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To: The Honorable Terence R. McAuliffe
Members of the General Assembly

From: David K. Paylor

Date: September 30, 2015

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 2015.

Air quality in Virginia continues to improve. Ambient concentrations of ozone, fine particulate matter ($PM_{2.5}$), nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and carbon monoxide (CO) in Virginia met the United States Environmental Protection Agency's (EPA) National Ambient Air Quality Standards (NAAQS) in 2014. Additionally, ozone air quality is making improvements. All Virginia monitors recorded ozone data that complies with the 2008 ozone NAAQS in 2014. However, the air quality standards that the Commonwealth must attain are becoming increasingly stringent. EPA proposed a new ozone NAAQS on December 17, 2014 within a range of 0.065 parts per million (ppm) and 0.070 ppm. EPA expects to release the final rule by October 2015.

This report is being made available on DEQ's website at http://www.deq.virginia.gov/LawsRegulations/ReportstotheGeneralAssembly.aspx.

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 Terence R. McAuliffe, Governor and the General Assembly of Virginia

Virginia Department of Environmental Quality

October 2015

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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
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
CSAPR	Cross State Air Pollution Rule
CTG	Control Technique Guideline
DMV	Department of Motor Vehicles
DV	Deciviews, a metric of visibility
ECHO	Enforcement and Compliance History Online
EGU	Electric Generating Unit
ELRP	Emergency Load Response Program
EPA	Environmental Protection Agency
ERTAC	Eastern Regional Technical Advisory Committee
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
ICI	Industrial/commercial/institutional
I/M	Motor Vehicle Inspection and Maintenance Program
IPM	Integrated Planning Model
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
MATS	Mercury and Air Toxics Standard
MOU	Memorandum of Understanding
MJO	Multi-jurisdictional planning organization
MMte	Million Metric Tons of CO_2 equivalent
MPO	Metropolitan Planning Organization
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
NO_X	Oxides of Nitrogen
NOIRA	Notice of Intended Regulatory Action
NOV	Notice of Violation
NOX	Nitrogen Oxides
NSPS	New Source Performance Standard
NSR	New Source Review
OBD	On-Board Diagnostics
OCS	Outer Continental Shelf
ORE	On-Road Emissions Program
ORVR	On Board Refueling Vapor Recovery
OTC	Ozone Transport Commission
OTR	Ozone Transport Region
Pb	Lead
PCE	Partial Compliance Evaluation
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
QFF	Qualification Fumigation Facilities
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
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SOP	State Operating Permit
SSI	Sewage Sludge Incinerator
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
VDEQ	Virginia Department of Environmental Quality
VDH	Virginia Department of Health
VISTAS	Visibility Improvement State and Tribal Association of the Southeast
VOC	Volatile Organic Compounds
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. Ambient concentrations of ozone, fine particulate matter ($PM_{2.5}$), nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and carbon monoxide (CO) in Virginia met the United States Environmental Protection Agency's (EPA) National Ambient Air Quality Standards (NAAQS) in 2014. Additionally, EPA recognizes all areas as attaining all standards with the exception of Northern Virginia, which is part of the Metropolitan Washington, D.C. air quality region. EPA has designated the Metropolitan Washington, D.C. region as a marginal nonattainment area for the 2008 ozone NAAQS, and one monitor in this area located outside of Virginia continues to monitor unhealthy air quality. EPA proposed a new ozone NAAQS on December 17, 2014 (79 FR 75234) within a range of 0.065 parts per million (ppm) and 0.070 ppm. EPA expects to release the final rule by October 2015.

1.2. Air Quality Policies in the Commonwealth

After many years of litigation, the Cross State Air Pollution Rule (CSAPR) became effective in Virginia on January 1, 2015. This rule addressed interstate transport requirements for the 1997 ozone NAAQS. EPA is updating the supporting analyses to address the 2008 ozone NAAQS, the conclusions of which may result in additional mandates for Virginia facilities. A number of outstanding issues may also affect Virginia, including EPA's recently finalized rules on carbon pollution, forthcoming rules on SO_2 emissions, and startup/shutdown/malfunction guidance.

1.3. Summary of Annual Air Division Activities

Monitoring Locations:	**39**	**On Site Inspections :**	**824**
Monitoring Instruments:	**126**	**Enforcement Actions:**	**237**
Minor Source Permits Issued:	**191**	**Vehicles Inspected:**	**848,778**
PSD Permits Issued:	**1**	**Vehicles Failed:**	**29,736**
General Permits Issued:	**20**	**Inspection Station Overt Audits:**	**460**
State Operating Permits Issued:	**6**	**Inspection Station Covert Audits:**	**133**
Federal Operating Permits Issued:	**64**	**Consent Orders Issued:**	**21**
Compliance Evaluations (all):	**6,470**	**Civil Charges Collected:**	**$282,016**

2. Status of Air Quality in the Commonwealth of Virginia

VDEQ monitors a variety of different pollutants in the ambient atmosphere. A portion of Virginia's monitoring network measures concentrations of the criteria pollutants: ozone, $PM_{2.5}$, NO_2, SO_2, and CO. Criteria pollutants are harmful to public health and the environment, and EPA has set NAAQS for these pollutants to provide public health and public welfare protection. The two criteria pollutants that have historically been problematic in Virginia are ozone and $PM_{2.5}$. Recently, air quality for both pollutants has improved. $PM_{2.5}$ air quality is now in the healthy range across Virginia and has been for the last several years. Ozone air quality is making improvements. All Virginia monitors recorded ozone data that complies with the 2008 ozone NAAQS in 2014.

2.1. Criteria Pollutant Overview

Ozone is not generally emitted directly into the atmosphere. Rather, a photochemical reaction between volatile organic compounds (VOC) and oxides of nitrogen (NO_X) creates this pollutant when these precursors combine in the presence of sunlight. Ozone is the primary component of smog, is a lung irritant, and interferes with plants' abilities to process food and ward off diseases.

EPA defines $PM_{2.5}$ as any airborne particle of solid or liquid matter that is less than or equal to 2.5 micrometers in diameter. $PM_{2.5}$ is not a single pollutant. Rather, the nomenclature describes a category of compounds that have diameters less than 2.5 micrometers, approximately $1/30^{th}$ the width of a human hair. The main adverse health impacts of $PM_{2.5}$ are on the respiratory system and the cardiovascular system.

NO_2 is a gaseous air pollutant that forms when fossil fuels such as coal, oil, gasoline, or diesel burn 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.

SO_2 is one of a group of highly reactive compounds known as "oxides of sulfur." The largest source of SO_2 emissions is fossil fuel combustion at power plants and at other types of industrial facilities. Smaller sources of SO_2 emissions include industrial processes such as extracting metal from ore and the combustion 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 $PM_{2.5}$.

CO is a colorless, odorless gas emitted from combustion processions. Particularly in urban areas, the majority of CO emissions to ambient air originate from mobile sources. CO can cause harmful health effects by reducing oxygen delivery to the body's organs.

2.2. Monitoring Network

VDEQ's Office of Air Quality Monitoring (AQM) maintains an extensive air quality monitoring network throughout the Commonwealth. Approximately 126 instruments at 39 sites monitored ambient air quality across Virginia during 2014 - 2015. Figure 2-1 shows the various ozone monitoring sites in Virginia. All monitoring sites meet 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. AQM quality assures all data gathered from the Virginia air quality monitoring network 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/Programs/Air/AirMonitoring/Publications.aspx.

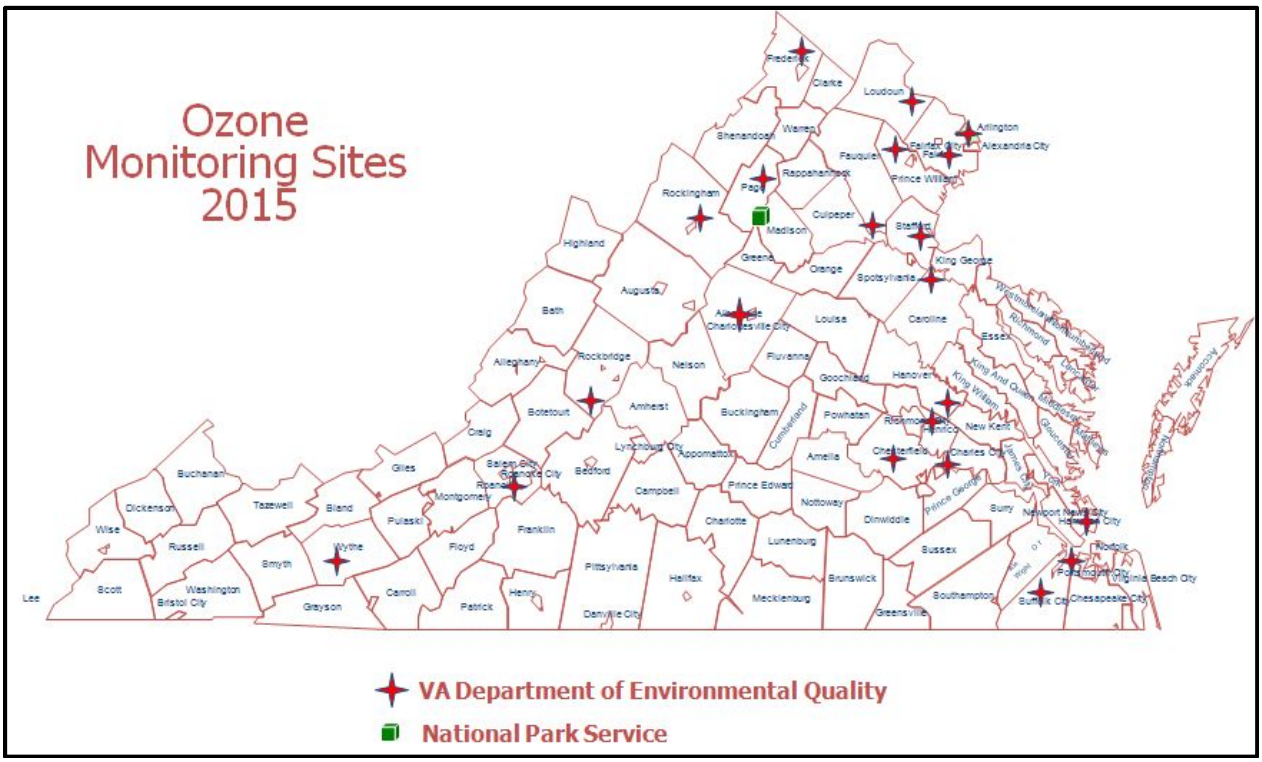

Figure 2-1: Virginia Ozone Monitoring Network

2.2.1. Community Air Monitoring Study (Suffolk)

Pursuant to HB 1625 (2011), VDEQ is conducting an air monitoring study at fumigation sites to provide data to the Virginia Department of Health for its assessment of health impacts. VDEQ has formed a stakeholder group to help communicate the results of the study to the public. VDEQ designed the study in cooperation with the Department of Health, and the Department of Agriculture and Consumer Services is assisting with the stakeholder process. The sampling and analysis program is ongoing with a scheduled completion date of October 1, 2015.

2.2.2. Near-Road Monitoring for NO_2

In February 2010 EPA promulgated a new NO_2 NAAQS, setting the standard at 100 parts per billion (ppb). This standard included a new requirement for the installation and operation of monitoring stations in close proximity to heavily traveled roadways. According to federal mandates, VDEQ must install three such monitoring stations. EPA is providing start-up funds for these locations but is not at this time providing operating funds. VDEQ has installed one of three monitoring stations, located in Richmond at Bryan Park adjacent to the I-95 and I-64 interchange, as shown in the Figure 2-2. The station has been up and running since October

2013. The data from this site is available at the following URL: http://vadeq.tx.sutron.com/cgi-bin/daily_summary.pl?cams=37. VDEQ expects to install a similar station at the Backlick Road park and ride lot in Fairfax County as well as at the I-64/I-264 interchange in Hampton Roads.

Figure 2-2: Bryan Park Near-Road Monitoring Site

2.3. Data Trends for Criteria Pollutants

Trends for all criteria pollutants across Virginia show significant improvements over the last decade. These improvements are the result of the emission reductions associated with a variety of implemented control programs. In some cases, emissions from nearby states have also decreased, so that Virginia no longer receives as much pollution transported into the Commonwealth from upwind areas.

Figure 2-3 provides the 24-hour $PM_{2.5}$ and ozone design value concentrations for monitors in the Hampton Roads, Richmond-Petersburg, Roanoke, and Northern Virginia areas. These areas and monitors demonstrate compliance with the 2006 $PM_{2.5}$ daily NAAQS of 35 micrograms per cubic meter ($\mu g/m^3$) and the 2008 ozone NAAQS of 0.075 ppm (75 ppb). Other areas of the Commonwealth follow similar trends. Annual averages of $PM_{2.5}$ also follow such trends across the Commonwealth and comply with the 2012 $PM_{2.5}$ annual NAAQS of 12.0 $\mu g/m^3$.

Figure 2-4 provides NO_2 measurements and compares this data to the 2010 NO_2 NAAQS of 100 ppb. Likewise, Figure 2-5 provides SO_2 measurements and compares this data to the 2010 SO_2 NAAQS of 75 ppb, and Figure 2-6 provides CO measurements for comparison against the 1971 CO NAAQS of 9 ppm. These downward trends should continue into the future due to forthcoming emission reductions associated with implemented and new control programs.

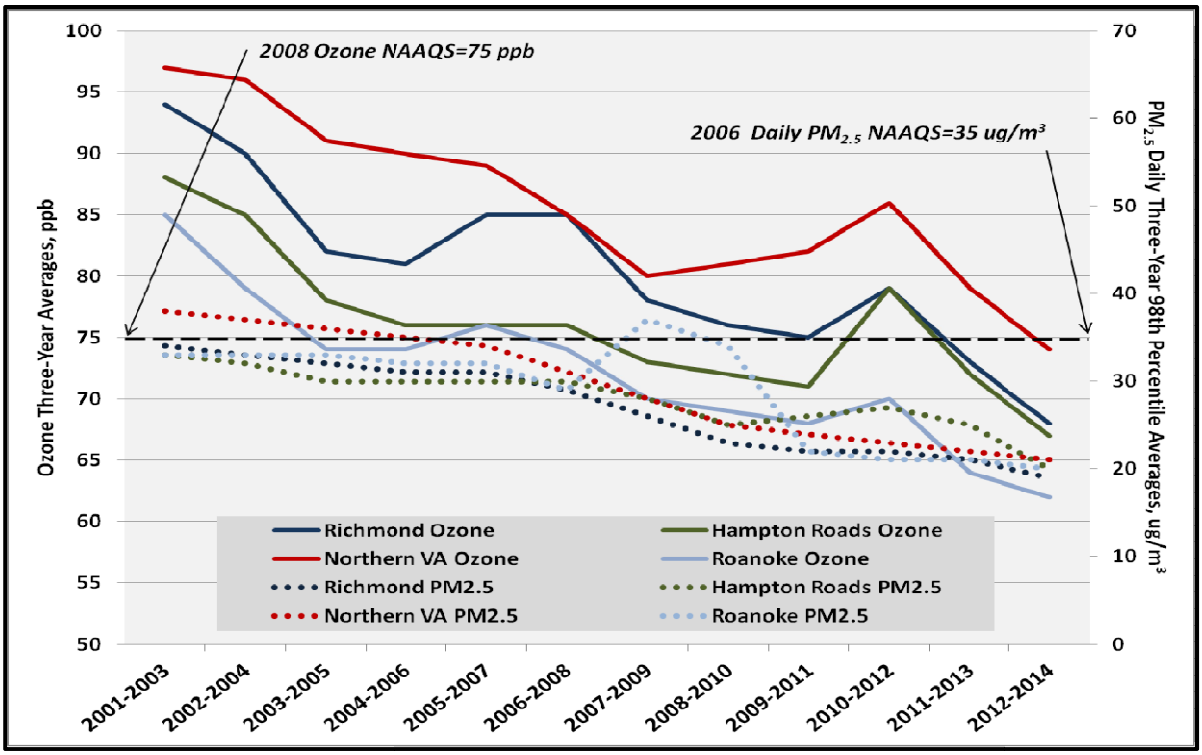

Figure 2-3: Ozone and 24-Hour $PM_{2.5}$ Concentrations

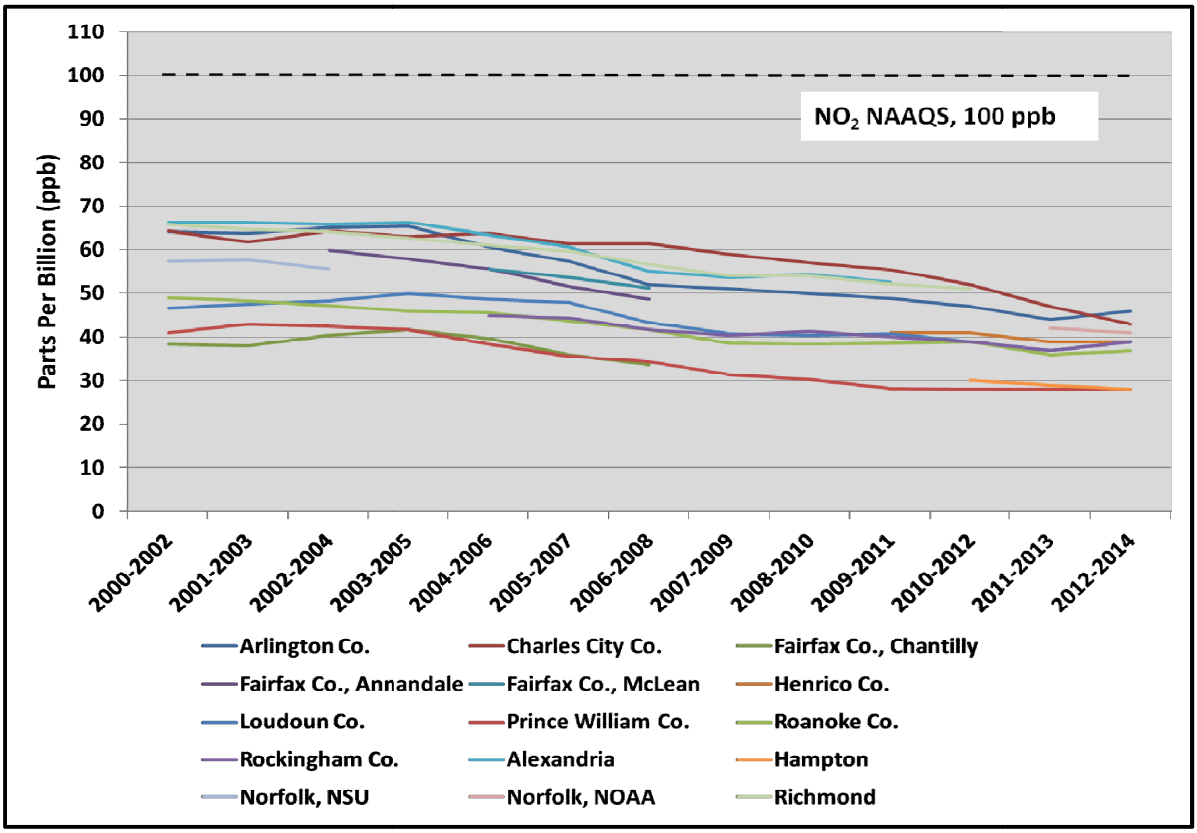

Figure 2-4: Virginia NO_2 Measurements

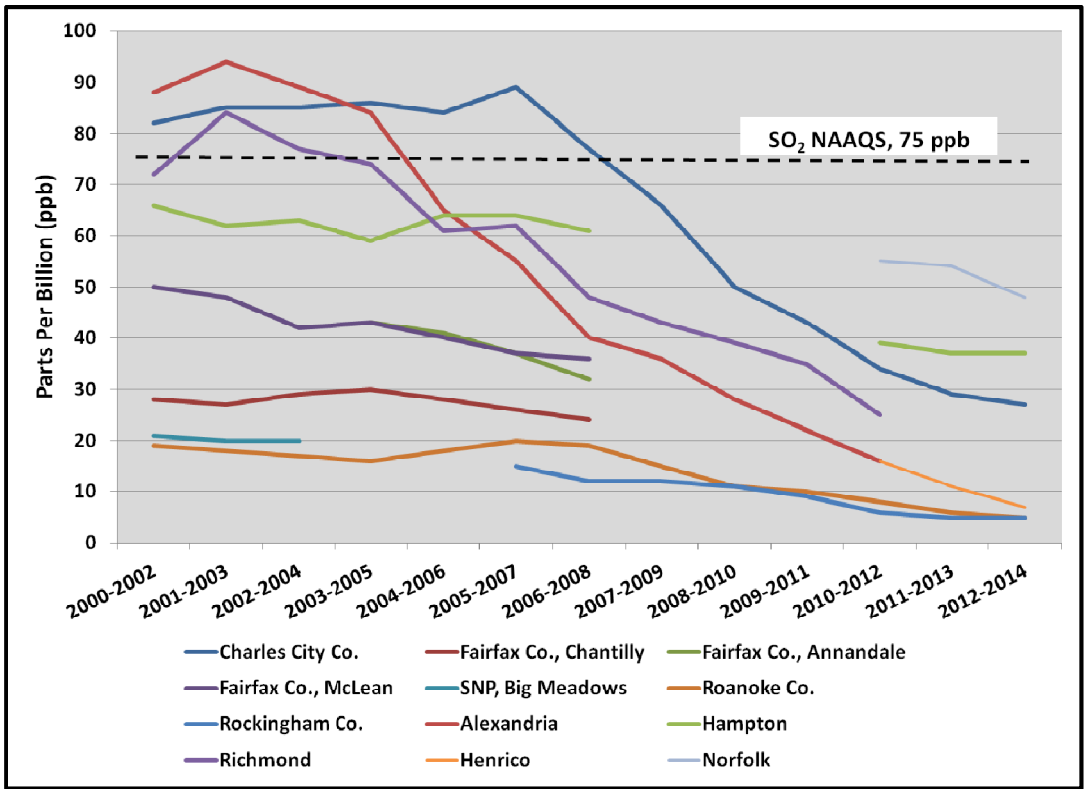

Figure 2-5: Virginia SO_2 Measurements

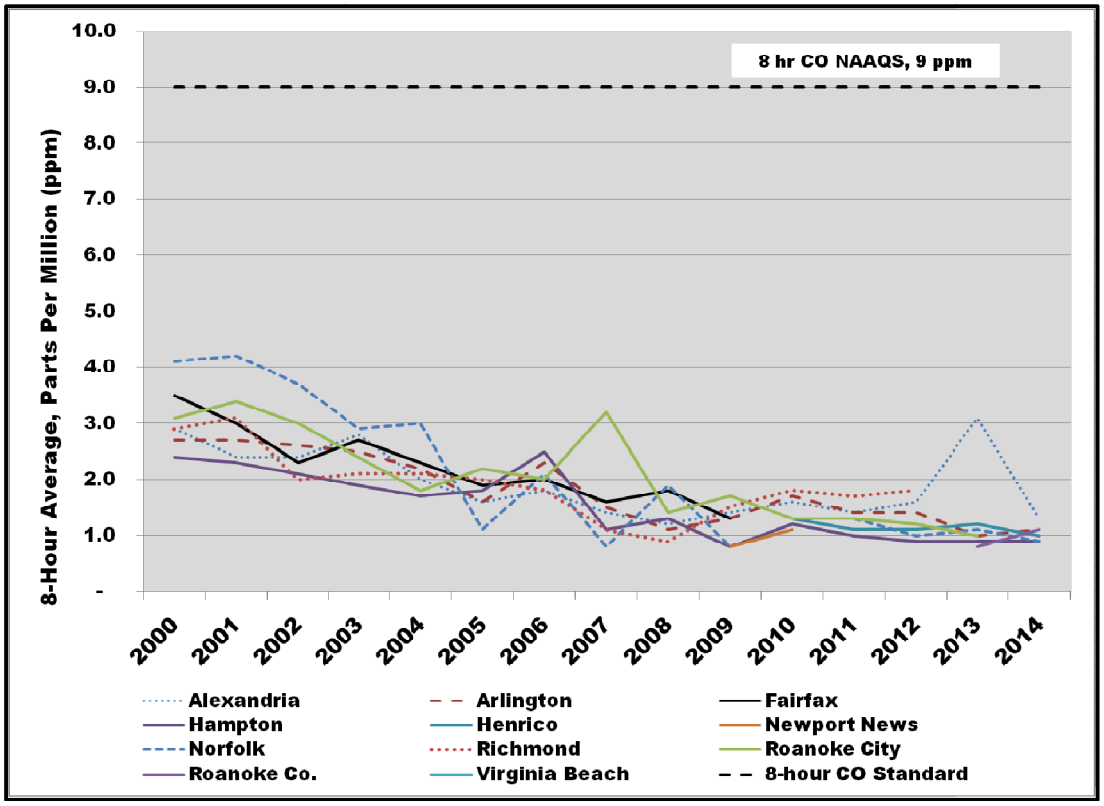

Figure 2-6: Virginia CO Measurements

3. Air Pollution Control Overview

This overview describes planning, permitting, compliance, enforcement, and other initiatives. Information on significant current policy issues under each category is provided.

3.1. Air Quality Planning and Regulatory Initiatives

Air quality planning strategies now focus on meeting all federal requirements associated with current NAAQS. VDEQ also expends resources on necessary endeavors such as improving the Virginia portion of EPA's emissions inventory and modeling platform and analyzing potential effects of proposed rules and federal guidance documents.

3.1.1. 1997 $PM_{2.5}$ NAAQS

On December 17, 2004, EPA designated the metropolitan Washington, D.C. area, of which Northern Virginia is a part, as a nonattainment area for the 1997 $PM_{2.5}$ NAAQS. Since that time, air quality in the D.C. area has improved tremendously due to the effectiveness of many $PM_{2.5}$ precursor control programs. VDEQ submitted, and EPA approved, a redesignation request for this region so that the area is now an attainment/maintenance area for the 1997 $PM_{2.5}$ NAAQS.

3.1.2. 2006 $PM_{2.5}$ NAAQS

On September 22, 2006, EPA promulgated a revised $PM_{2.5}$ NAAQS. The 2006 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.

3.1.3. 2008 Ozone NAAQS

On March 12, 2008, EPA revised both the primary and the secondary NAAQS for ozone to 0.075 ppm. EPA published the final area designations and classifications for this standard on May 21, 2012. EPA designated all areas of the Commonwealth, with the exception of Northern Virginia, as attaining this standard. EPA designated Northern Virginia as nonattainment, with a classification of marginal.

On March 5, 2015, EPA issued the implementation rule for this standard. The implementation rule requires that states implement Reasonably Available Control Technology (RACT) in support of this standard for all major stationary sources within the Ozone Transport Region (OTR). The OTR includes ten jurisdictions within Virginia, and according to this rule, all major stationary sources of VOC or NOx must implement RACT by January 1, 2017. Updates to the regulations are currently in the review process.

3.1.4. 2008 Pb NAAQS

On October 15, 2008, EPA strengthened the NAAQS for lead, revising the level of the health-based standard to 0.15 µg/m^3. On November 22, 2011, EPA published the final Pb designations for the 2008 NAAQS and designated the entire Commonwealth as attainment/unclassifiable since monitoring data showed compliance with the new standard.

3.1.5. 2010 NO_2 NAAQS

On January 22, 2010, EPA finalized a new primary NO_2 NAAQS and set the standard at 100 ppb over a one-hour average. On February 17, 2012, EPA classified all areas of the Commonwealth as attainment/unclassifiable for this standard. EPA may update these classifications once sufficient near-road NO_2 data are available.

3.1.6. 2010 SO_2 NAAQS

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 one-hour basis. 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. EPA issued regulations within the *Federal Register* on August 21, 2015 (80 FR 51052) detailing how facilities may demonstrate compliance with this standard, and VDEQ is working with facilities on this effort.

3.1.7. 2013 $PM_{2.5}$ NAAQS

On January 15, 2013, EPA published in the *Federal Register* a new rule strengthening the NAAQS for $PM_{2.5.}$ On January 25, 2015, EPA designated all of Virginia unclassifiable/attainment for this standard.

3.1.8. 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. The absorption and scattering of light by fine particles causes visibility impairment or haze in these areas. 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, which requires that state, tribal, and federal agencies work together to improve visibility in 156 national parks and wilderness areas.

VDEQ developed a state implementation plan (SIP) to address visibility impairment in the Commonwealth's two Class I areas, the Shenandoah National Park and the James River Face Wilderness Area. EPA approved this plan on June 13, 2012. VDEQ also submitted a progress report that EPA approved on May 2, 2014. The progress report shows visibility is improving and should continue to improve in both the Shenandoah National Park and the James River Face Wilderness area. This progress in visibility improvement is mainly due to the reduced emissions of SO_2 and sulfates from fuel combustion sources.

3.1.9. Control Technique Guidelines

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

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. The CAA requires a state with ozone nonattainment areas 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 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 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.

3.1.10. Stage II Gasoline Vapor Recovery Systems

On May 16, 2012, the EPA Administrator published in the *Federal Register* a notice of final rulemaking determining that onboard refueling vapor recovery (ORVR) systems are in widespread use throughout the motor vehicle fleet. That notice waived the statutory requirement for Stage II vapor recovery systems on gasoline dispensing facilities. EPA finalized guidance on August 7, 2012, describing appropriate methods for removing these requirements from SIPs. Based on the information provided by EPA, VDEQ has submitted documentation to EPA showing that Stage II vapor recovery systems are not needed to maintain or further improve air quality in Virginia. In fact, the calculations show that due to the incompatibility of ORVR systems with some types of Stage II systems, requiring Stage II after certain dates increases emissions to the environment. EPA has approved these submittals, and VDEQ amended the regulations on July 30, 2015 to allow immediate decommissioning of Stage II equipment from gasoline dispensing facilities located in Northern Virginia. A facility must complete

decommissioning in accordance with regulatory requirements. Facilities in the Richmond area will have the same option beginning January 1, 2017; however, some facilities meeting certain criteria may decommission such equipment before then. More information on this rule phase out is available at http://www.epa.gov/airquality/ozonepollution/pdfs/20120807guidance.pdf.

3.1.11. Start Up, Shut Down, and Malfunction Rules

On May 22, 2015, EPA instructed Virginia and other states to update their regulations to ensure CAA requirements are enforceable when emissions units are starting up, shutting down, or malfunctioning (i.e., when excess emissions are likely). EPA determined that Virginia's rules adequately address startup and shutdown periods but required that Virginia update a provision providing an exemption from violation for facilities taking specific measures to address a malfunction. VDEQ is currently considering how best to adjust the associated regulatory language and to revise the SIP. Virginia has 18 months to submit a SIP revision to EPA.

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 undergo 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 must 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. VDEQ issued one PSD permit in fiscal year 2015. The second program is the non-attainment major NSR program, which applies to major sources located in an area designated as nonattainment for one or more NAAQS. A facility in a nonattainment area must apply the Lowest Achievable Emission Rate, which is often more rigorous than BACT, and must obtain offsets for the pollutant for which the area is not in attainment. VDEQ did not issue any nonattainment NSR permits in fiscal year 2015. 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. During the 2015 fiscal year, VDEQ issued 191 minor NSR permits. 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 (tpy) of a criteria pollutant but that do not fit the criteria to be classified as PSD or nonattainment major NSR. VDEQ issued one state major permit in fiscal year 2015. Virginia also has general permits (or permits by regulation) for non-metallic mineral processors and distributed generation. If a facility meets the necessary requirements, the facility may use the general permit process instead of the normal minor NSR permitting process. VDEQ issued 20 general permits during fiscal year 2015.

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 therefore exempt from a major source permitting program. Facilities often use SOPs to place federally and state enforceable

limits on hazardous air pollutants (HAPs) to remain exempt from the federal HAP program. The federal HAP program generally requires the implementation 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). VDEQ issued six SOPs during fiscal year 2015.

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 and applicable regulations 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. VDEQ must issue these permits to sources that are subject to the federal Acid Rain program (CAA Title IV). VDEQ issued seven federal operating permits and 57 operating permit renewals during fiscal year 2015.

VDEQ provides citizens an extensive website on air permitting issues, including active permit application listings and issued operating permits available for review, at http://www.deq.virginia.gov/Programs/Air/PermittingCompliance/Permitting.aspx.

VDEQ provides various forms of compliance assistance to potentially thousands of small businesses throughout the Commonwealth. VDEQ provides these services at no cost to facilities in order to inform, educate, and assist small businesses in complying with environmental regulations. More generally, the Small Business Assistance (SBA) program conducts personal and web-based outreach to small businesses, providing access to various resources including regulatory updates, fact sheets, checklists, brochures, enforcement case assistance, and financial resources. VDEQ maintains the SBA website at http://www.deq.virginia.gov/Programs/Air/SmallBusinessAssistance/SBAPServices.aspx.

3.3. Air Compliance Activities

VDEQ's air compliance program works to identify and address potential violations of applicable state and federal air regulations and laws. Facilities operating within the Commonwealth must be compliant with those regulations and laws to which they are subject, and the focus of the air compliance program is to provide the necessary assistance to return facilities to compliance as expeditiously as possible. These concepts support VDEQ's mission to protect the environment and human health.

To ensure that industry constructs and operates within the boundary of applicable laws and regulations, VDEQ's air compliance program operates in a manner consistent with EPA's 2010 Clean Air Act Stationary Source 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. Often completed through a series of partial compliance evaluations (PCEs), an FCE consists of a comprehensive evaluation of the facility records and equipment associated with pollutant emissions, including the examination of documents detailing throughputs, emissions, testing, and reporting, to determine the facility's overall compliance status. VDEQ reports the compliance status and enforcement activities related to Virginia's regulated facilities to EPA on a periodic basis (approximately weekly). This

information is publicly available on EPA's Environmental Compliance and History Online (ECHO) external website.

Virginia has nearly 3,900 registered air facilities, excluding gasoline service stations in the Richmond area and Northern Virginia). For the 2014 Federal Fiscal Year (October 1, 2013 through September 30, 2014), the air compliance program conducted approximately 6,470 partial and full compliance evaluations, including 824 on-site inspections and 45 stack test observations. As a result, the air compliance program issued 237 formal and informal enforcement actions.

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. In federal fiscal year 2014, VDEQ issued 21 consent orders that resulted in the collection of $282,016 in civil charges.

3.5. Motor Vehicle Inspection and Maintenance Program

Virginia's vehicle inspection and maintenance program (I/M) improves 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 mandates I/M for several areas across the country, including the Northern Virginia area, 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 at 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. 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. Over 29,000 vehicles failed the initial test and received repairs in calendar year 2014.

VDEQ maintains an extensive website to inform station owners and citizens subject to I/M on a variety of topics at http://www.deq.virginia.gov/Programs/AirCheckVirginia.aspx.

3.5.1. Mobile Source Operations Section

The Mobile Source Operations Section (MSOS) of the Northern Virginia Regional Office monitors the performance of the various service stations, certified emissions repair facilities, and licensed emissions inspectors within the I/M program. In calendar year 2014, these stations inspected 848,778 vehicles. MSOS personnel conducted 593 separate audits during that timeframe, including 133 covert audits, of approximately 518 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, owners of high emitting vehicles receive a Notice of Violation (NOV) and must make necessary repairs. Low-income owners may be eligible for repair assistance. Owners of exceptionally clean vehicles receive a clean screen, which constitutes an emission inspection pass. In the first six years of operation, the ORE program identified over 1,900 vehicles as gross emitters and issued over 1,550 clean screen passes. The gross emitters received repairs and passed an emissions test. Otherwise, owners took these vehicles off the road or sold them outside of the Northern Virginia program area. Each year ORE currently observes about 18% of the Northern Virginia fleet that is subject to the I/M program.

The 2012 General Assembly passed legislation expanding the number of vehicles eligible to receive a clean screen. Owners of certain very clean vehicles will have the option of getting a station test or purchasing a clean screen pass. Eventually up to 30% of the cleanest vehicles may be eligible. This enhanced clean screen program will begin by the end of 2015.

4. Emission Estimates and Control Programs

As shown in Figure 4-1, VDEQ projects that anthropogenic emissions of NO_X, $PM_{2.5}$, SO_2, and VOC in Virginia will decrease significantly from 2011 levels even though forecasts estimate that growth in vehicle miles traveled, population, and industry will continue through 2018. These projected reductions are the result of control programs implemented at the federal and state level as well as changing facets in the economy.

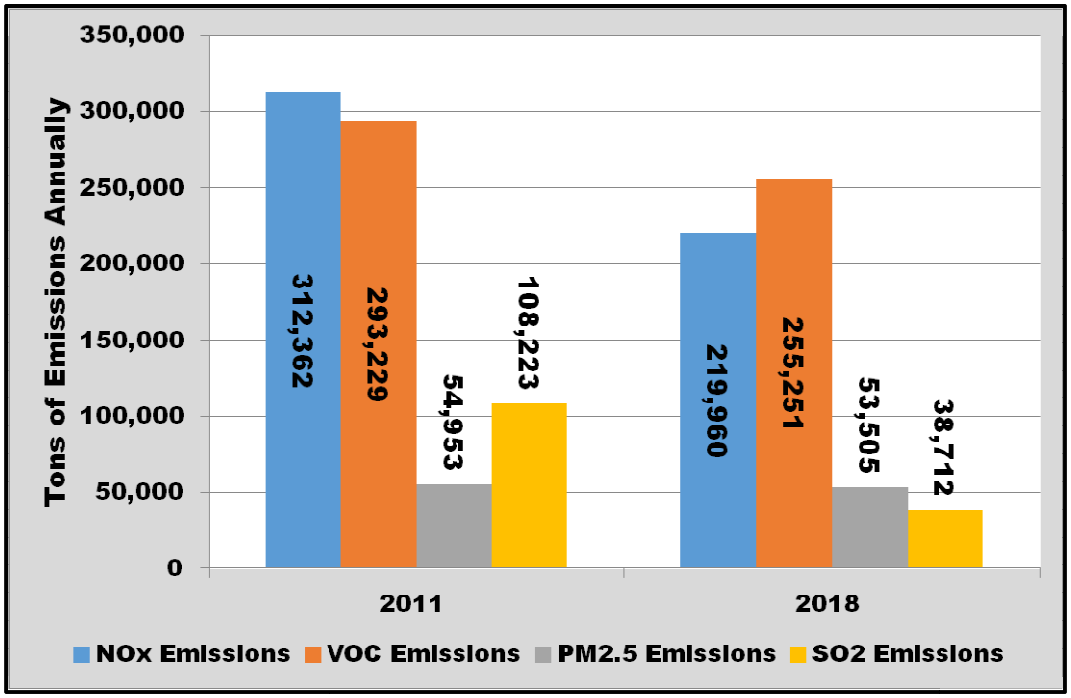

Figure 4-1: Anthropogenic Emission Estimates for Virginia: 2011 and 2018

4.1. Emissions from Electrical Generating Units

Figure 4-2 provides the annual emissions of SO_2 and NO_X from Acid Rain Program electrical generating units located in Virginia. The emission reductions from this source sector are attributable to a number of factors, including control programs such as the Mercury and Air Toxics Rule. Between 2002 and 2014, Virginia emissions and emission rates decrease in this source sector even though utilization rates, depicted by the yellow line in Figure 4-2, remain relatively consistent.

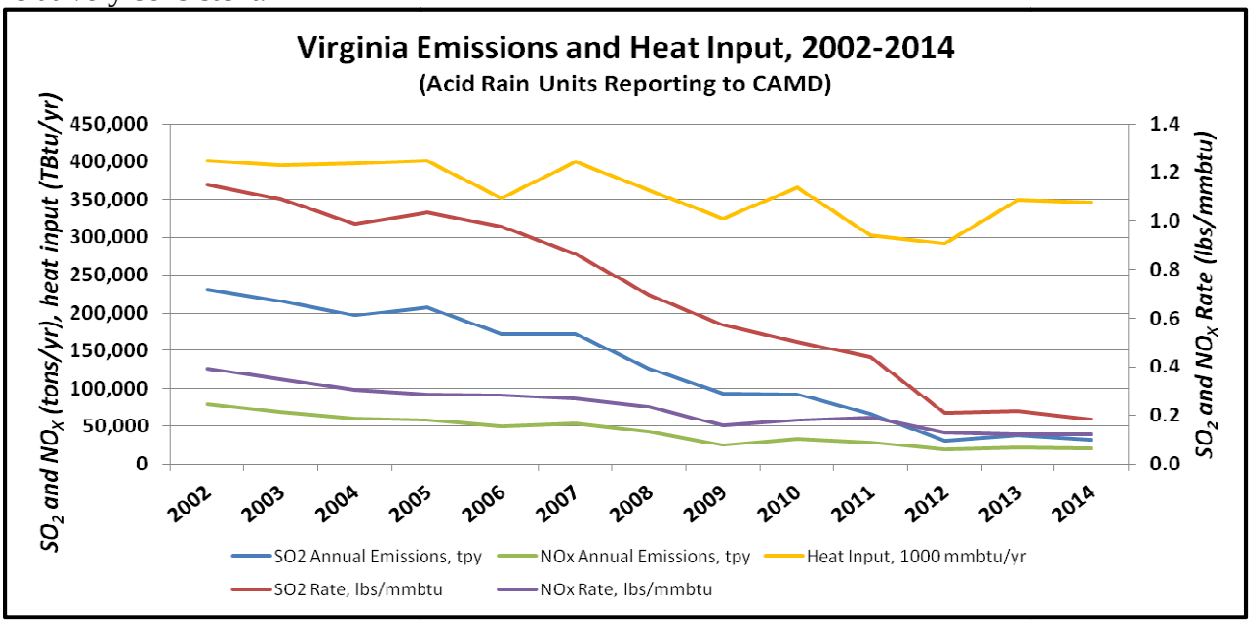

Figure 4-2: Virginia Acid Rain Unit Emissions

As shown in Figure 4-3, state estimates using the Eastern Regional Technical Advisory Committee (ERTAC) tool and federal estimates using the Integrated Planning Model (IPM) project continued emission reductions from this source sector in Virginia. These reductions result from existing control programs and economic factors and are in spite of expected utilization increases by Virginia EGUs in the future years.

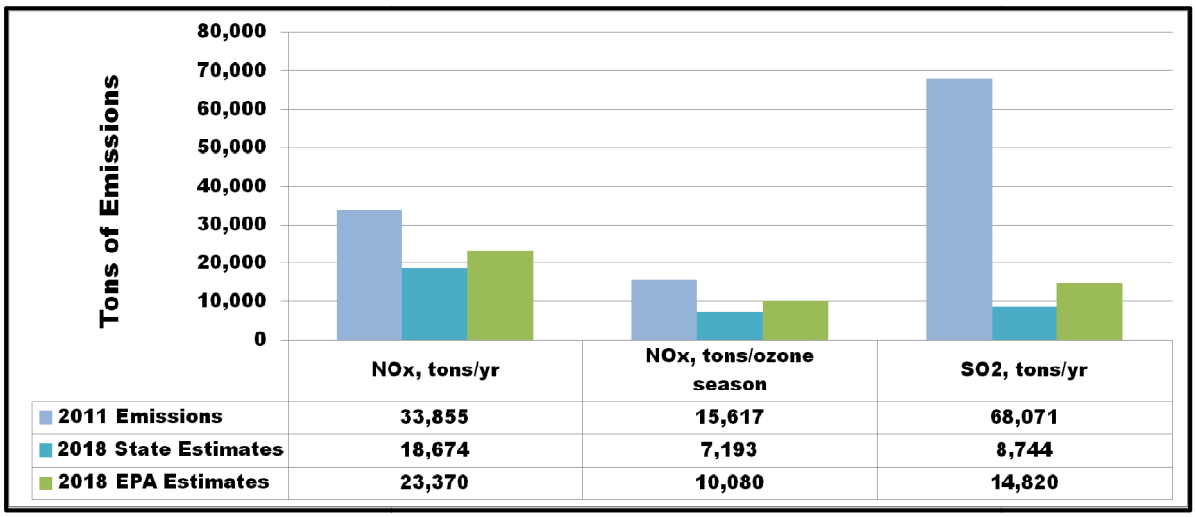

Figure 4-3: Virginia Emission Projections: CAMD EGUs and Cogeneration Facilities

4.1.1. Mercury and Air Toxics Standard

On February 16, 2012, EPA promulgated the National Emission Standards for Hazardous Air Pollutants from Coal- and Oil-Fired Electric Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units. This rule is often referred to as the Mercury and Air Toxics Standard or MATS. The standard applies to 13 electrical generating facilities in Virginia. Sources had until April 16, 2015, to comply with the rule unless granted a one-year extension. On June 29, 2015, the United States Supreme Court ruled EPA did not properly address the cost of the regulation and sent the rule back to the D. C. Circuit Court to be either remanded or vacated. The D.C. Circuit has not yet ruled on the issue. As of the preparation of this report, none of the applicable Virginia facilities has indicated to VDEQ that they intend to discontinue use of their controls. Two facilities, Dominion Chesapeake and American Electric Power (AEP) Glen Lyn, have retired units in accordance with their original plans. AEP Clinch River is continuing the conversion of two of their units from coal to natural gas. EPA provides more information on this rule at http://www.epa.gov/mats/.

4.1.2. Interstate Transport

The CAA requires each upwind state to ensure that it does not interfere with either the attainment of a NAAQS or continued compliance with a NAAQS at any downwind monitor. This section of the CAA, § 110(a)(2)(D)(i)(I), is called the Good Neighbor provision. EPA has implemented a number of rules enforcing the Good Neighbor provision for a variety of NAAQS, including the NOx Budget Trading Program (1990 ozone NAAQS) and CSAPR (1997 ozone NAAQS, 1997 $PM_{2.5}$ NAAQS, and 2006 $PM_{2.5}$ NAAQS). Each of these rules set emissions budgets for the electrical generation sector. EPA is currently working on an update to the CSAPR rule that addresses transport of $PM_{2.5}$, ozone, and precursor emissions from upwind states to downwind monitoring sites for the 2008 ozone NAAQS and the 2012 $PM_{2.5}$ NAAQS. This work may result in emission budget adjustments for Virginia, and these budget adjustments may require further emission reductions from the electrical generation sector. EPA expects to propose this new rule by the end of 2015 and provides more information on this process at http://www.epa.gov/airtransport/ozonetransportNAAQS.html.

4.1.3. 2010 SO_2 NAAQS

The 2010 SO_2 NAAQS focuses attention on emissions from large SO_2 sources, which are predominantly combustion units burning fossil fuels. EPA estimates that large facilities with at least 1,000 tpy of SO_2 accounted for 90% of the total anthropogenic SO_2 emissions in 2011. EPA's implementation rule for the 2010 SO_2 NAAQS, published on August 21, 2015 in the *Federal Register*, may further reduce emissions of SO_2 from the electrical generating sector. EPA addresses the 2010 SO_2 NAAQS on its website at http://www.epa.gov/airquality/sulfurdioxide/implement.html.

4.2. Emissions from Title V Industrial Facilities

Title V facilities are operations that have the potential to emit at least 100 tpy of any criteria pollutant. In the 10 Virginia jurisdictions located within the OTR, the VOC potential to emit threshold is 50 tpy for Title V applicability. Title V facilities are generally industrial in nature. Figure 4-4 shows annual VOC emissions from Virginia Title V facilities. These data

demonstrate significant VOC reductions from 2000 to 2014, approximately 37%. These reductions have occurred for a number of reasons. Some facilities have closed. Others have installed controls or have upgraded equipment, resulting in emissions reductions. Controls derived from the various MACT regulations reduce VOC emissions as a co-benefit of HAP controls. EPA provides more information on HAP emissions and MACT regulations at http://www.epa.gov/ttn/atw/. New industrial facilities must control emissions using BACT, and application of BACT assures that growth in the industrial sector does not negatively affect air quality.

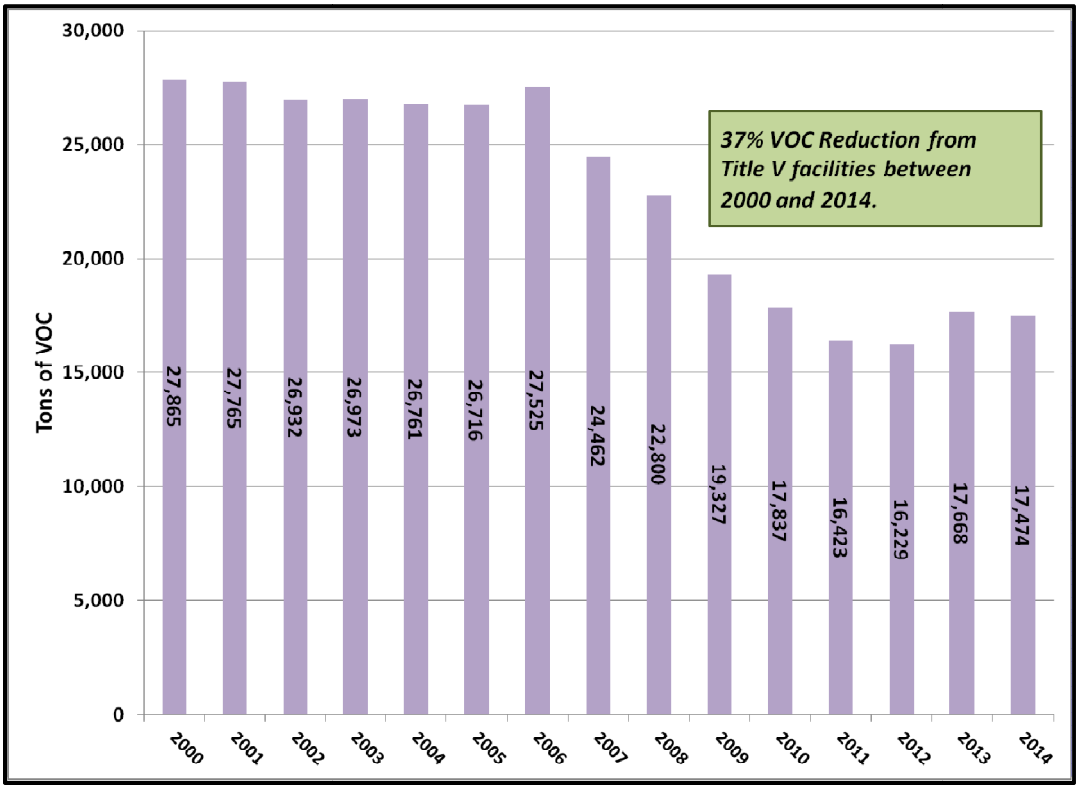

Figure 4-4: Virginia VOC Emissions From Title V Facilities, 2000-2014

4.3. Mobile Source Programs

According to EPA's 2011 National Emissions Inventory (Version 2), NO_X emissions from the mobile source sector accounted for 46% of the entire anthropogenic NOx inventory. This fact is important because NO_X is the predominant cause of ozone in this part of the United States. VDEQ developed mobile emission estimates for 2018 using MOVES2014, EPA's most recent inventory tool for this purpose. Figure 4-5 provides this information and shows that by 2018, statewide NOx and VOC emissions from the mobile sector should drop 52% and 44%, respectively, from 2011 estimates. These reductions are largely due to federal vehicle control programs and cleaner fuel requirements.

On April 28, 2014, EPA finalized a new rule that lowers emissions standards from on-road engines beginning with model year 2017 vehicles. This rule, known as the Tier 3 standards, also reduces the amount of sulfur in gasoline beginning in 2017. Reducing the sulfur content of gasoline allows manufacturers to equip vehicles with better controls so that new vehicles may

meet the lower engine standards. The cleaner fuel also reduces emissions from existing vehicles because the catalytic converters on existing vehicles will operate more efficiently. EPA provides more information on this rule at http://www.epa.gov/otaq/tier3.htm.

Between 2011 and 2018, current mobile sector projections include an increase in vehicle miles traveled (VMT) of approximately 16%, 93,643 million VMT in 2018 as compared to 80,974 million VMT in 2011. However, recent data show that VMT in Virginia has been relatively steady since 2007 even though the population of citizens with driver's licenses increased during this timeframe. For example, in Figure 4-5, 2007 estimates of VMT are about 82,077 million VMT while 2013 estimates of VMT are about 80,767 million VMT, statewide. This stability in the VMT data could be partially attributable to the recession of 2009 and to the driving habits of young adults, which may change as they age. Regardless of why annual VMT in Virginia has not grown since 2007, the 2018 emission projections show large decreases in emissions in spite of a strong growth estimate for VMT.

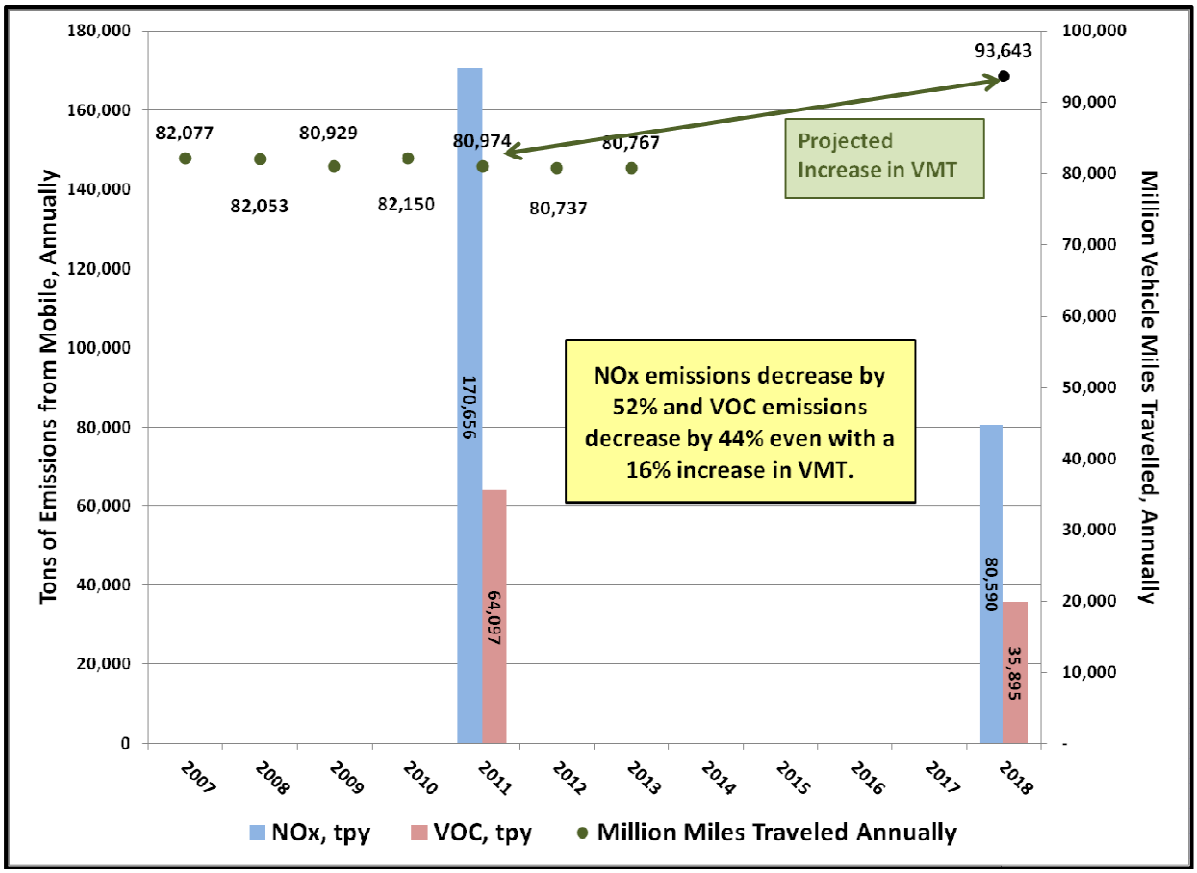

Figure 4-5: Mobile Emission Estimates and VMT

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, diesel generator sets, gasoline generator sets, marine engines, and locomotive engines. In 2011, this source sector accounted for 32% of the anthropogenic NO_X emissions in Virginia, according to EPA's 2011 National Emissions Inventory (Version 2).

Federal regulations 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 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.

4.4.1. Engine Controls

EPA promulgated a series of control programs in 40 CFR Part 89, Part 90, Part 91, Part 92, and Part 94. These regulations phased in engine emission limitations in compression ignition engines, spark-ignition nonroad engines, marine engines, and locomotive engines through 2012. Environmental benefits continue into the future as consumers replace older engines with newer engines that have improved fuel economy and that have more stringent emissions standards. These regulations also required the use of cleaner fuels. EPA has extensive information available on these programs at this website: http://www.epa.gov/nonroad/.

4.4.2. Emission Control Area Designation and Commercial Marine Vessels

On April 14, 2014, new standards for ocean going vessels became effective and apply to ships constructed after 2015. These requirements also mandate the use of significantly cleaner fuels by all large ocean-going vessels when operated near the coast lines. The cleaner fuels lower SO_2 emission rates as well as emissions of other criteria pollutants since the engines operate more efficiently on the cleaner fuel. Additional information on this program is available at this website: http://www.epa.gov/otaq/oceanvessels.htm#emissioncontrol.