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 2016

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Commonly Used Abbreviations

AQM	Office of Air Quality Monitoring
CAA	Clean Air Act
CMS	Compliance Monitoring Strategy
CO	Carbon monoxide
CSAPR	Cross State Air Pollution Rule
CTG	Control Technique Guideline
DEQ	Virginia Department of Environmental Quality
ECHO	Enforcement and Compliance History Online
EPA	Environmental Protection Agency
FCE	Full Compliance Evaluation
GVWR	Gross Vehicle Weight Rating
HAP	Hazardous Air Pollutant
I/M	Motor Vehicle Inspection and Maintenance Program
MACT	Maximum Achievable Control Technology
MATS	Mercury and Air Toxics Standard
$\mu g/m^3$	Micrograms per cubic meter
MSOS	Mobile Source Operations Section
NAAQS	National Ambient Air Quality Standard
NO_2	Nitrogen dioxide
NO_X	Nitrogen oxides
NSR	New Source Review
ORE	On-Road Emissions Program
ORVR	On Board Refueling Vapor Recovery
OTR	Ozone Transport Region
Pb	Lead
PCE	Partial Compliance Evaluation
$PM_{2.5}$	Particulate matter not more than 2.5 angstroms in diameter
ppb	Parts per billion
ppm	Parts per million
PSD	Prevention of Significant Deterioration
RACT	Reasonably Available Control Technology
RBIS	Risk Based Inspection System
SAPCB	State Air Pollution Control Board
SBA	Small Business Assistance
SIP	State Implementation Plan
SO_2	Sulfur dioxide
SOP	State Operating Permit
tpy	Tons per year
VDH	Virginia Department of Health
VOC	Volatile Organic Compounds
VPM	Virginia Productivity Measurements

1. Executive Summary

This report was prepared by the Virginia Department of Environmental Quality (DEQ) 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 federal and state air quality programs.

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 United States Environmental Protection Agency (EPA) National Ambient Air Quality Standards (NAAQS) in 2015. EPA finalized the 2015 ozone NAAQS on October 26, 2015 (80 FR 65292) and set this new standard at 0.070 parts per million (ppm). EPA expects to designate areas based on this new standard in 2017.

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 litigation on EPA's Clean Power Plan, updates to the $PM_{2.5}$ NAAQS, new Regional Haze regulations, and changes to monitoring network requirements.

1.3. Summary of Annual Air Division Activities

Monitoring Locations:	**37**	**On Site Inspections:**	**864**
Monitoring Instruments:	**122**	**Enforcement Actions:**	**226**
Minor Source Permits Issued:	**172**	**Vehicles Inspected:**	**871,429**
PSD Permits Issued:	**2**	**Vehicles Failed:**	**26,928**
General Permits Issued:	**30**	**Inspection Station Overt Audits:**	**593**
State Operating Permits Issued:	**4**	**Inspection Station Covert Audits:**	**174**
Federal Operating Permits Issued:	**30**	**Consent Orders Issued:**	**29**
Compliance Evaluations (all):	**6,540**	**Civil Charges Collected:**	**$465,403**

2. Status of Air Quality in the Commonwealth of Virginia

DEQ 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 protect public health and welfare. 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. In 2015, ozone air quality met federal standards across the Commonwealth for the first time.

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 $PM_{2.5}$. This gas is also 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 processes. 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

DEQ's Office of Air Quality Monitoring (AQM) maintains an extensive air quality monitoring network throughout the Commonwealth. Approximately 122 instruments at 37 sites monitored ambient air quality across Virginia during 2015 - 2016. 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 DEQ website at http://www.deq.virginia.gov/Programs/Air/AirMonitoring/Publications.aspx.

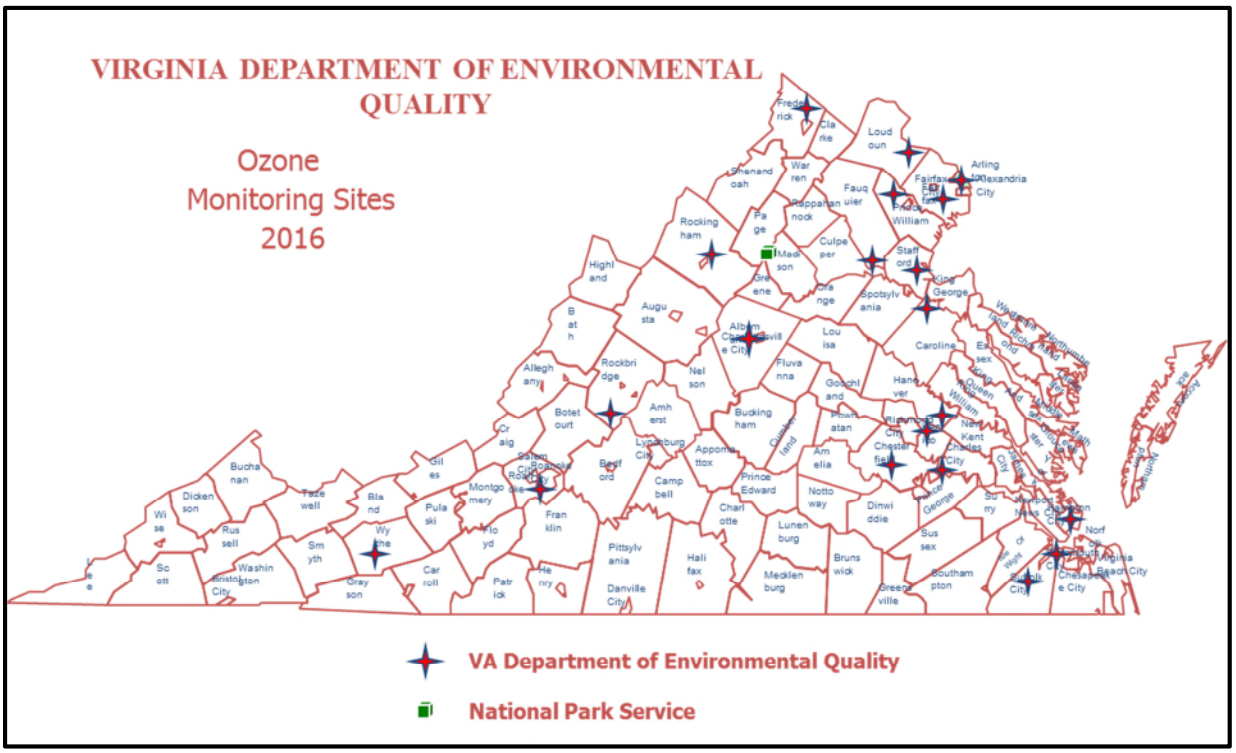

Figure 2-1: Virginia Ozone Monitoring Network

2.2.1. Community Air Monitoring Study (Suffolk)

Pursuant to House Bill 1625 (2011), DEQ is conducting an air monitoring study at fumigation sites to provide data to the Virginia Department of Health for its assessment of health impacts. DEQ formed a stakeholder group to help communicate the results of the study to the public. DEQ 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 has been put on hold due to the relocation of both fumigation facilities. Sampling will resume once the facilities have been completely relocated.

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, DEQ must install three such monitoring stations. DEQ has installed two of the three monitoring stations. The Richmond station at Bryan Park is adjacent to the I-95 and I-64 interchange and has been running since October 2013. The northern Virginia site is located in Springfield on Backlick Road and began sampling in April 2016. The data from these sites are

available on DEQ's webpage. DEQ expects to install a similar station at the I-64/I-264 interchange in Hampton Roads in the near future.

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 emission reductions associated with a variety of implemented control programs. Emissions from nearby states have also decreased, so that less pollution is transported into the Commonwealth from upwind areas.

Figure 2-2 provides the three year average ozone design value concentrations for monitors in the Hampton Roads, Richmond-Petersburg, Fredericksburg, Roanoke, and Northern Virginia areas. These areas and monitors demonstrate compliance with the 2008 ozone NAAQS of 0.075 ppm (75 ppb) as well as the 2015 ozone NAAQS of 0.070 ppm (70 ppb). Other areas of the Commonwealth follow similar trends.

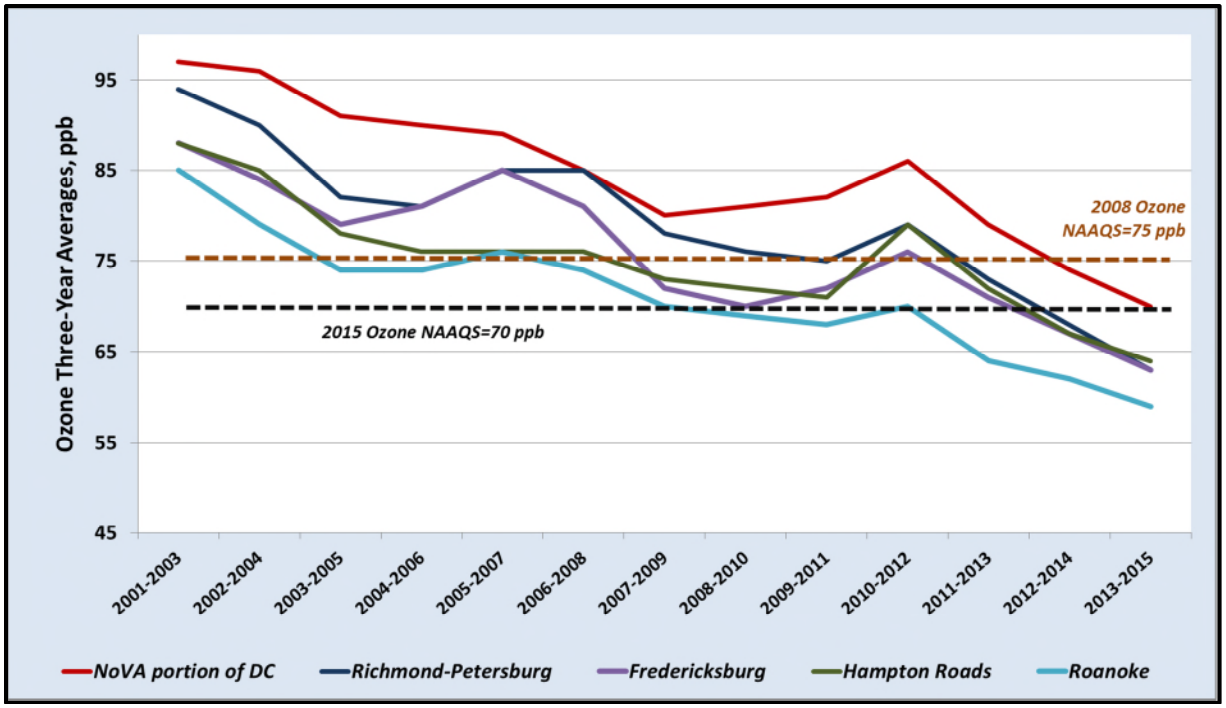

Figure 2-2: Ozone Concentrations

Figure 2-3 provides the $PM_{2.5}$ daily design value concentrations for Hampton Roads, Richmond-Petersburg, and Northern Virginia. Figure 2-4 provides the annual average $PM_{2.5}$ design value concentrations for these three areas. Concentrations of $PM_{2.5}$ follow these trends across the Commonwealth and comply with the 2006 $PM_{2.5}$ daily NAAQS of 35 $\mu g/m^3$ and the 2012 $PM_{2.5}$ annual NAAQS of 12.0 $\mu g/m^3$.

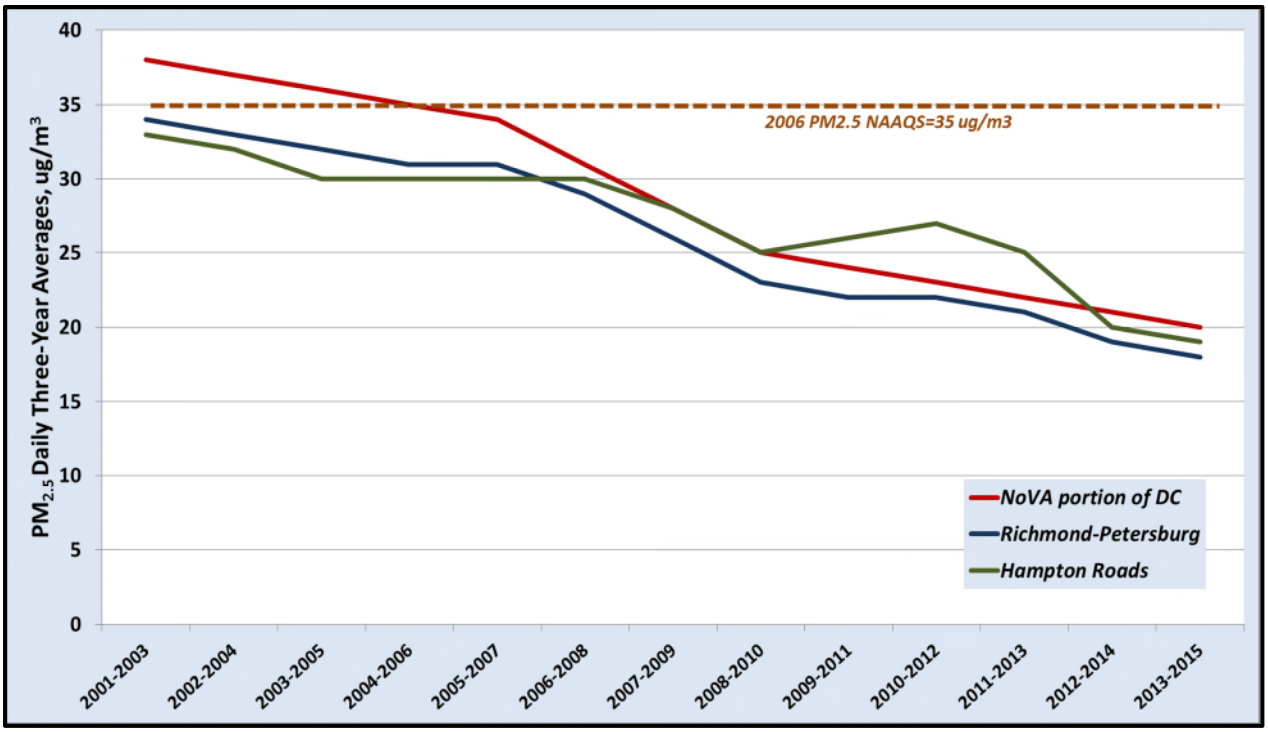

Figure 2-3: Daily $PM_{2.5}$ Averages

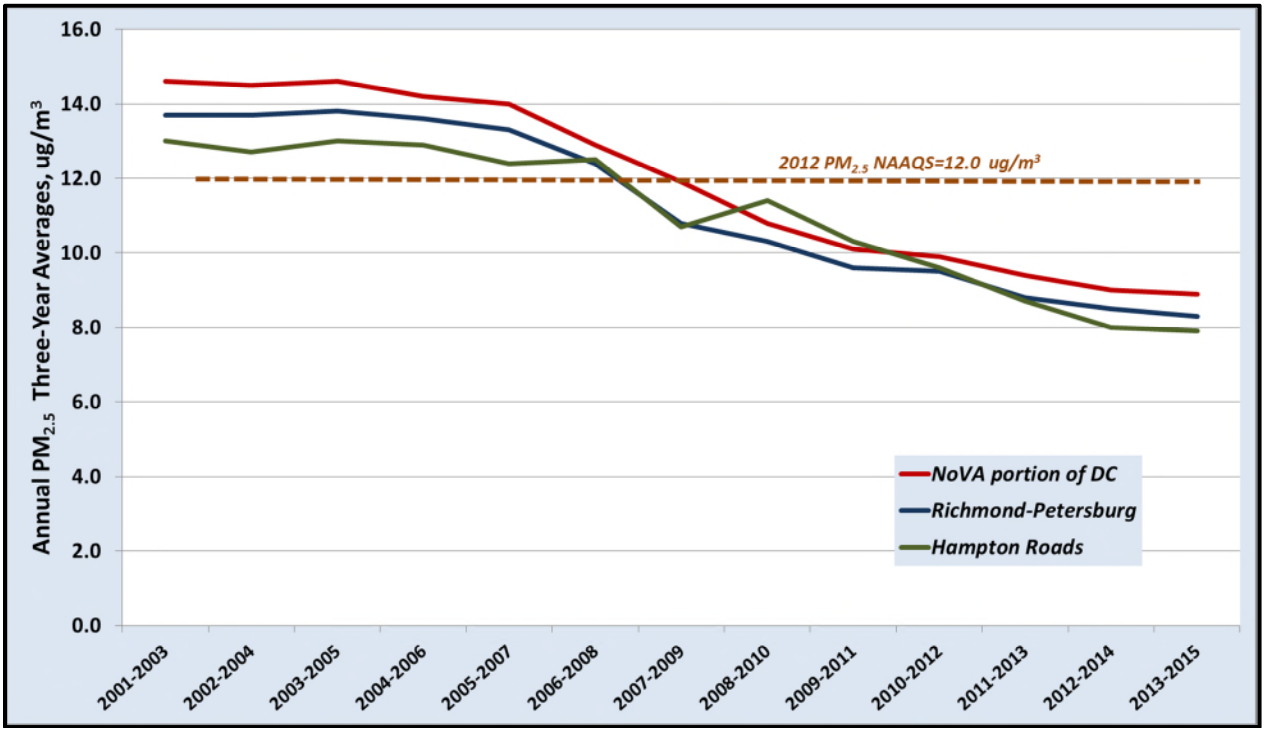

Figure 2-4: Annual $PM_{2.5}$ Averages

Figure 2-5 provides NO_2 measurements and compares this data to the 2010 NO_2 NAAQS of 100 ppb. Likewise, Figure 2-6 provides SO_2 measurements and compares this data to the 2010 SO_2 NAAQS of 75 ppb, and Figure 2-7 provides CO measurements for comparison against the 1971

CO NAAQS of 9 ppm. All monitors demonstrate compliance with the federal NAAQS for these pollutants. The downward trends shown in these figures should continue into the future due to forthcoming emission reductions associated with implemented and new control programs.

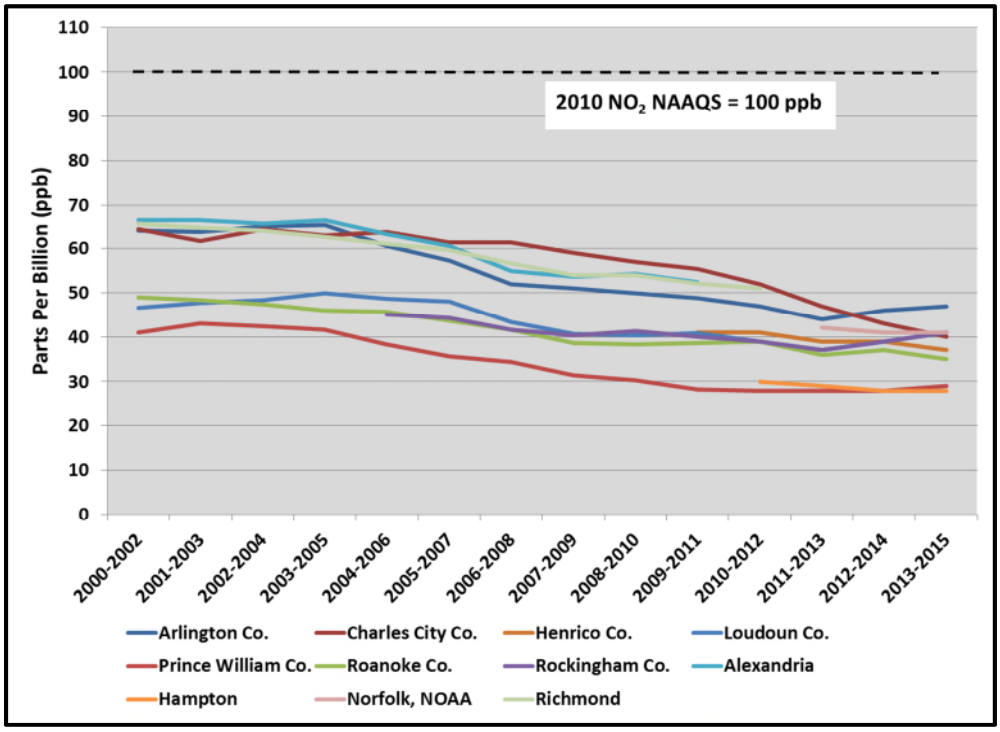

Figure 2-5: Virginia NO_2 Measurements

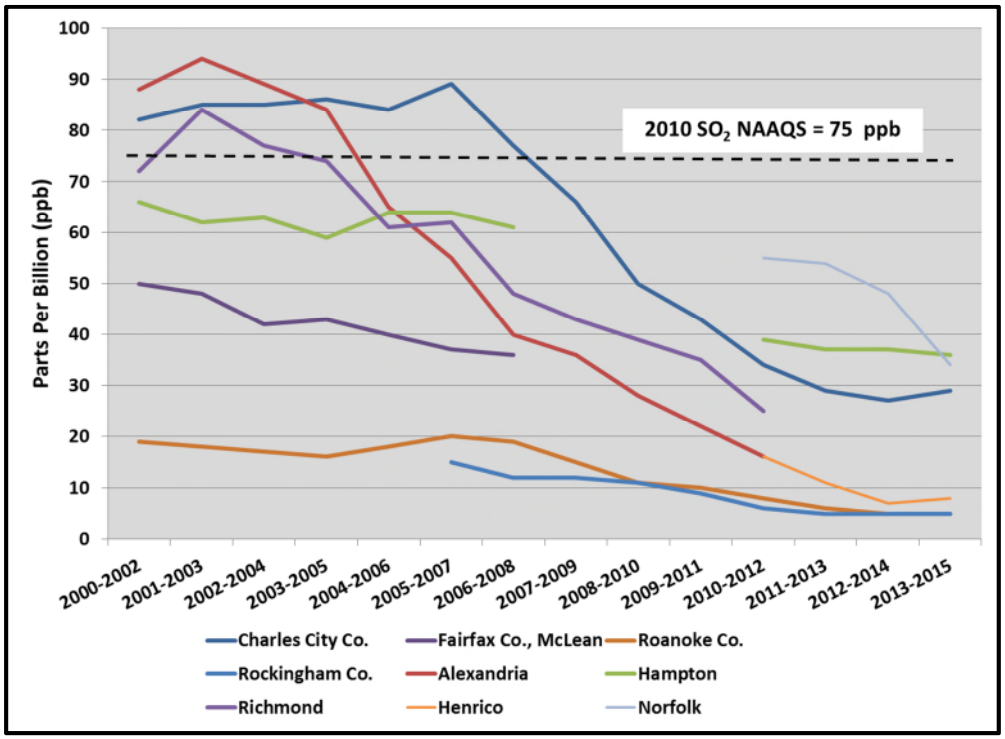

Figure 2-6: Virginia SO_2 Measurements

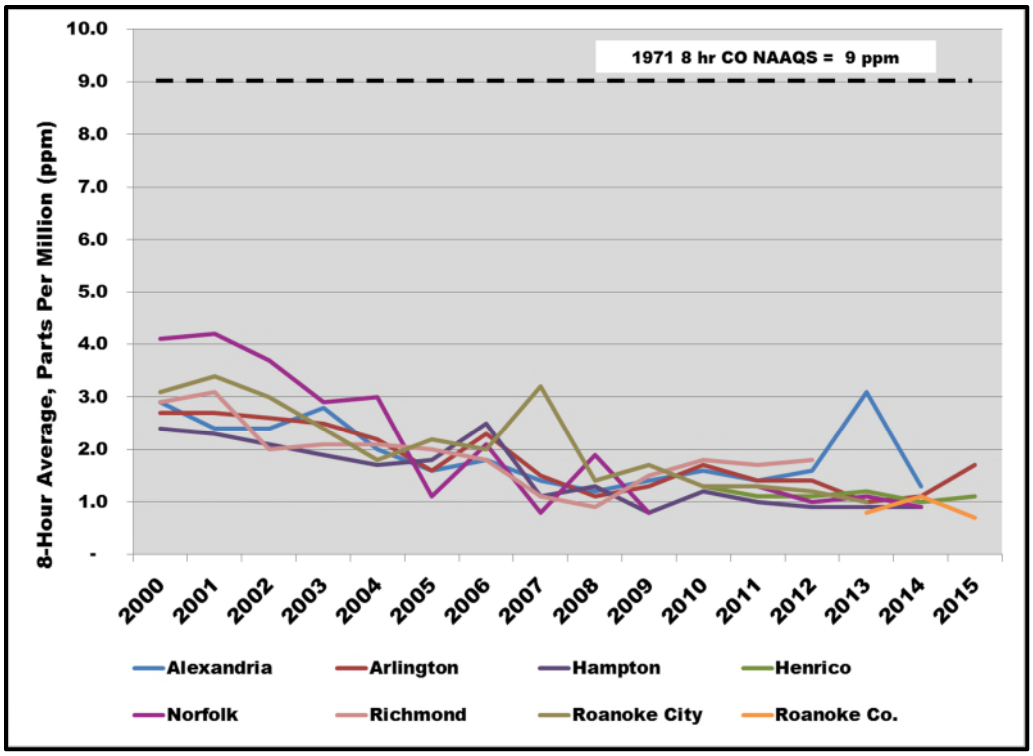

Figure 2-7: Virginia CO Measurements

3. Air Pollution Control Overview

This overview describes planning, permitting, compliance, enforcement, and other initiatives. Each section provides information on significant current policy issues related to each category.

3.1. Air Quality Planning and Regulatory Initiatives

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

3.1.1. CO NAAQS

On August 31, 2011 (76 FR 54294), EPA issued a decision to retain the existing primary CO NAAQS, which were originally promulgated in 1971. The existing primary standards are 9 ppm measured over an eight-hour period and 35 ppm measured over a one-hour period. EPA revised the CO monitoring network requirements to include near-road CO monitoring sites in large urban areas. All jurisdictions within the Commonwealth are attaining these standards and are designated either attainment areas or attainment/maintenance areas for the 1971 CO NAAQS.

3.1.2. 2006 $PM_{2.5}$ NAAQS

On October 17, 2006 (71 FR 61144), EPA promulgated a revised $PM_{2.5}$ NAAQS. The 2006 standard revised the daily $PM_{2.5}$ standard from 65 µg/m^3 to 35 µg/m^3 and retained the $PM_{2.5}$ annual standard of 15.0 µg/m^3. On November 13, 2009 (74 FR 58688), EPA published the final

designations for the 2006 daily $PM_{2.5}$ standard, and all areas of the Commonwealth were designated as attainment or unclassifiable.

3.1.3. 2008 Ozone NAAQS

On March 27, 2008 (73 FR 16436), 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 (77 FR 30088). 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. Due to improvements in air quality, DEQ is working with the other states included in the Metropolitan Washington D.C. nonattainment area (the District of Columbia and Maryland) to develop and submit a redesignation request for this standard.

On March 6, 2015 (80 FR 12264), 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. DEQ is working with EPA and regulated facilities to determine and implement source specific RACT requirements.

3.1.4. 2008 Lead NAAQS

On November 12, 2008 (73 FR 66964), EPA strengthened the NAAQS for lead (Pb), revising the level of the health-based standard to 0.15 $\mu g/m^3$. On November 22, 2011 (76 FR 72097), 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 February 9, 2010 (75 FR 6474), EPA revised the primary NO_2 NAAQS and set the standard at 100 ppb over a one-hour average. On February 17, 2012 (77 FR 9532), 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 22, 2010 (75 FR 35520), 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 air quality monitoring data, federal guidance, and the lack of source-specific modeling results, on June 2, 2011, DEQ made recommendations to the EPA Administrator that all areas in Virginia be classified as “unclassifiable” for this standard. EPA published a data requirements rule for the 2010 SO_2 NAAQS on August 21, 2015 (80 FR 51052). This rule required that DEQ submit to EPA a letter identifying each facility with at least 2,000 tons per year (tpy) of SO_2 emissions in 2014. The rule required that the letter be submitted by January 15, 2016. Additionally, this rule required that DEQ submit another letter to EPA identifying the methodology each facility intended to use to demonstrate compliance with the

2010 SO_2 NAAQS. DEQ complied with both mandates. DEQ will continue to work with regulated facilities and EPA to meet all requirements in this regulation in a timely manner.

3.1.7. 2012 $PM_{2.5}$ NAAQS

On January 15, 2013 (78 FR 3086), EPA published a rule strengthening the NAAQS for $PM_{2.5}$. This rule left the daily value initially published in 2006 unchanged at 35 µg/m^3 but reduced the annual threshold from 15.0 µg/m^3 to 12.0 µg/m^3. On January 15, 2015 (80 FR 2206), EPA designated all of Virginia unclassifiable/attainment for this standard.

3.1.8. 2015 Ozone NAAQS

On October 26, 2015 (80 FR 65292), EPA revised the NAAQS for ozone. This revision lowered the standard from 0.075 ppm to 0.070 ppm. DEQ is working to develop recommendations for designations and classifications under this standard, and these recommendations are due to EPA by October 1, 2016.

3.1.9. Regional Haze

Section 169 A of the Clean Air Act (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 cause visibility impairment (haze) in these areas. Sources and activities that emit fine particles and their precursors, such as NO_X, SO_2, VOC, and ammonia, 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.

DEQ 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 (77 FR 35287). DEQ also submitted a progress report that EPA approved on May 2, 2014 (79 FR 25019). 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.

In concert with other southeastern states, DEQ has begun working on the next Regional Haze SIP submittal, which will be due to EPA between 2018 and 2021.

3.1.10. 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 DEQ promulgates a regulation implementing the requirements of the CTG for a product or source category, DEQ must submit the regulation to 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.

DEQ 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 area. However, the survey results indicate that, for some categories, potentially affected facilities may be operating in the Northern Virginia area. Therefore DEQ developed regulations for offset lithographic printing and letterpress printing; industrial cleaning solvents; miscellaneous metal and plastic parts coatings; and miscellaneous industrial adhesives. DEQ sent these final regulations to EPA on February 1, 2016.

3.1.11. Stage II Gasoline Vapor Recovery Systems

On May 16, 2012 (77 FR 28772), EPA published 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 EPA requirements, DEQ submitted documentation to EPA showing that Stage II vapor recovery systems are not needed to maintain or further improve air quality in Virginia. 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 approved these submittals, and DEQ amended the Virginia regulations accordingly, with an effective date of July 30, 2015. The amended regulation allows immediate decommissioning of Stage II equipment from gasoline dispensing facilities located in northern Virginia. 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. Facilities must

complete all decommissioning in accordance with regulatory requirements. More information on the phase-out of Stage II is available at http://www.deq.virginia.gov/programs/air/permittingcompliance/compliance.aspx.

3.1.12. Startup, Shutdown, and Malfunction

On June 12, 2015 (80 FR 33840), EPA issued a mandate (SIP Call) instructing Virginia and other states to update their regulations to ensure that CAA requirements are enforceable when emissions units start up, shut down, or malfunction (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. Virginia's regulation was modified accordingly and became effective June 1, 2016.

3.2. Air Permitting Activities

DEQ 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.

DEQ 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. DEQ issued two PSD permits in fiscal year 2016. The second program is the nonattainment 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. DEQ did not issue any nonattainment NSR permits in fiscal year 2016. 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 2016 fiscal year, DEQ issued 172 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 tpy of a criteria pollutant but that do not fit the criteria to be classified as PSD or nonattainment major NSR. DEQ issued one state major permit in fiscal year 2016. Virginia also has general permits (i.e., 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. DEQ issued 30 general permits during fiscal year 2016.

DEQ issues two types of operating permits: state operating permits (SOPs) and federal operating permits that include federal operating (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 SOPs at any time, and DEQ may issue SOPs as necessary (due to a modeled or actual exceedance of a NAAQS or to meet a CAA requirement). DEQ issued four SOPs during fiscal year 2016.
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. DEQ must issue these permits to sources that are subject to the federal Acid Rain program (CAA Title IV). DEQ issued 5 federal operating permits and 25 operating permit renewals during fiscal year 2016.

DEQ 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.

3.3. Air Compliance Activities

DEQ's air compliance program identifies and addresses potential violations of applicable regulations and laws to ensure compliance for facilities operating within the Commonwealth. The focus of the air compliance program is to expeditiously return facilities to compliance, supporting DEQ's mission to protect the environment and human health. To do so, air compliance personnel perform partial compliance evaluations (PCEs) and full compliance evaluations (FCEs). These actions include onsite inspections, test observations, and comprehensive evaluations of the facility records and equipment associated with pollutant emissions, including examination of documents detailing throughputs, emissions, testing, and reporting.

DEQ's air compliance program operates in accordance with EPA's 2014 Clean Air Act Stationary Source Compliance Monitoring Strategy (CMS). This strategy primarily targets the largest potential emitters of air pollution for an FCE at a minimum recommended frequency of once every two years. Depending on available resources, DEQ's air compliance program also targets smaller potential emitters under its Risk-Based Inspection Strategy (RBIS). This strategy allows flexibility during inspection planning. Regional offices may target facilities for an FCE based on the likelihood of noncompliance or in response to sector initiatives.

Virginia has nearly 3,750 registered air facilities, excluding gasoline service stations in the Richmond area and Northern Virginia. For the 2015 Federal Fiscal Year (October 1, 2014 through September 30, 2015), the air compliance program conducted 6,540 compliance evaluations, including 864 on-site inspections and 52 stack test observations. As a result, the air compliance program issued 226 formal and informal enforcement actions. DEQ reports compliance and enforcement activities related to Virginia's regulated facilities to EPA on a weekly basis. This information is publicly available on EPA's Environmental Compliance and History Online (ECHO) website: https://echo.epa.gov/.

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 DEQ to achieve compliance is 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 2015, DEQ issued 29 consent orders that resulted in the collection of $465,403 in civil charges.

3.5. Small Business Assistance

DEQ provides various forms of compliance assistance to potentially thousands of small businesses throughout the Commonwealth. DEQ 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. DEQ maintains the SBA website at http://www.deq.virginia.gov/Programs/Air/SmallBusinessAssistance/SBAPServices.aspx.

3.6. 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 requiring them to be fixed as a prerequisite to vehicle registration within a given nonattainment 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 geographic location. DEQ's decentralized I/M program 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. 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. Almost 27,000 vehicles failed the initial test and received repairs in calendar year 2015. DEQ maintains an extensive I/M website at http://www.deq.virginia.gov/Programs/AirCheckVirginia.aspx.

3.6.1. Mobile Source Operations Section

The Mobile Source Operations Section (MSOS) of the DEQ 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 2015, these stations inspected 871,429 vehicles. MSOS personnel conducted 593 separate audits during that timeframe, including 174 covert audits, of approximately 554 emission inspection facilities.

3.6.2. On-Road Emissions Monitoring Program

As required by the CAA, each I/M 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 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 8 years of operation, the ORE program identified over 2,200 vehicles as gross emitters and issued over 1,725 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 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 began in early 2016.

4. Emission Estimates and Control Programs

As shown in Figure 4-1, DEQ 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 economic factors.

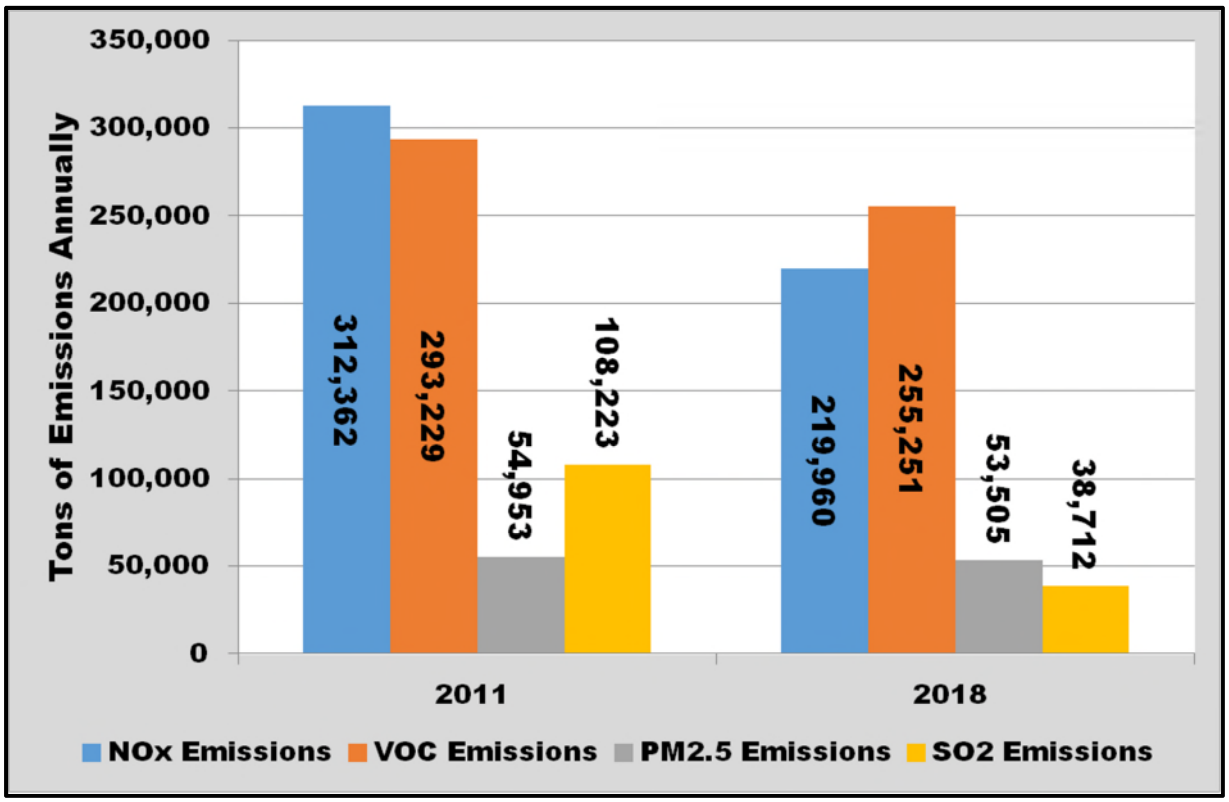

Figure 4-1: Anthropogenic Emission Estimates for Virginia: 2011 and 2018

4.1. Emissions from Electrical Generation

Figure 4-2 provides the annual emissions of SO_2 and NO_X from Acid Rain Program electrical generating units located in Virginia. These units are the largest fossil fuel-fired equipment in the Commonwealth. Emission reductions from this source sector are attributable to a number of factors, including control programs such as the federal Mercury and Air Toxics Rule, retirement of older, high-emitting units, and the construction and operation of new, very low-emitting units. Between 2002 and 2015, Virginia emissions and emission rates decreased in this source sector even though utilization rates, depicted by the yellow line in Figure 4-2, remained relatively consistent.

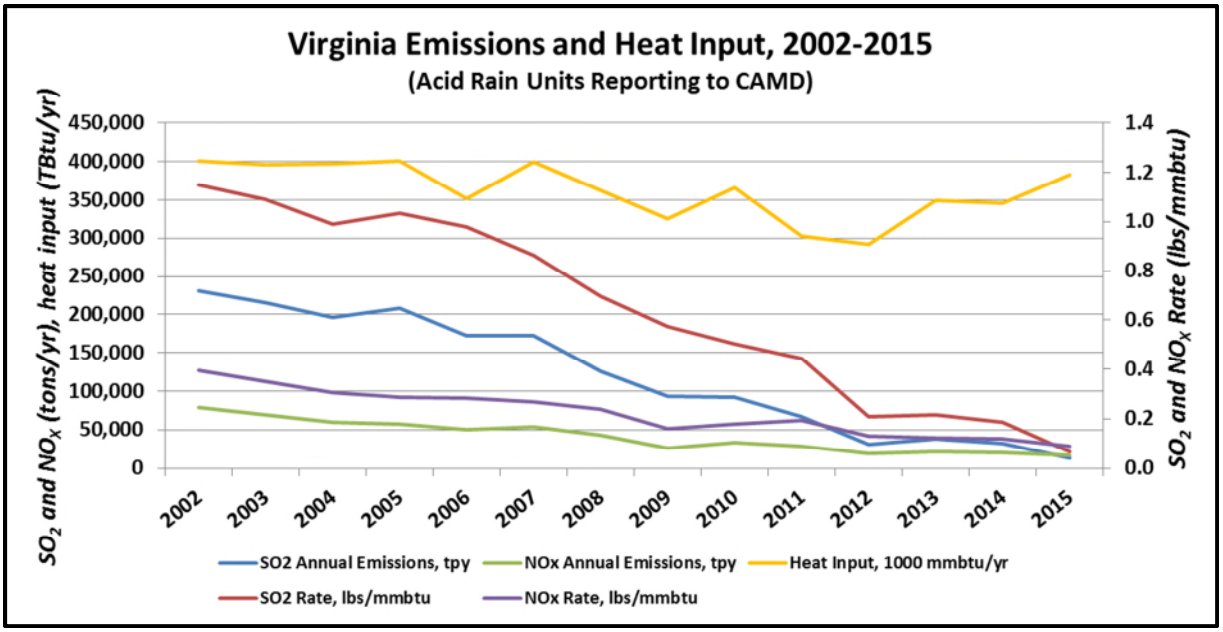

Figure 4-2: Virginia Acid Rain Unit Emissions

4.1.1. Mercury and Air Toxics Standard

On February 16, 2012 (77 FR 9304), 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 (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 for control installation or an additional extension for reliability reasons. Yorktown Power Station received an extension through April 15, 2017, due to reliability concerns. EPA provides more information on this rule at http://www.epa.gov/mats/. Virginia implements the MATS rule via its state regulations which adopt the federal standards by reference.

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), CSAPR (1997 ozone NAAQS, 1997 $PM_{2.5}$ NAAQS, and 2006 $PM_{2.5}$ NAAQS), and the CSAPR update (2008 ozone NAAQS). Each of these rules sets emissions budgets for the electrical generation sector. EPA issued the CSAPR update addressing the 2008 ozone NAAQS on September 7, 2016. This work will reduce emissions in the 22 affected states, Virginia included. EPA provides more information on this process at https://www.epa.gov/airmarkets/final-cross-state-air-pollution-rule-update. EPA is now working on amendments to this rule to address the 2015 ozone NAAQS.

4.2. 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. On April 28, 2014 (79 FR 23414), 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.

4.3. 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, these source sectors accounted for 22% 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.

4.3.1. 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 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/.

4.3.2. Emission Control Area Designation and Commercial Marine Vessels

On April 4, 2014, new standards for ocean-going vessels became effective and applied 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: https://www3.epa.gov/otaq/oceanvessels.htm