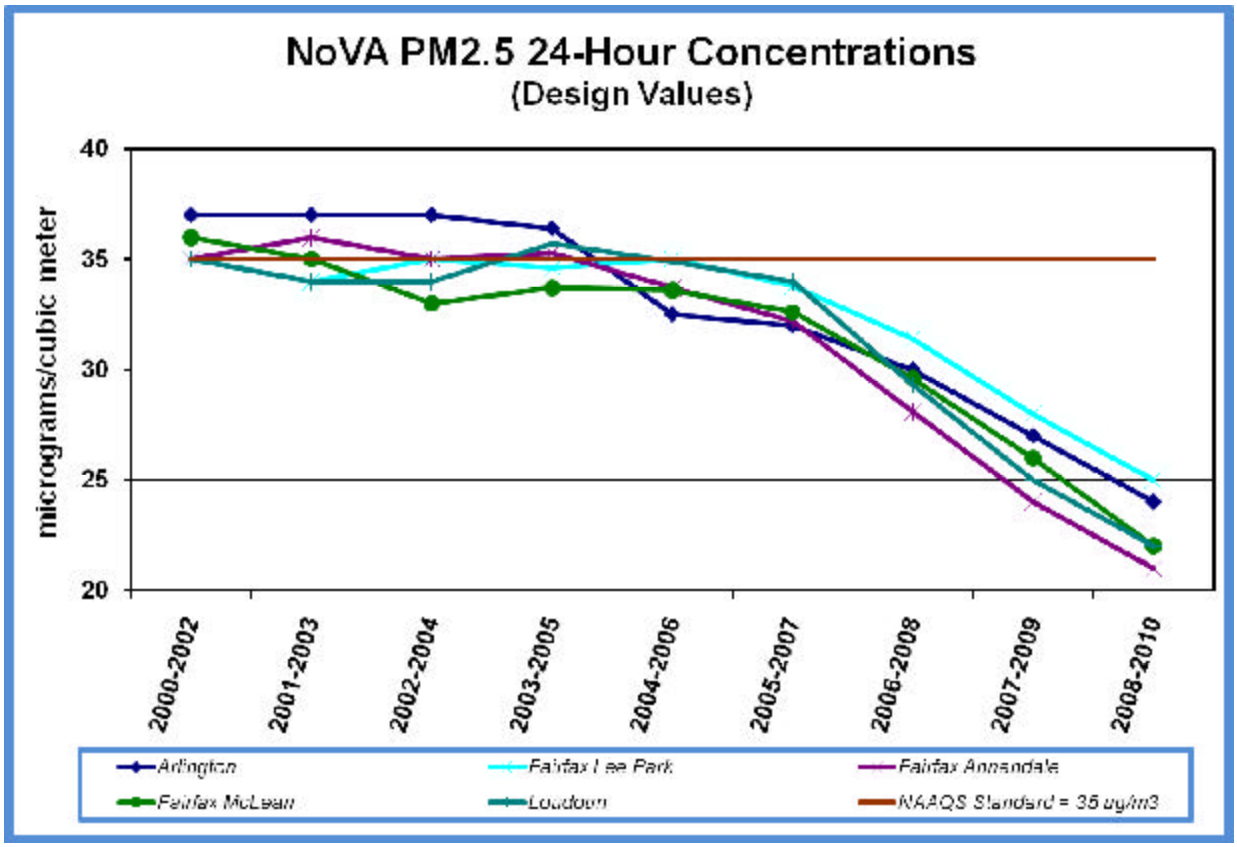

Figure 2-5: Northern Virginia 24-Hour $PM_{2.5}$ Air Quality

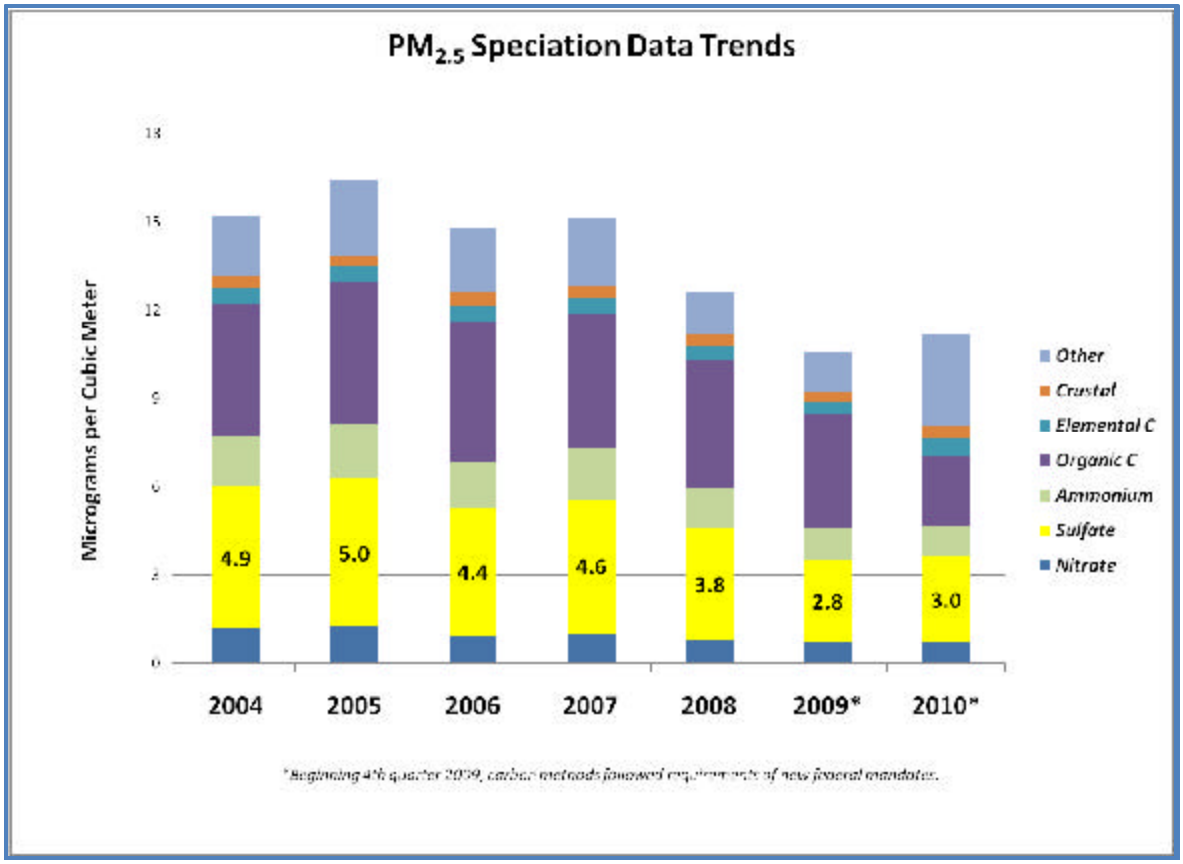

Figure 2-6: Henrico $PM_{2.5}$ Speciation Data, 2004-2010

Like $PM_{2.5}$, ozone trends continue to show improvement in air quality. In 2008, EPA finalized an ozone standard of 0.075 ppm. Certain areas of the Commonwealth have air quality monitoring data that are above this standard. Table 2-1 shows the monitoring data for the 2008 through 2010 ozone seasons for each of the monitors in Virginia. Data are provided in parts per billion. More information regarding this ozone standard may be found in Section 3.1.4.

Table 2-1: Ozone Air Quality Values for All Virginia Monitors, 2008-2010 Data

County	*Value, ppb*	*County*	*Value, ppb*	*County*	*Value, ppb*
Loudoun	75	Shenandoah	73	Wythe	66
Prince William	70	Stafford	70	Rockbridge	65
Arlington	79	Caroline	73	Page	66
Alexandria	74	Frederick	68	Fauquier	66
Fairfax-Lee Park	81	Roanoke	69	Rockingham	66
Hanover	75	Chesterfield	75	Albemarle	69
Charles City	75	Henrico	76	Suffolk-TCC	71
				Suffolk-Holland	72

3 Air Pollution Control Overview

This overview is broadly categorized into planning, permitting, compliance, enforcement, and other initiatives. Descriptions of significant current policy issues under each broad category are provided.

3.1 Air Quality Planning Initiatives

Air quality planning strategies now focus on preparations for compliance with the 2010 NO_2 NAAQS, the 2010 SO_2 NAAQS, and the 2008 ozone NAAQS. However, other initiatives continue to require attention and resources. These initiatives include the development and submittal of various Clean Air Act (CAA) infrastructure requirements; the mid course review requirements of the Regional Haze program; and the development of a redesignation request and maintenance plan for the Northern Virginia 1997 NAAQS $PM_{2.5}$ nonattainment area. Many of these strategies and initiatives will be heavily influenced by the requirements in the CSAPR, which was finalized on July 6, 2011.

3.1.1 Control Technique Guidelines

As required by §183(e) of the CAA, EPA conducted a study of volatile organic compound (VOC) emissions from the use of consumer and commercial products to assess their potential to contribute to levels of ozone that violate the NAAQS for ozone and to establish criteria for regulating VOC emissions from these products. Any regulations issued under §183(e) must be based on "best available controls" (BAC).

Section 183(e)(3)(C) provides that EPA may issue a control technique guideline (CTG) in lieu of a national regulation for a product category where EPA determines that the CTG will be substantially as effective as national regulations in reducing emissions of VOC in ozone nonattainment areas. A state with ozone nonattainment areas is required to evaluate the recommendations provided in the CTGs and determine if modification of existing regulations or creation of new regulations is needed to be consistent with the requirements of the CTG. A state with areas included in the Ozone Transport Region (OTR), like Northern Virginia, must apply the requirements in the OTR for all sources covered by the CTG. After VDEQ promulgates a regulation implementing the requirements of the CTG for a product or source category, VDEQ must submit the regulation to the EPA for approval as part of the State Implementation Plan (SIP) within one year from signature of the CTG. EPA has issued four groups of standards under §183(e) of the CAA:

- Group I: These standards apply to categories such as consumer products, architectural coatings, and auto body refinishing coatings. Unlike Groups II, III, and IV, these standards are national requirements and are codified in 40 CFR Part 59.
- Group II: Issued September 29, 2006, these CTGs regulate VOC emissions from flexible packaging printing operations, lithographic and letterpress printing materials, industrial cleaning solvents, and flat wood paneling coatings.

- Group III: Issued October 9, 2007, these CTGs regulate VOC emissions from paper, film, and foil coatings; metal furniture coatings; and large appliance coatings.
- Group IV: Issued July 14, 2008, these CTGs regulate VOC emissions from miscellaneous metal products coatings; plastic parts coatings; auto and light-duty truck assembly coatings; fiberglass boat manufacturing materials; and miscellaneous industrial adhesives.

VDEQ has surveyed the Northern Virginia area and submitted declarations to EPA for several of the CTG categories demonstrating that no potentially regulated facilities operate in the Northern Virginia area. However, the survey results indicate that, for some categories, potentially affected facilities may be operating in the Northern Virginia area and that regulations must be developed for offset lithographic printing and letterpress printing; industrial cleaning solvents; miscellaneous metal and plastic parts coatings; and miscellaneous industrial adhesives. These regulations are continuing through the Commonwealth's regulatory process.

3.1.2 1997 Ozone NAAQS Maintenance Areas

Improvements in air quality allowed the following areas to demonstrate compliance with the 1997 ozone NAAQS standard after these areas were originally designated as nonattainment: Richmond-Petersburg, Fredericksburg, the Shenandoah National Park, and Hampton Roads. When an area is redesignated from nonattainment to attainment, Virginia must prepare a SIP that meets the requirements for 8-hour ozone maintenance areas and that demonstrates how good air quality will be maintained into the future. Using EPA guidance, the Commonwealth submitted redesignation requests, inventories, and maintenance plans for these areas to EPA, which were approved after review and public comment.

During the 2007 and 2008 ozone seasons, ozone violations were registered at a monitor in Henrico County, part of the Richmond-Petersburg maintenance area. The maintenance plan for the area includes contingency measures to be implemented in such an event. A regulatory action was initiated in order to implement control strategies specified in the contingency measures for the Richmond-Petersburg area. These contingency measures include control strategies for mobile equipment repair and refinishing, architectural and industrial maintenance coatings, consumer products, and portable fuel containers. As a proactive measure towards meeting the new ozone NAAQS in this area, the SAPCB also directed VDEQ to take comment on the implementation of an additional regulation, the adhesives and sealants regulation. These regulations are continuing through the Commonwealth's regulatory process.

3.1.3 2006 NAAQS for $PM_{2.5}$

On September 22, 2006, EPA promulgated a revised $PM_{2.5}$ NAAQS. The new standard revised the daily $PM_{2.5}$ standard from 65 ug/m^3 to 35 ug/m^3 and retained the $PM_{2.5}$ annual standard of 15.0 ug/m^3. On October 8, 2009, EPA published the final designations for the 2006 daily $PM_{2.5}$ standard in the Federal Register, and all areas of the Commonwealth were designated as attainment or unclassifiable.

3.1.4 2008 NAAQS for Ozone and 2011 Reconsideration

On March 12, 2008, EPA revised both the primary and the secondary NAAQS for ozone to 0.075 ppm. However, on September 16, 2009, EPA announced that it was reconsidering the 2008 ozone standard, and on January 6, 2010, EPA proposed a new ozone standard of between 0.060 ppm and 0.070 ppm on an 8-hour average. EPA noted that the ozone standards set in 2008 were not as protective as recommended by EPA's panel of science advisors, the Clean Air Scientific Advisory Committee (CASAC). EPA stated that the proposed standards are consistent with CASAC's recommendations and place more weight on key scientific and technical information. On September 2, 2011, the Obama Administration requested that EPA withdraw its proposed reconsideration of the 2008 standard. As demonstrated in Table 2-1, the 2008 ozone NAAQS of 0.075 ppm will be challenging for certain areas of Virginia to meet. At this time federal implementation strategies for the 2008 ozone NAAQS are not known. The next review of the ozone NAAQS will be in 2013.

3.1.5 2010 NO_2 NAAQS

NO_2 is a gaseous air pollutant that forms when fossil fuels such as coal, oil, gasoline, or diesel are burned at high temperatures. NO_2 contributes to the formation of particle pollution by converting in the atmosphere to nitrate aerosols, a component of $PM_{2.5}$. NO_2 also is a building block of ozone.

On January 22, 2010, EPA finalized a new primary NO_2 NAAQS and set the standard at 100 ppb over a one-hour average, which is significantly more stringent than the previous primary standard of 53 ppb on an annual average. In this standard EPA also established new monitoring and reporting requirements that will require the location of NO_2 monitors near major road ways. EPA noted that NO_2 concentrations near major roads are expected to be appreciably higher than the levels measured in the current network.

VDEQ is working towards modifying the existing monitoring network to meet the requirements of the NO_2 NAAQS, including the installation of a near-road monitor. VDEQ expects that one roadside monitoring site will be required for Virginia, and the location of this monitoring site is tentatively planned for the I-95/I-395 interchange in Fairfax County.

Data from the existing air quality monitoring network demonstrates compliance with the new NAAQS, as shown in Figure 3-1. Based on federal guidance, the data shown in Figure 3-1, and other information, VDEQ submitted in January 2011 a recommendation to the EPA Administrator that all areas in Virginia be designated as "unclassifiable." Once near road NO_2 data is available, additional recommendations may be made.

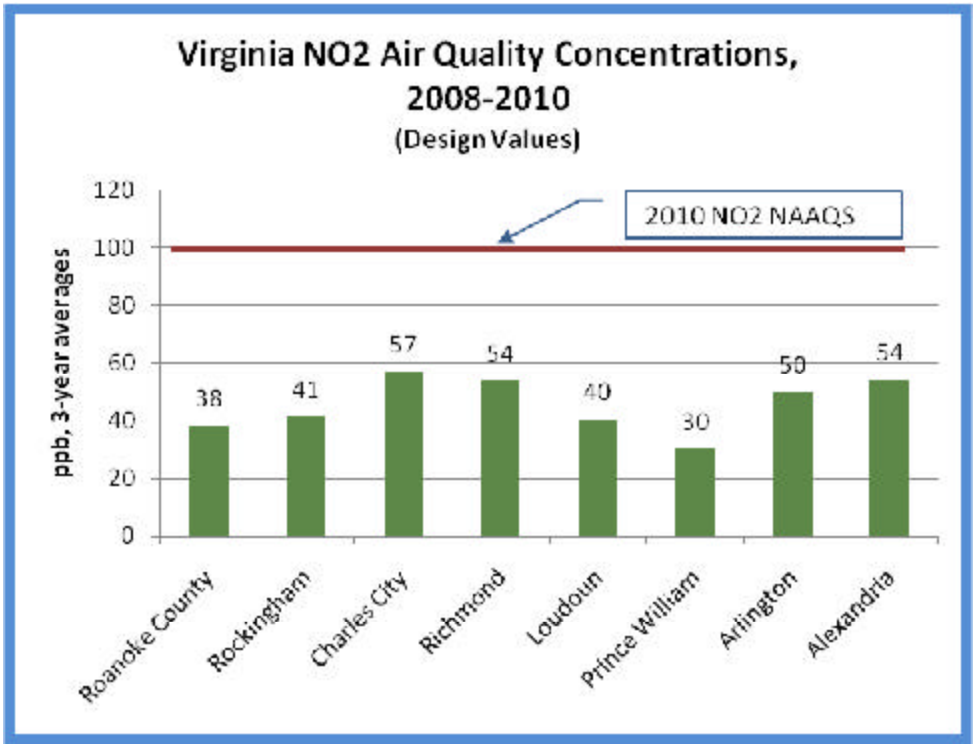

Figure 3-1: Virginia NO_2 Data, 2008-2010

3.1.6 2010 SO_2 NAAQS

SO_2 is one of a group of highly reactive compounds known as "oxides of sulfur." The largest sources of SO_2 emissions are fossil fuel combustion at power plants and other industrial facilities. Smaller sources of SO_2 emissions include industrial processes such as extracting metal from ore and the burning of sulfur-laden fuels by locomotives, large ships, and non-road equipment. Emissions of SO_2 also contribute to the formation of particle pollution by converting in the atmosphere to sulfate aerosols, a major component of $PM_{2.5}$.

On June 2, 2010, EPA finalized a new primary NAAQS for SO_2. This regulation significantly strengthened the short term requirements by lowering the standard to 75 ppb on a 1-hour basis. The new federal regulation revokes the previous primary standards of 140 ppb over a 24-hour period and 30 ppb over an annual period. Monitoring data from AQM's monitoring network show compliance with this standard, as demonstrated in Figure 3-2.

Air quality data from the existing network show significant air quality improvement in recent years due to many control programs being implemented. These air quality trends may be seen in Figure 3-3, and these trends mirror the SO_2 emission reduction trends in recent years within the Commonwealth. Figure 3-4 shows the significant reductions in SO_2 emissions realized by a variety of federal programs such as regulations on the interstate transport of SO_2 by power plants and the requirements for greatly reduced sulfur content in on-road and off-road fuels.

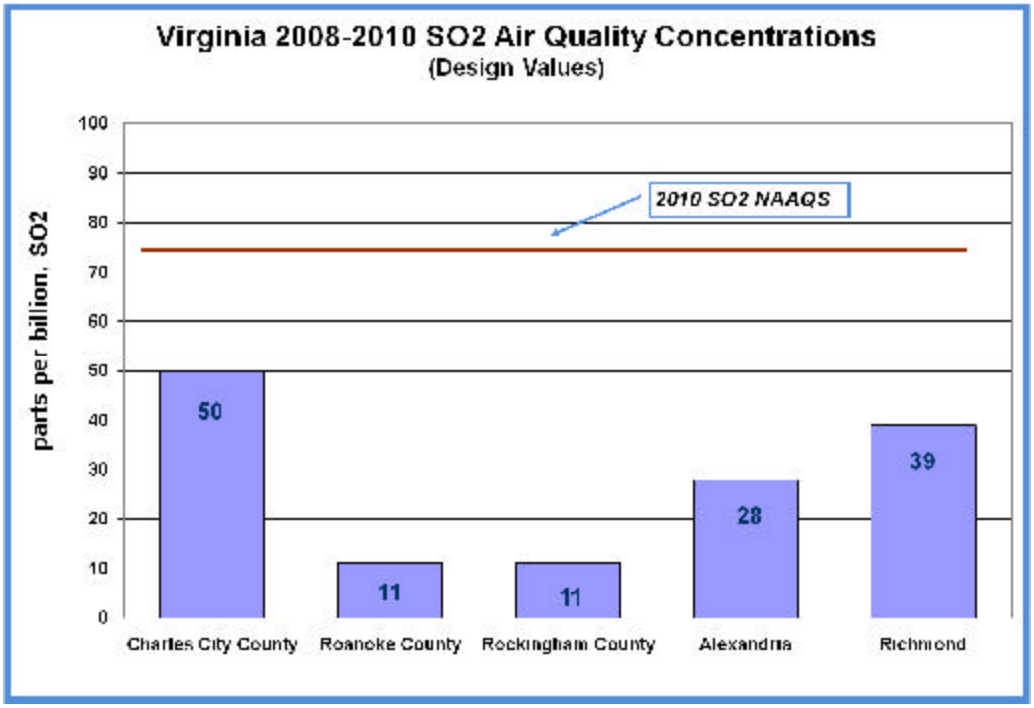

Figure 3-2: Virginia SO_2 Data, 2008-2010

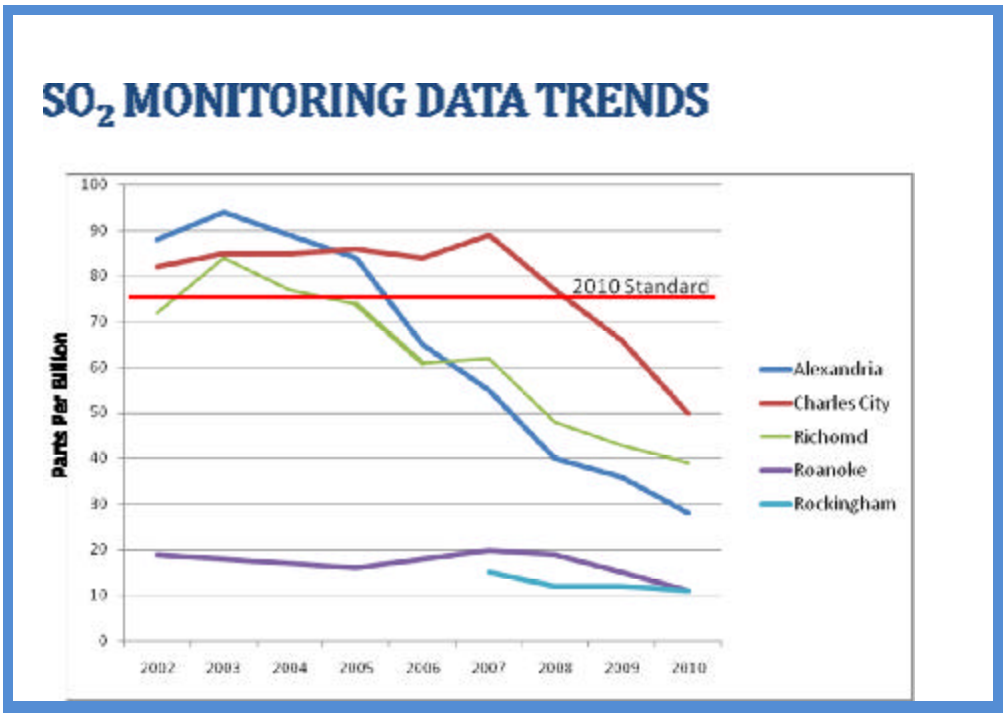

Figure 3-3: Virginia SO_2 Air Quality Trends 2002-2010

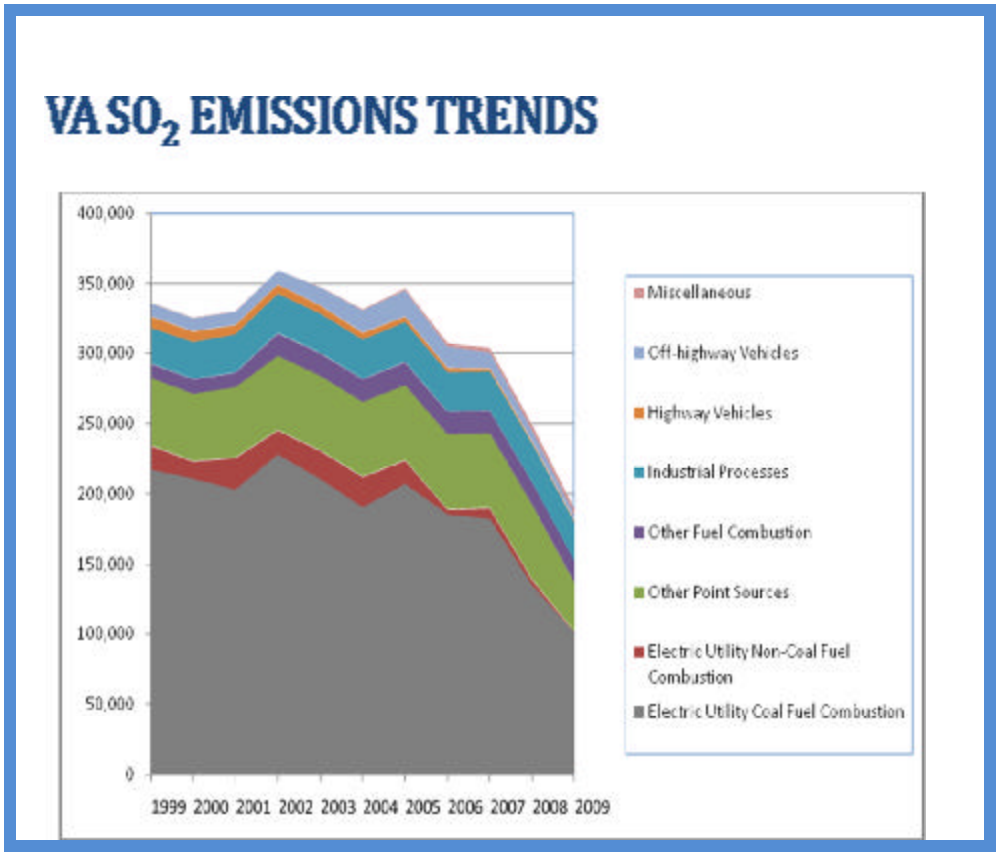

Figure 3-4: Virginia SO_2 Emission Trends 1999-2009

Based on this air quality monitoring data, federal guidance, and the lack of source-specific modeling results, VDEQ made recommendations to the EPA Administrator on June 2, 2011, that all areas in Virginia be classified as "unclassifiable" for this standard.

The SO_2 NAAQS regulation takes a new approach to the implementation of the NAAQS through the inclusion of additional requirements for CAA Section 110(a) SIPs. These "infrastructure" SIPs have in the past been used to show that states have the authority to adequately fund, monitor, enforce, and otherwise implement the NAAQS. This regulation indicates that future 110(a) SIP submittals for this NAAQS must contain demonstrations by major SO_2 facilities that their emissions do not cause or contribute to a NAAQS violation or that such situations will be remedied as soon as practicable but no later than 2017, the NAAQS compliance year. These 110(a) SIP submittals are due to EPA in 2013. Requirements for air dispersion modeling and for permitting designed to ensure NAAQS compliance would significantly increase the modeling staff and permitting staff work load. Implementation guidance for this rule is expected to be published by the end of 2011.

3.1.7 Regional Haze

Section 169 A of the CAA mandates the protection of visibility in national parks, forests, and wilderness areas, referred to as Class I federal areas. Visibility impairment or haze is caused by absorption and scattering of light by fine particles. Sources and activities that emit fine

particles and their precursors, such as NO_X, SO_2, VOC, and ammonia (NH_3), contribute to this problem. In 1999, EPA finalized the Regional Haze Rule, calling for state, tribal, and federal agencies to work together to improve visibility in 156 national parks and wilderness areas.

VDEQ developed a SIP to address visibility impairment in the Commonwealth's two Class I areas, the Shenandoah National Park and the James River Face. This plan established goals and emission reduction strategies to reduce visibility impairment such that the visibility in the Shenandoah National Park and the James River Face will be returned to natural conditions by 2064. With the help of the Visibility Improvement State and Tribal Association of the Southeast (VISTAS) multi-jurisdictional planning organization (MJO), VDEQ developed and submitted a SIP to address visibility impairment in these two Class I areas. The SIP, which was finalized on October 4, 2010, addressed reasonable progress requirements of the CAA, long term strategies, and Best Available Retrofit Technology (BART) requirements for certain industrial facilities. VDEQ is currently working on the development of a mid course review, as required by federal regulations, for analyzing progress toward the visibility goals in the SIP submittal. The mid course review is expected to be ready for submittal to EPA in early 2013.

Figure 3-5: Expected Visibility Improvement Between 2004 (left) and 2018 (right) in Shenandoah

3.2 Air Permitting

VDEQ issues two basic types of air permits: construction permits and operating permits. Construction permits, termed New Source Review (NSR) permits, apply to new facilities as well

as existing facilities that are undergoing an expansion or modification. Operating permits apply to sources that are already in operation.

VDEQ has three construction permit programs for criteria pollutants. The Prevention of Significant Deterioration major new source review (PSD) program applies to major sources that are located in an area that is in attainment with the NAAQS. Sources are required to apply Best Available Control Technology (BACT) as well as undergo a thorough air quality analysis demonstration (i.e. air modeling) to assure the new facility or major modification will not cause or contribute to a violation of the NAAQS or have an adverse impact on any Class I area. The second program is the non-attainment major NSR program that applies to major sources located in an area that is not in compliance with one or more NAAQS. A facility in a non-attainment area must apply the Lowest Achievable Emission Rate (LAER), which is often more rigorous than BACT, and must obtain offsets for the pollutant for which the area is not in attainment. The third program is the minor NSR program. This program applies to new sources or existing sources that are undergoing a modification and that are below major source emissions thresholds. This program is used more than any other in Virginia. During the 2011 fiscal year, 244 minor NSR permits were issued. Additionally, the minor NSR program is used to issue state major source permits, which apply to those sources that have emissions greater than 100 tons per year of a criteria pollutant but that do not fit the criteria to be classified as PSD or nonattainment major NSR. One state major permit was issued in Virginia in fiscal year 2011. Virginia also has a general permit (or permit by regulation) for non-metallic mineral processors. If the facility meets the necessary requirements, the facility may use the general permit process instead of the normal minor NSR permitting process. Twenty-four general permits were issued in Virginia during fiscal year 2011.

VDEQ issues two types of operating permits: state operating permits (SOPs) and federal operating permits that include Title V permits. SOPs are used primarily to cap a source's emissions to keep it below major source emissions thresholds and out of a major source permitting program. SOPs are often used to place federally and state enforceable limits on hazardous air pollutants (HAPs) to keep a source out of the federal HAP program. The federal HAP program generally requires the use of maximum achievable control technology (MACT) standards. A source may request a SOP at any time, and the SAPCB may issue a SOP as necessary (due to a modeled or actual exceedance of a NAAQS or to meet a CAA requirement). Thirty-one SOPs were issued during fiscal year 2011.

The Title V permit program applies to sources that meet the criteria for being "major" under Title V of the CAA. The purpose of a Title V permit is to compile all requirements from a source's multiple air permits (construction and operating) into one permit document. A newly constructed source that is large enough to qualify as a Title V source must apply for a Title V permit within one year of starting operation. Title V permits must be renewed every five years.

Acid Rain permits also are considered federal operating permits. These permits are issued to sources that are subject to the federal acid rain program (CAA Title IV). One federal operating permit and 30 operating permit renewals were issued during fiscal year 2011.

3.2.1 Revision of Minor NSR Regulation

In fiscal year 2011, the SAPCB took final action on the amendments to the minor NSR regulation. The amended rule makes clarifications and incorporates the most recent federal and state policies and guidance into the minor NSR program. The final rule is going through the Commonwealth's regulatory review process.

3.2.2 Development of General Permits

Section 10.1-1308.1 requires the development of a general permit for qualified energy generators that use biomass and produce up to five mega watts (MW) of energy. The biomass general permit was finalized in fiscal year 2011 and may now be used by facilities.

Pursuant to legislation adopted during the 2009 General Assembly Session, the SAPCB was directed to develop two additional general permits. One general permit is for specific sources that generate electricity during emergencies, including Independent Systems Operator (ISO) declared emergencies. This general permit applies to sources above the minor source permitting exemption levels but below the major source permitting exemption levels. The second general permit applies to generators that are used for load curtailment, demand response, or peak shaving. Sources have the option of getting a general permit or a minor NSR permit. Both of these general permits were finalized in fiscal year 2011 and will become effective in fiscal year 2012.

3.2.3 Greenhouse Gas Permitting

On January 2, 2011, greenhouse gases (GHGs) became regulated pollutants that must be considered during the major source air permitting process. On May 13, 2011, EPA approved Virginia's program for GHGs. As a result of this approval, VDEQ, not EPA, became the official permitting authority for major sources emitting GHGs. A source is only required to address their GHG emissions if they emit more than 100,000 tons per year (tpy) of carbon dioxide equivalent pollution (CO_2e) or modify their source such that there is at least a 75,000 tpy increase in CO_2e. Minor sources of air pollution are excluded from the GHG requirements. Additionally, on March 21, 2011, EPA proposed a deferral for sources that emit CO_2 from biomass processes such as wood combustion. The EPA deferral will be finalized in fiscal year 2012 and is scheduled to be submitted to the SAPCB for approval. The deferral is for three years and gives EPA time to evaluate the net result of emitting CO_2 by combusting biomass versus the absorption of CO_2 by biomass. Sources that would have been major only because of their CO_2 emissions from biomass will not have to go through the major NSR permitting process until the deferral expires.

3.2.4 Dominion Warren County

On December 21, 2010, VDEQ issued a PSD permit to Dominion for a new 1,280 MW combined-cycle combustion turbine facility in Warren County. The facility will be located within five miles of the Shenandoah National Park. Part of the permit process included a negotiation between Dominion and the Federal Land Manager to assure any negative impacts to the Park would be mitigated by Dominion by obtaining emission offsets.

3.2.5 Fumigation

The 2010 General Assembly added §10.1-1308.01, Qualification Fumigation Facilities, which exempts from minor source air permitting requirements small fumigation operations that fumigate commodities. These facilities usually use methyl bromide or phosphine, both of which are HAPs under the CAA. Facilities using less than 10 tpy of any HAP avoid permitting as long as certain conditions are met such as reporting specific operational information to VDEQ and maintaining a buffer zone to limit public exposure outside the fence line of the property. The law became effective on July 1, 2011.

3.2.6 Outer Continental Shelf Permitting

Section 328 of the CAA requires the regulation of air pollution sources located on the Outer Continental Shelf (OCS). States may request the permitting authority for those sources located within 25 miles of the coast, and Senate Bill 659 (2010) directed VDEQ to do so. This is accomplished in two phases. First, EPA conducts a consistency evaluation and adopts the state regulations into 40 CFR Part 55. Once that has been accomplished, a state may request EPA to delegate those requirements back to the state. The first part of the requirement has been met, and it is anticipated the second part will occur in fiscal year 2012. At that point, VDEQ, not EPA, will become the permitting authority for any source of air pollution locating off the Virginia coast.

3.3 Air Compliance Activities

The purpose of the compliance program is to enforce all applicable state and federal air regulations and laws. The goal is for facilities operating within the Commonwealth to be compliant with those regulations and laws, and the focus is to provide the necessary compliance and/or enforcement assistance to correct detected violations as expeditiously as possible. This concept supports VDEQ's mission to protect the environment and human health.

To ensure that industry constructs and operates within the boundary of applicable regulations and permit conditions, VDEQ's air compliance program operates consistent with EPA's 2001 National Compliance Monitoring Strategy (CMS). This strategy targets the largest potential emitters of air pollution for a full compliance evaluation (FCE) at a minimum

recommended frequency of once every two years. An FCE consists of a comprehensive evaluation of the facility records and equipment associated with pollutant emissions, to include the examination of documents detailing throughputs, emissions, testing, and reporting, in order to determine the facility's overall compliance status. The compliance status of Virginia's regulated facilities is reported to EPA weekly and is publicly available on EPA's Environmental Compliance and History Online (ECHO) external website.

3.3.1 Inspection Planning

VDEQ advocates the use of a risk based concept when identifying facilities for an FCE. Using a number of qualifiers, VDEQ identifies facilities with a higher potential adverse impact to the environment and targets those facilities for an FCE based on one or more risk factors. This concept was developed by VDEQ and is being used in collaboration with the CMS to develop annual inspection plans; it also has a multimedia component. Referred to as VDEQ's Risked Based Inspection Strategy or RBIS, it provides flexibility to use resources where they are most needed. EPA granted VDEQ approval to exercise the risk based concept on a three year trial basis with EPA Region 3 oversight.

Virginia is the only EPA Region 3 state with a formal risk based strategy. The RBIS may identify facilities that are not a focus of the CMS strategy, and the RBIS may be used to justify increases or decreases in the frequency of inspections. Determinations of increased or decreased inspection frequencies are based on risk qualifiers such as participation in the environmental enhancement program, compliance history, facility type, environmental sensitivity, multi-media applicability, environmental justice (concerns and complaints), and agency initiatives.

3.3.2 Sources Evaluated for Compliance

Virginia has approximately 5,000 registered facilities, not including approximately 1,192 gasoline dispensing Stage II vapor recovery facilities (gas service stations in the Richmond area and Northern Virginia). In June 2009, VDEQ signed a Memorandum of Understanding (MOU) with EPA Region 3 accepting delegation to enforce 23 of 26 federal area source MACT regulations and since then has accepted delegation of another seven. These regulations apply to a substantial universe of facilities emitting toxic pollutants below major source and minor source NSR permitting thresholds. As part of the MOU, VDEQ agreed to support EPA through outreach efforts for the three area source MACT regulations not accepted while EPA retained sole implementation and enforcement authority. The three area source MACT regulations for which VDEQ has not taken delegation are the reciprocating internal combustion engine standards, the gasoline dispensing standards, and the auto body refinishing standards. These three area source MACT regulations are estimated to constitute a source population of more than 20,000 in Virginia.

For the 2010 federal fiscal year, the air compliance program completed a total of 7,781 partial and full compliance inspection reports; conducted a total of 1,555 on-site inspections, including complaint investigations and Stage II inspections; observed 55 stack tests; and issued a combination of 347 formal and informal enforcement actions.

3.3.3 Small Business Assistance

The Small Business Assistance (SBA) program is required by Virginia law and mandated under the CAA. The air compliance program provides various forms of compliance assistance to potentially thousands of small businesses throughout the Commonwealth. These services are provided at no cost in order to inform, educate, and assist small businesses in complying with environmental regulations. Examples are the Dry Cleaner and Stage II calendars made available to small businesses to improve understanding of those regulations.

Most of these small business owners do not have experience interpreting or complying with environmental regulations. Therefore, the SBA services provided are beneficial to the facility's operation, the environment, and the local economy. In addition, VDEQ actively works with other states and EPA to share ideas in an effort to best support the Virginia small business community.

3.4 Air Enforcement Activities

The goal of enforcement is to take appropriate actions to address violations of environmental laws and return facilities to compliance with Virginia's statutory and regulatory requirements. The mechanism used by VDEQ to achieve compliance must be proportional to the violation, responsive to the facility's compliance history, and protective of human health and the environment. In addition, an appropriate enforcement action, which may include a civil charge and recovery of economic benefit, sends a message of deterrence to the regulated community.

EPA's guidance on timely and appropriate enforcement response to high priority violations (HPVs) articulates the mutual expectations of the respective parties of the federal - state partnership in the enforcement of air pollution control requirements for stationary sources. VDEQ's enforcement staff is responsible for implementing this policy. This policy applies to all major (as defined by the CAA) stationary sources of air pollution that are in violation of a federally enforceable regulation and helps prioritize federal and state agency enforcement efforts with respect to sources of air pollution in their jurisdictions.

Agency HPV activities are designed to identify and to expeditiously return to compliance those violating sources that the agency believes are environmentally most important, namely the HPVs. The policy also promotes a more complete and accurate compliance picture and enhances the responsibility of the agency, as well as EPA, to track and address all violations. An essential part of this tracking process is assuring that all HPVs are promptly entered into the shared EPA-state database.

In fiscal year 2010, 28 consent orders were issued (ten of which were HPVs) and resulted in the collection of $1,203,204 in civil charges.

3.5 Motor Vehicle Inspection and Maintenance Program

Vehicle inspection and maintenance programs (I/M) help improve air quality by identifying high-emitting vehicles in need of repair and causing them to be fixed as a prerequisite to vehicle registration within a given non-attainment area. The CAA made I/M mandatory for several areas across the country, based upon criteria such as air quality classification, population, and/or geographic location. VDEQ created a decentralized I/M program that retains the convenience of having emissions inspections and repairs performed in the same stations but uses the latest accepted technology to determine which vehicles emit excessive pollutants.

In 2005, VDEQ updated the program to allow for testing of the on-board diagnostic (OBD) systems on model year 1996 and newer vehicles. The OBD system monitors key components of the vehicle's emission control system, records any diagnostic trouble codes, and warns the driver if there is a condition that could cause excess emissions. Beginning with model year 2009, all vehicles up to 14,000 pounds are required by federal mandate to be OBD-compliant.

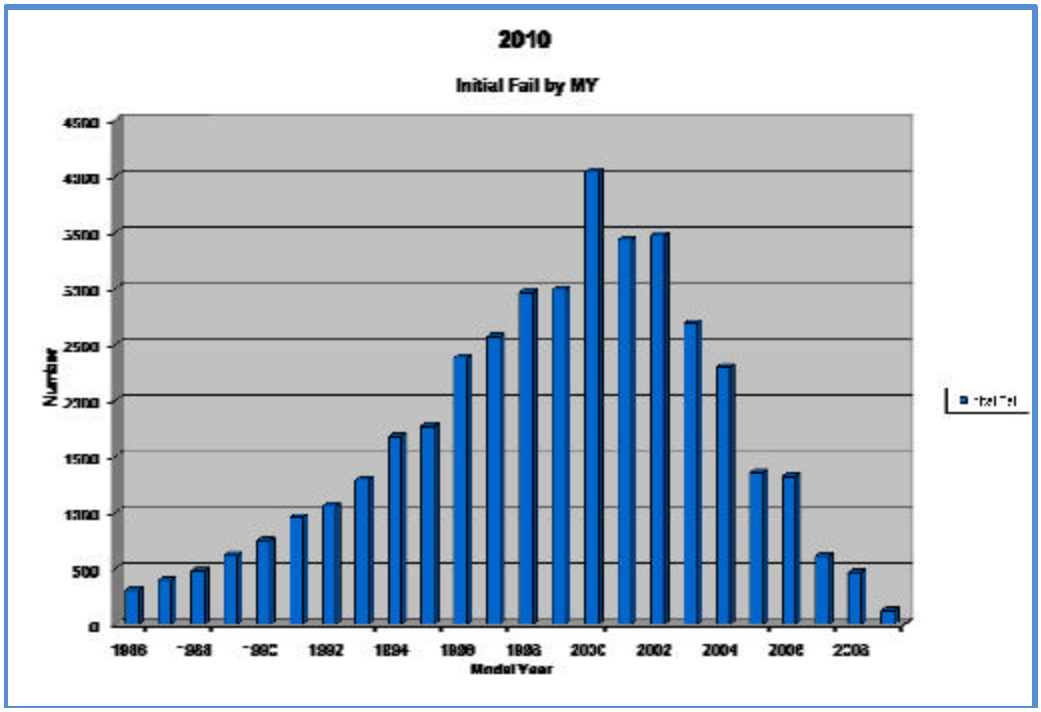

Figure 3-6: 2010 Initial Failures by Vehicle Model Year (Number x 10)

The Northern Virginia I/M program provides significant air pollution reduction benefits in the Northern Virginia area. Vehicles up to 10,000 pounds gross vehicle weight rating (GVWR) and newer than 25 model years are required to pass an emissions test or receive a waiver every two years in order to be registered. As noted in Figure 3-6, just over 40,000 vehicles failed the initial test and received repairs in 2010.

3.5.1 MSOS

The Mobile Source Operations Section (MSOS) is part of the Northern Virginia Regional Office and monitors the performance of the various service stations, certified emissions repair facilities, and licensed emissions inspectors within the I/M program. In 2010, over 821,000 vehicles were inspected. MSOS personnel conducted over 1,200 separate audits during that time frame, including 169 covert audits, of approximately 490 emission inspection facilities. MSOS routinely handles in excess of 1,100 calls per month from citizens, inspectors, repair technicians, and others.

3.5.2 On-Road Emissions Monitoring Program

As required by the CAA, each vehicle emissions inspection program must conduct remote sensing of vehicle emissions in the program area. In the On-Road Emissions (ORE) monitoring program, vehicles with very high emissions as identified by remote sensing devices are sent a Notice of Violation (NOV) and are required to make any necessary repairs to their vehicles. Owners of vehicles observed by remote sensing to be exceptionally clean are notified that their vehicle has received a clean screen, which constitutes an emission inspection pass. VDEQ also implemented procedures to provide repair assistance to low-income vehicle owners whose vehicles were found to be high emitters through remote sensing.

After nearly five years of operation, the ORE program has identified over 1,100 vehicles as gross emitters and issued over 1,000 clean screen passes. The gross emitters were repaired and passed an emissions test, taken off the road, or sold outside of the Northern Virginia program area. Currently only about 14% of the Northern Virginia fleet is observed. Unmanned remote sensing units may soon be available, which would greatly increase the number of observations being recorded.

Studies by EPA in other states have indicated that remote sensing can be used to identify vehicles with very high evaporative emissions, possibly coming from leaking fuel tanks or lines. VDEQ notifies owners of such vehicles that they may have a gasoline leak, which could be a potential safety issue. The notice is advisory only.

3.6 Title V Fees

Under the CAA (§502) and Virginia Statute (§10.1-1322), VDEQ is required to collect fees to run and maintain the Title V permitting program. If EPA determines a state does not have sufficient funds to maintain the program, the federal government has the authority to take back the program and become the administrator. The money for maintaining the program comes from fees paid by major sources of air pollution based on pollutant emissions. Major sources pay a specified dollar per ton for each pollutant emitted up to 4,000 tons. The fee is adjusted each year based on the Consumer Price Index (CPI). For 2010 emissions, the fee was $43.68/ton. As new regulations have come into effect, emissions have gone down for most major sources as noted in Figure 3-7.

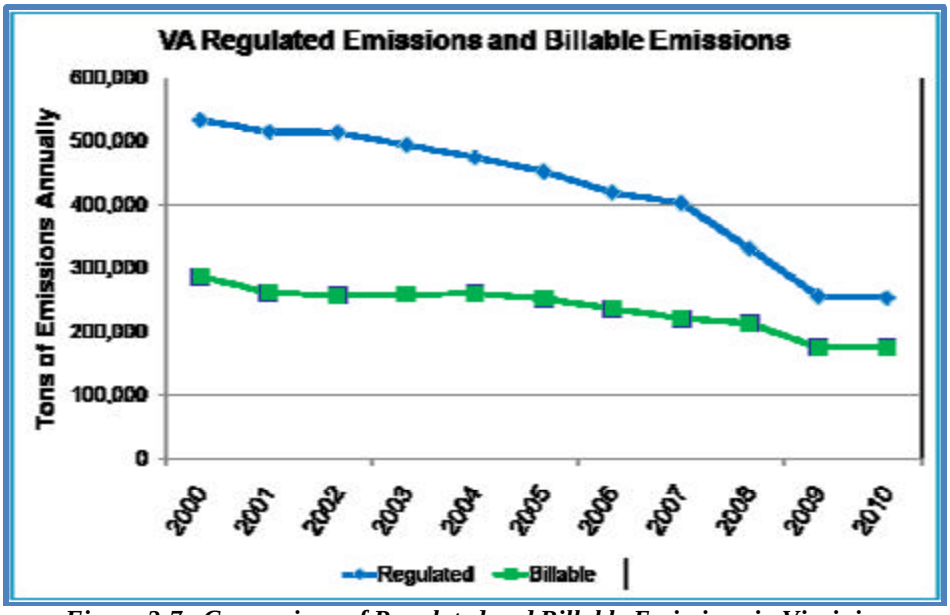

Figure 3-7: Comparison of Regulated and Billable Emissions in Virginia

Due to the reduction in emissions, the amount of money collected by VDEQ to run the program has decreased. Despite the decrease in emissions, the cost of running the program has remained the same. Each year, more regulations have gone into effect, which has kept constant and/or increased the workload for the air division in both permitting and compliance. VDEQ has been working with stakeholders to address the shortfall created by declining revenue from emissions fees so that VDEQ may continue to be the administrator of the Title V program. Legislation may be introduced in fiscal year 2012.

4 Control Programs

As shown in Figure 4-1, emissions of VOC, NO_X, and SO_2 are expected to decrease significantly from 2002 levels by 2018, even though growth in both vehicle miles traveled and population is expected to continue throughout this time frame. These projected reductions are the result of several control programs being implemented at the federal level as well as programs being implemented in the Commonwealth. Some of these programs are described in the following paragraphs.

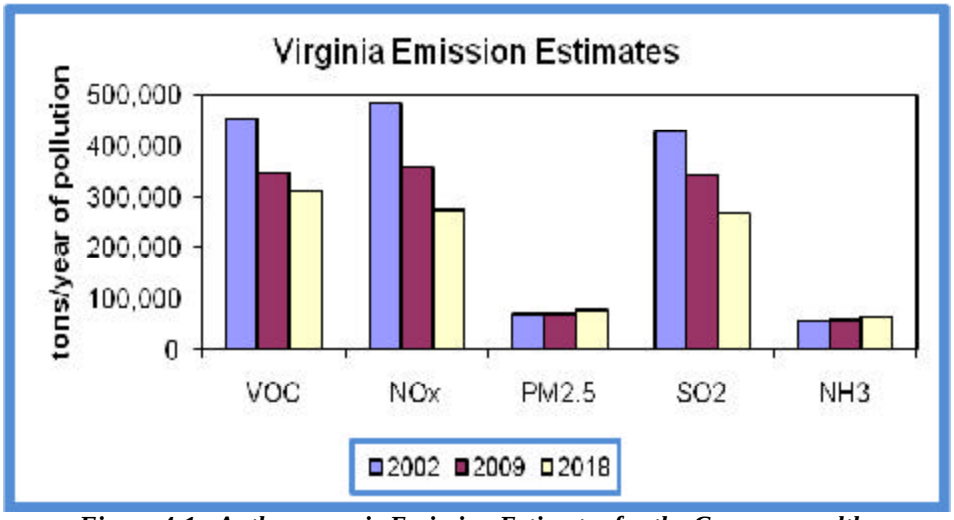

Figure 4-1: Anthropogenic Emission Estimates for the Commonwealth

4.1 Cross State Air Pollution Rule

On July 6, 2011, EPA finalized the Cross State Air Pollution Rule (CSAPR), which affects 27 states in the eastern half of the United States. CSAPR will significantly improve air quality by reducing power plant emissions that cross state lines and contribute to ozone and $PM_{2.5}$ pollution in other states.

The first phase of compliance begins in 2012 for SO_2 and NO_X. The second phase of this rule begins in 2014. By 2014, CSAPR is expected to reduce power plant SO_2 emissions by 73 percent and power plant NO_X emissions by 54 percent from 2005 levels across the 27 states. Figure 4-2 shows Virginia assurance levels of pollution compared to actual emissions in 2010 from subject Virginia facilities.

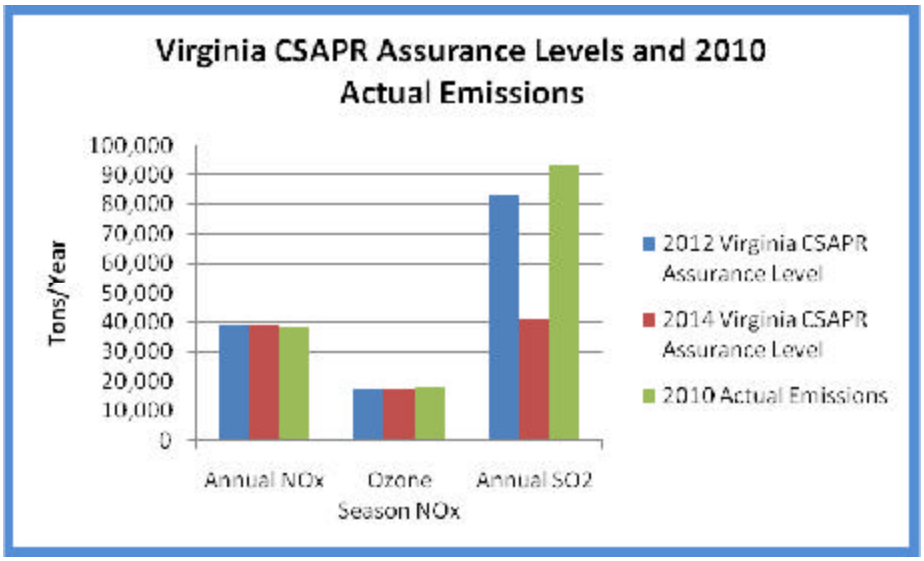

Figure 4-2: CSAPR Assurance Levels and Actual 2010 Emissions

4.2 Mobile Source Programs

As noted in Figure 4-3 and Figure 4-4, emissions of VOC, NO_X, SO_2, and $PM_{2.5}$ from the mobile source sector in Virginia are expected to decrease significantly in future years. Mobile sources are generally pollution emitting activities that move by their own power, such as cars and trucks, on public roadways. The expected decreases in this emissions sector are the result of federal regulatory programs that require emission reductions from vehicles such as automobiles and heavy duty diesel trucks.

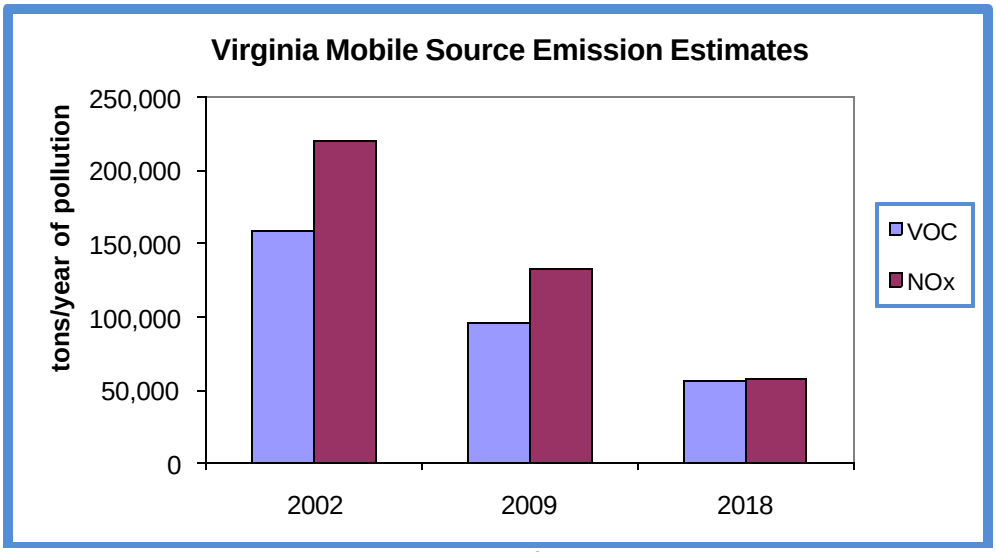

Figure 4-3: $PM_{2.5}$ and SO_2 Emissions from Mobile Sources in Virginia

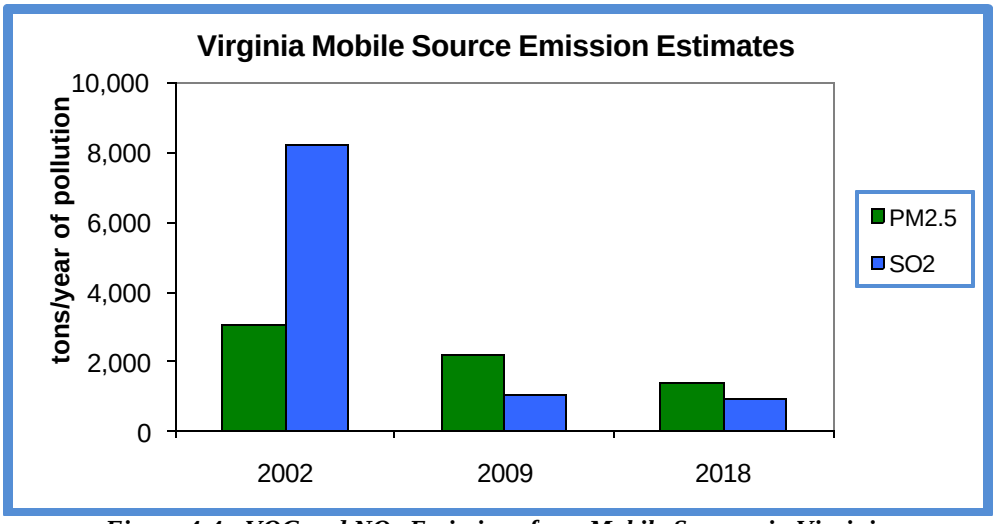

Figure 4-4: VOC and NO_X Emissions from Mobile Sources in Virginia

4.3 Product Based Programs

A variety of both state and federal control programs are being implemented that reduce emissions from product-based categories such as the use of portable fuel containers; the coating

of architectural supports; the application of traffic markings; the use of personal products such as deodorant and hair spray; and the use of household products such as cleaners and pesticides. These types of programs have been implemented in the northern Virginia area and the Fredericksburg area. These regulations generally target VOC emissions but can also help decrease public exposure to harmful chemicals.

4.4 Non-Road Control Programs

Non-road equipment consists of devices with an engine where the power from the engine is generally not used to move the equipment along roadways. Examples are lawn mowers, weed eaters, diesel generator sets, gasoline generator sets, marine engines, and locomotive engines.

Federal regulations have been finalized that control emissions of various pollutants from all these categories. Most of these regulations have phase-in periods, where standards are more stringent for equipment manufactured in later years. These federal standards will result in a 60% to 90% reduction in air pollutants. Air pollution benefits are related to the purchase of new equipment, and the benefits to air quality continue until the entire fleet of a type of equipment has been replaced.

In addition to engine standards, the non-road heavy duty diesel engine standards and the rail and marine vessel standards require the phase-in of much cleaner diesel fuel. Non-road engines must use diesel fuel with no more than 15 ppm sulfur beginning in 2010. Railroad and marine vessels must use diesel fuel with no more than 15 ppm sulfur beginning in 2012. The cleaner fuels allow more efficient engine operation, facilitate the use of state-of-the-art emissions controls on new units, and directly result in greatly reduced SO_2 emissions from such equipment.