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To: The Honorable Timothy M. Kaine
Members of the General Assembly

From: David K. Paylor

Date: October 1, 2009

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

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In accordance with 10.1-1307.G of the Virginia Code, the Department of Environmental Quality has completed its annual report on Air Quality and Air Pollution Control Policies of the Commonwealth of Virginia for 2009.

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 2008 and ozone levels during the 2009 ozone season were significantly better than in previous years.

This report is being made available at 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 Angela Jenkins, Policy Manager, at (804) 698-4268.

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

A Report to the Honorable Timothy M. Kaine, Governor and the General Assembly of Virginia

Virginia Department of Environmental Quality

October 2009

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Commonly Used Abbreviations

AQI	Air Quality Index
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
CO2	Carbon Dioxide
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
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
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
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
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
$PM_{10\text{-}2.5}$	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
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
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 compliance and air permitting programs, and briefly summarizes the federal, state, and local air quality programs being implemented.

1.1. Air Quality in the Commonwealth

Air quality in Virginia continues to improve. The air quality standards the Commonwealth must attain, however, continue to become more stringent. In 2008, the Environmental Protection Agency (EPA) published a lower National Ambient Air Quality Standard (NAAQS) for ozone that may prove challenging for some Virginia localities to meet. In 2008 EPA also published a much lower NAAQS for lead. Virginia will most likely meet the lead standard, but the new standard will require additional monitoring for industrial facilities that in the past have not been required to monitor. Earlier this year EPA proposed a new NAAQS for nitrogen dioxide (NO_2). This proposed standard may require road-side monitoring to determine human exposure to mobile source related NO_2 emissions.

1.2. Air Quality Policies in the Commonwealth

VDEQ's planning activities for the 2008 ozone NAAQS are on-going. This new ozone standard is much more stringent than prior standards and, at this time, some areas in the Commonwealth are unable to meet the new standard. EPA also is reviewing the 2008 ozone NAAQS to determine if any changes to the standard need to be made.

Efforts toward meeting Clean Air Act (CAA) requirements continue to be affected by recent decisions of the U.S. Court of Appeals for the D.C. Circuit. These decisions affected two EPA rules: the Clean Air Interstate Rule (CAIR) and the Clean Air Mercury Rule (CAMR). The court vacated and then subsequently remanded CAIR to EPA for revision consistent with the court's ruling. CAMR was closely related to CAIR and designed to address mercury emissions from coal-fired utility boilers. The court vacated CAMR, and EPA is evaluating the control requirements for mercury emissions under § 112 of the CAA pursuant to the court's decision. VDEQ awaits guidance from EPA regarding air quality issues in the absence of these rules.

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 sulfur dioxide (SO_2) in Virginia were meeting all of EPA's NAAQS in 2008. Virginia continued to experience problems in 2009 with summertime ozone levels. Ozone air quality in the summer of 2009, however, was significantly better than in previous summers. In addition to favorable meteorology during the summer of 2009, the emission reductions achieved through various vehicle and power plant air pollution control programs certainly played a part in this air quality improvement.

2.1. Monitoring Network

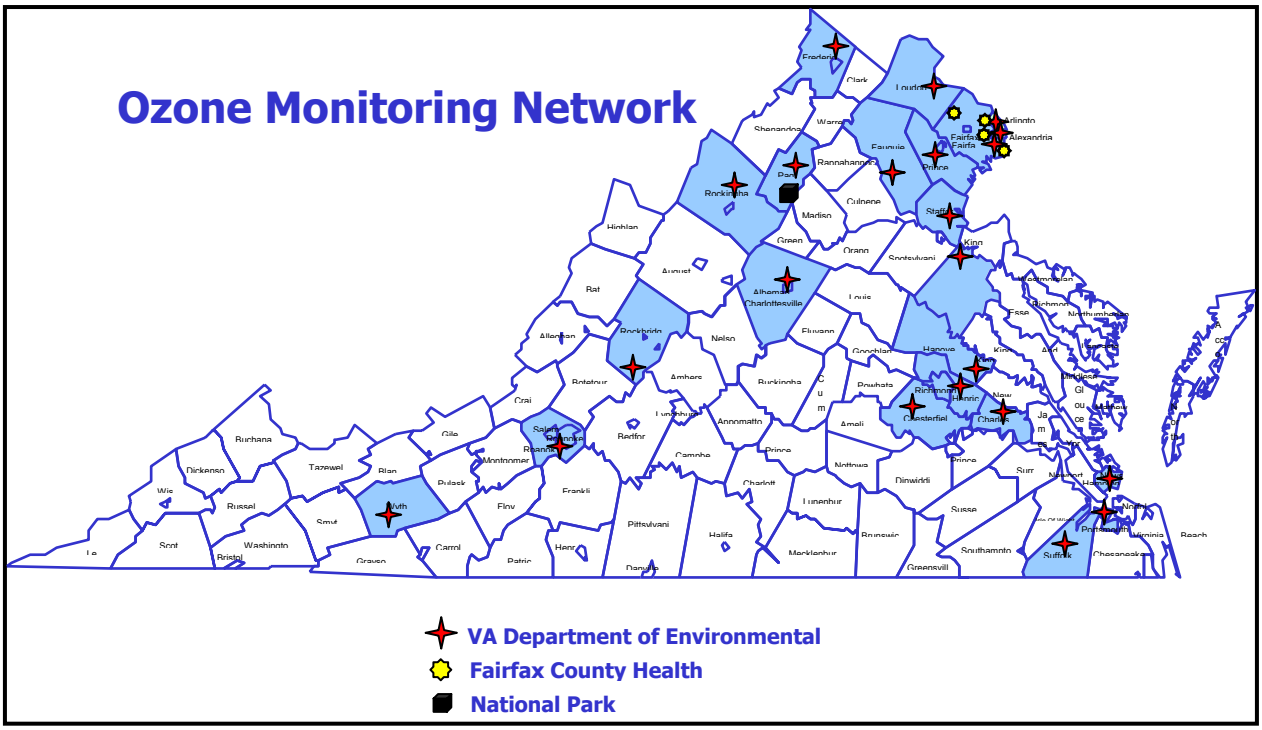


Figure 2-1: Virginia Ozone Monitoring Network

VDEQ maintains an extensive air quality monitoring network throughout the Commonwealth. Ambient air quality was measured by approximately 127 instruments at 47 sites during 2008-09. Figure 2-1 shows the various ozone monitoring sites in Virginia. All monitoring sites were established in accordance with EPA's siting criteria contained in Appendices D and E of Title 40, Part 58 of the Code of Federal Regulations, and conform to EPA guidance documents and generally accepted air quality monitoring practices. All data reported for the Virginia air quality monitoring network were quality assured in accordance with requirements contained in 40 CFR

Part 58, Appendix A. These data are published annually in the Virginia Ambient Air Monitoring Data Report and are available from the VDEQ website at www.deq.virginia.gov/airmon.

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 improvement in air quality. Figure 2-2, below, shows annual $PM_{2.5}$ averages for monitors in the Richmond-Petersburg area. Other areas of the Commonwealth follow a similar trend.

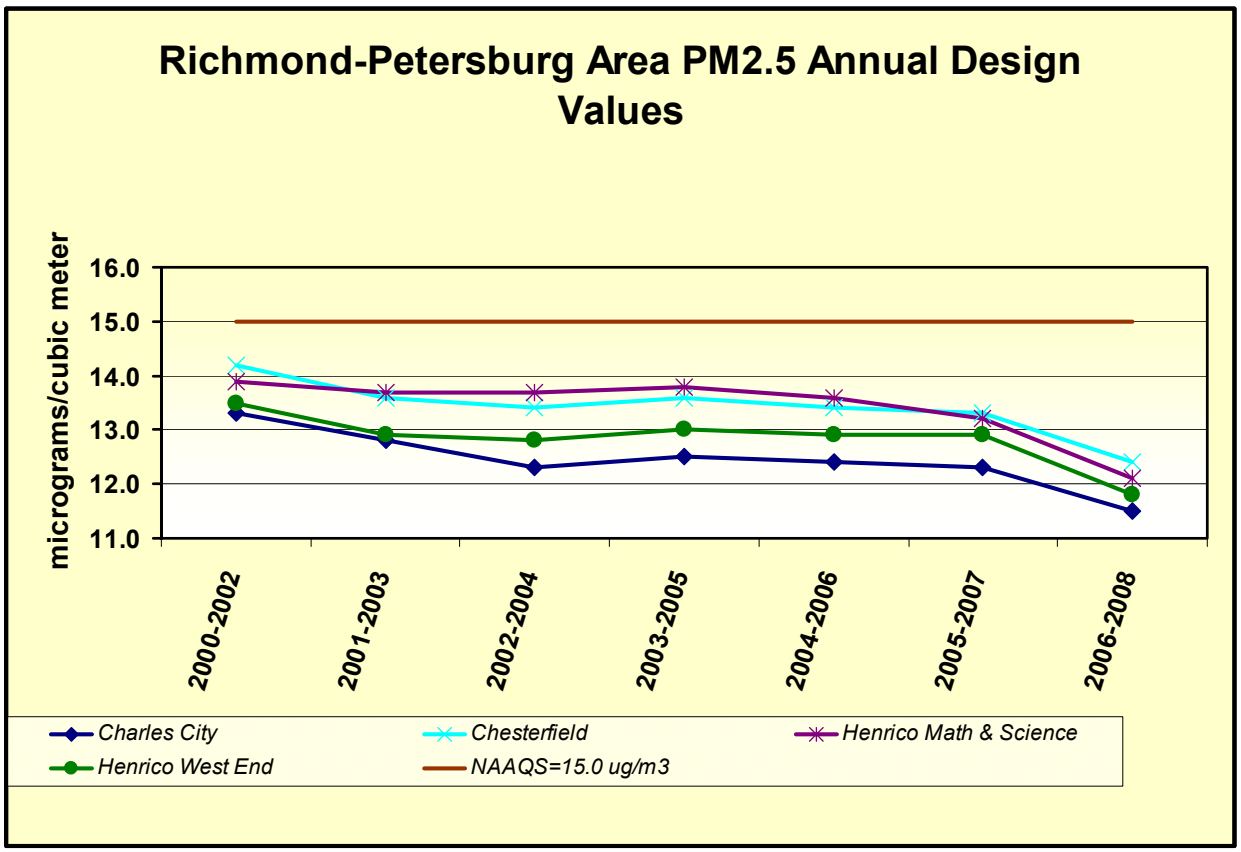


Figure 2-2: Richmond-Petersburg Area $PM_{2.5}$ Annual Design Values

For the 24-hour $PM_{2.5}$ data, the monitors across the Commonwealth have generally registered a pattern of decreasing values, and all monitors are in compliance with the 35 ug/m^3 standard. Figure 2-3 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 $PM_{2.5}$.

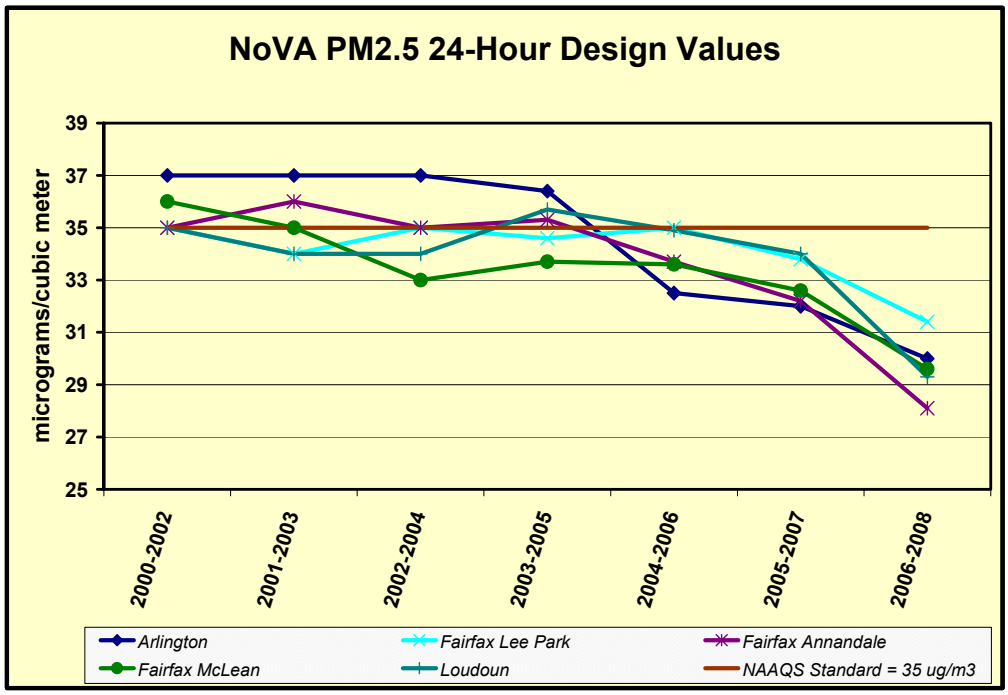


Figure 2-3: Northern Virginia 24-Hour $PM_{2.5}$ Air Quality

Ozone trends continue to show improvement in air quality. Four areas of the Commonwealth, however, are above the new 0.075 ppm 2008 ozone NAAQS standard. These areas are Fredericksburg, Tidewater, Richmond-Petersburg, and Northern Virginia. Figure 2-4 through Figure 2-8 show data trends from these areas.

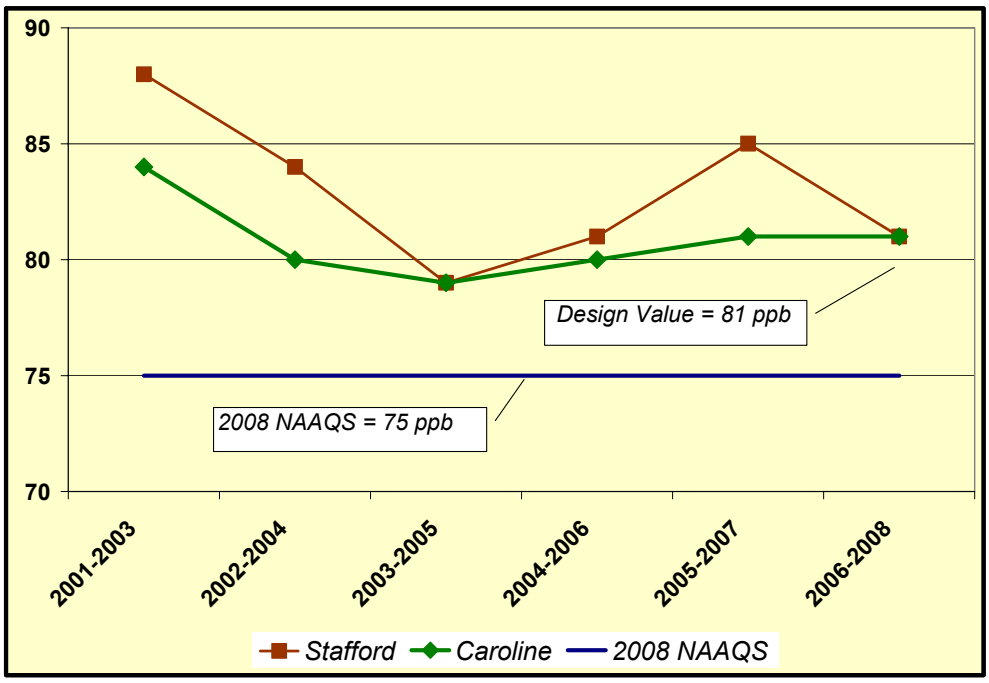


Figure 2-4: Fredericksburg 2006-2008 Ozone Air Quality

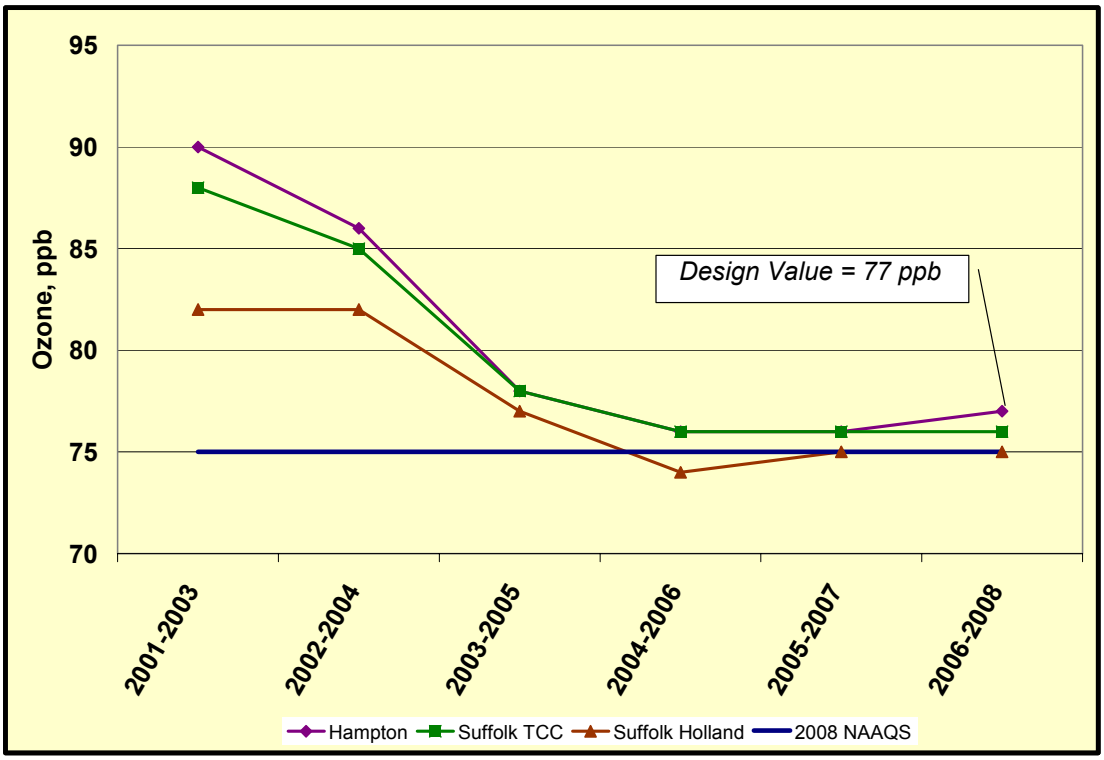


Figure 2-5: Tidewater 2006-2008 Ozone Air Quality

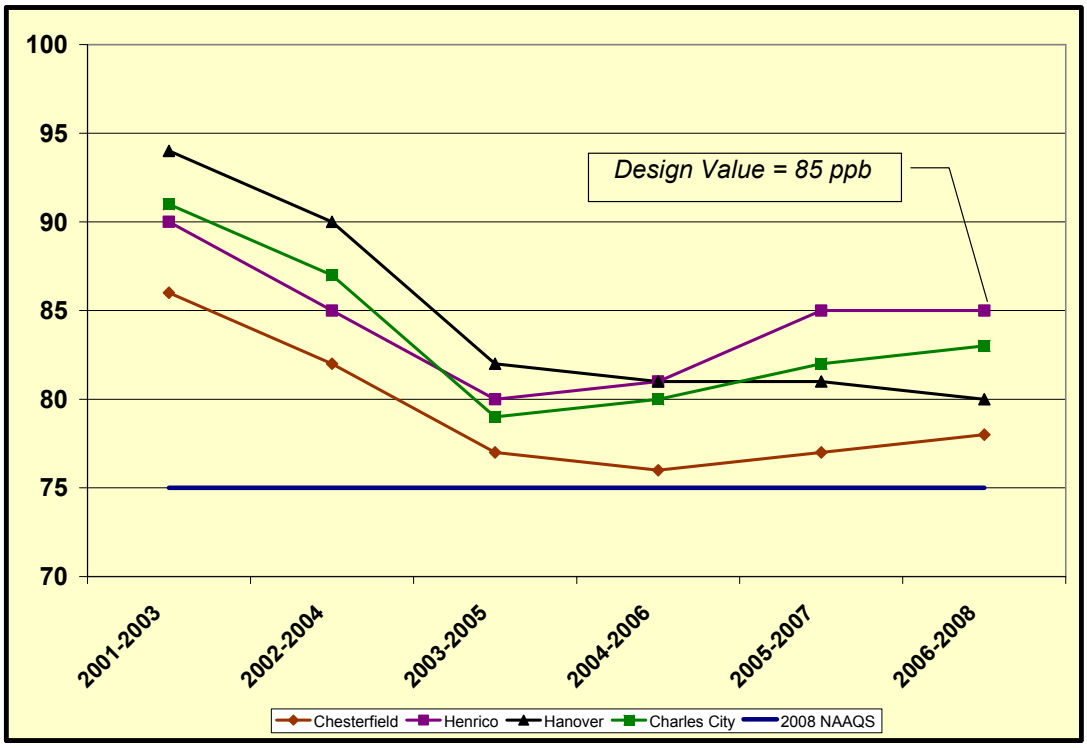


Figure 2-6: Richmond-Petersburg Ozone Air Quality

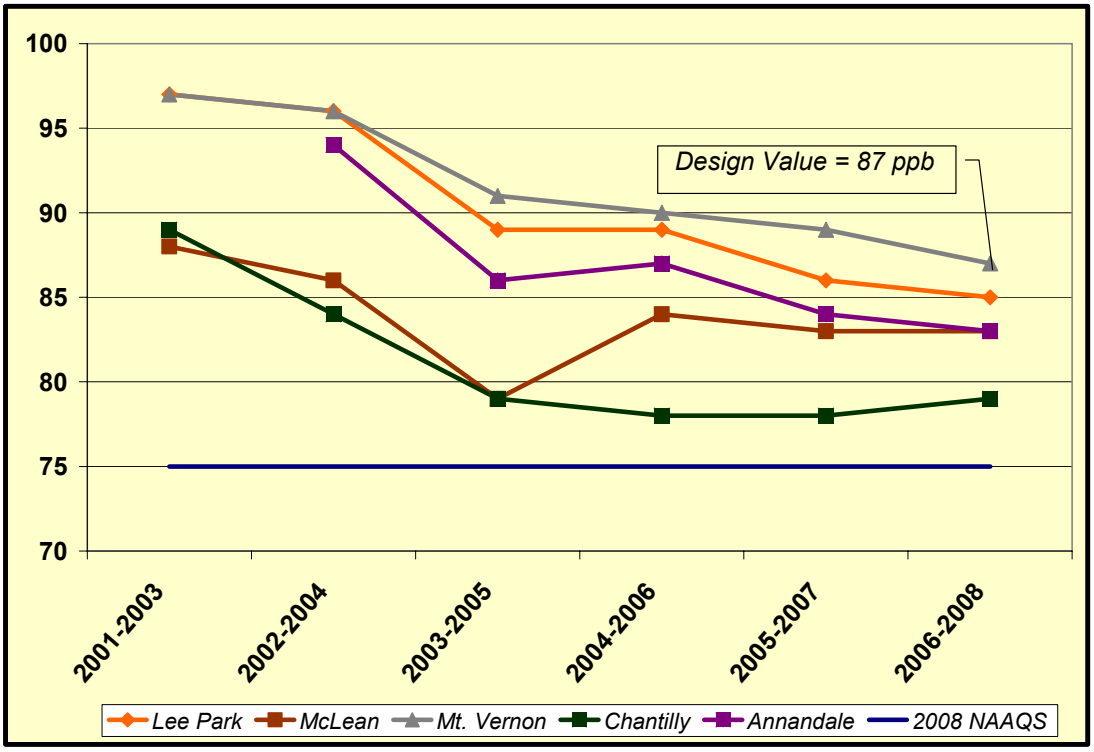


Figure 2-7: Fairfax County Ozone Air Quality

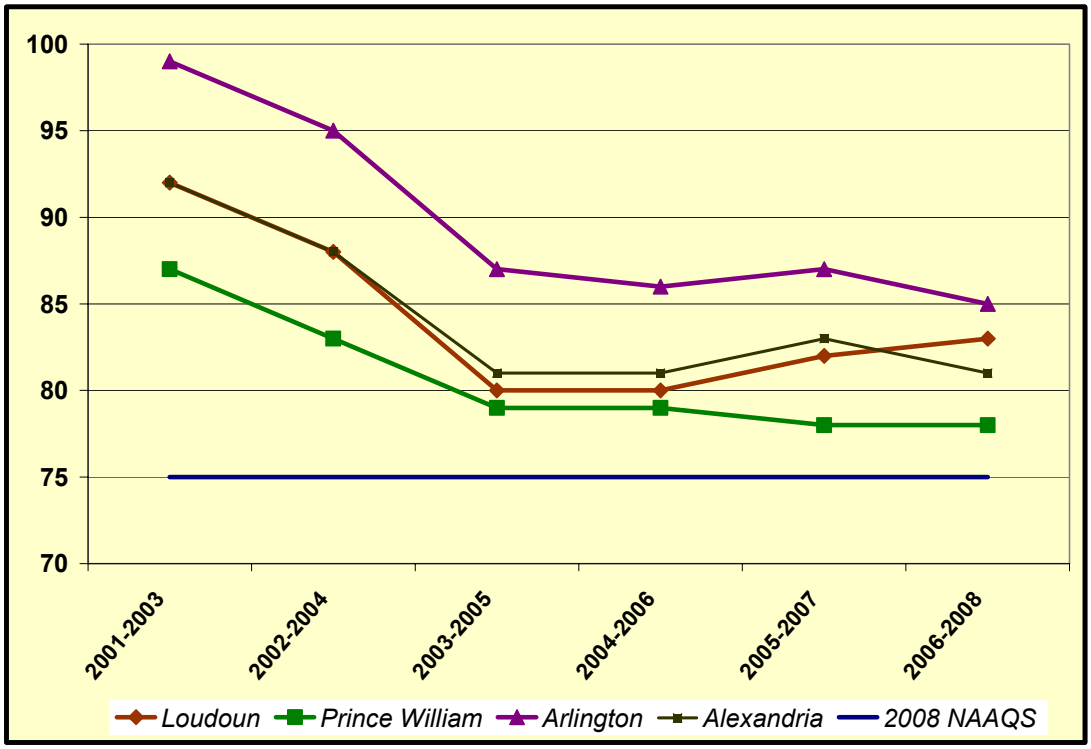


Figure 2-8: Northern Virginia Ozone Air Quality

2.3. Hopewell Air Toxics Study

VDEQ's Office of Air Quality Monitoring recently completed a study of air toxics in Hopewell. This study commenced in 2006, and the formal study was completed on November 1, 2008. Additional monitoring was conducted from November – June 2009. 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. 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. The data gathered from this study have been sent to VDEQ's Office of Risk Assessment to be used in a risk analysis. A final report of the results will include additional monitoring of the chemical acrolein to determine if this pollutant raises any concerns relative to state health standards. The Office of Air Quality Monitoring is performing additional formaldehyde monitoring as a result of the Hopewell study to determine the background levels of this chemical.

2.4. NATTS Site

VDEQ installed a new National Air Toxics Trend Site (NATTS) at the Math and Science Innovation Center monitoring station in eastern Henrico County. This addition expands the site's toxic monitoring capabilities, and data from this site is 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 and expanded instrumentation. EPA performed an audit of this site and determined that the site is constructed and operated in a manner consistent with all NATTS program requirements.

2.5. Air Monitoring in Northern Virginia

Effective July 1, 2009, the Fairfax County Department of Environmental Health established a one-year transition period for the complete shutdown of Fairfax County's air monitoring network. The county is maintaining the ozone monitors and the $PM_{2.5}$ monitors through July 1, 2010. At that time, VDEQ will assume responsibility for the monitoring network in Fairfax County. VDEQ will complete a monitoring plan for the Northern Virginia area prior to the beginning of the ozone monitoring season in 2010. Evaluation and establishment of the revised monitoring network in Northern Virginia will require significant resources during the planning phase. However, this exercise should allow VDEQ to ensure that the Northern Virginia monitoring network provides the best possible coverage given the resources available.

2.6. 2008 Lead NAAQS and Lead Monitoring

In October 2008, EPA established a new NAAQS for lead. This NAAQS reduced the standard for lead to 0.15 ug/m^3, making this NAAQS ten times more stringent than the previous lead NAAQS. The lead NAAQS also requires additional monitoring, including the installation of monitors near facilities that emit more than one ton of lead annually. In addition, the NAAQS requires the installation and operation of population-specific monitors.

VDEQ has evaluated available historical lead monitoring data, and these data indicate that Virginia's air quality will likely attain the 2008 lead NAAQS. Due to the monitoring specifications contained in the NAAQS, however, VDEQ may be required to install and operate source-specific lead monitors at the following facilities:

- Jewell Coal and Coke, Buchanan County
- Steel Dynamics d/b/a Roanoke Electric Steel, Roanoke
- GE Winchester Lamp, Frederick County

Based on data gathered from archived samples, which indicate that lead concentrations in Virginia are well beneath the 2008 lead NAAQS at these sites, VDEQ has requested that EPA waive some or all of these source-specific monitoring requirements. EPA has not yet responded to this request and has not yet published guidance on the implementation of this NAAQS. On July 22, 2009, EPA announced it would reconsider portions of the ambient monitoring requirements for lead. Specifically, EPA is reconsidering whether additional monitoring near industrial sources of lead is warranted and whether the monitoring requirements for urban areas need further revision. VDEQ's recommendations for attainment designations regarding this new NAAQS are due to the EPA Administrator in October 2009.

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 continues to be challenging due to the confluence of deadlines for compliance with the 1997 standards for $PM_{2.5}$ and ozone; the promulgation of the 2006 $PM_{2.5}$ NAAQS; the promulgation of the 2008 ozone NAAQS; the promulgation of the 2008 lead NAAQS; and the statutory deadlines for the Regional Haze program. Other initiatives, including the development and submittal of various CAA infrastructure requirements and the ongoing issues surrounding CAA §126

petitions to alleviate out-of-state air quality impacts from Virginia facilities, however, also continue to require attention and resources.

3.1.1. Control Technique Guidelines

As required by §183(e) of the CAA, EPA conducted a study of volatile organic compounds (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. Section 183(e) of the CAA directs EPA to list for regulation those categories of products that account for at least 80% of the VOC emissions, on a reactivity-adjusted basis, from consumer and commercial products in ozone nonattainment areas and to divide the list of categories to be regulated into four groups. Any regulations issued under §183(e) must be based on ``best available controls'' (BAC), which is defined as “the degree of emissions reduction that the Administrator determines, on the basis of technological and economic feasibility, health, environmental, and energy impacts, is achievable through the application of the most effective equipment, measures, processes, methods, systems or techniques, including chemical reformulation, product or feedstock substitution, repackaging, and directions for use, consumption, storage, or disposal.''

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 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 it must modify existing regulations or create new regulations 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 SIP within one year from signature of the CTG.

EPA has issued four groups of standards under §183(e) of the CAA. These are described below:

- 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 currently 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. VDEQ has begun work on these regulations, and the notices of intended regulatory action (NOIRA) for this work have been prepared.

3.1.2. 1997 NAAQS for Ozone

Ground-level ozone is the primary constituent of smog. Ozone is not usually emitted directly into the air. At ground level, ozone is created by a chemical reaction between oxides of nitrogen (NO_X) and VOC in the presence of sunlight. Sunlight and hot weather may cause ground-level ozone to form in harmful concentrations in the air.

In 1997, EPA replaced the 1-hour average ozone concentration standard of 0.12 ppm with an 8-hour average ozone concentration standard of 0.08 ppm. On April 30, 2004, EPA published Phase One of its rule for implementing the 8-hour ozone standard, and portions of this rule were subsequently vacated. Currently the Commonwealth's emissions thresholds for triggering major New Source Review (NSR) permitting requirements correspond to the requirements of the original Phase One rule. These levels, which are associated with the 1997 8-hour ozone classification of moderate and requirements in the CAA for the OTR, are 100 tons per year (tpy) of NO_X and 50 tpy of VOC. If EPA decides to require NSR thresholds equivalent to the 1-hour ozone classification, which for Northern Virginia was severe nonattainment, these NSR thresholds may need to be revised to as low as 25 tpy of NO_X and 25 tpy of VOC. VDEQ is waiting for final federal rule revisions on the issue prior to the development of new NSR thresholds for the area. Paragraph 3.2 below provides more information regarding air permitting.

3.1.2.1. 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, violations were registered at a monitor in Henrico County, part of the Richmond-Petersburg maintenance area. The maintenance plan for the area, however, includes contingency measures to be implemented in the case of such an event. A regulatory action has been 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 2008 ozone NAAQS in this area, the State Air Pollution Control Board also directed VDEQ to take comment on the implementation of an additional regulation, the adhesives and sealants regulation.

3.1.2.2. 1997 NAAQS 8-hour Ozone Attainment Plan for Northern Virginia

The Northern Virginia area, as part of the metropolitan Washington, D.C. nonattainment area, was designated by EPA as a moderate nonattainment area for the 1997 8-hour ozone standard. The metropolitan Washington, D.C. nonattainment area includes the city of Washington, D.C. as well as the Virginia counties of Fairfax, Prince William, Loudoun, and Arlington and the Virginia cities of Manassas, Manassas Park, Falls Church, Fairfax, and Alexandria. The southern Maryland portion of this nonattainment area includes the counties of Montgomery, Prince George's, Frederick, Charles, and Calvert. This tri-state area was required to submit an attainment plan for the 1997 8-hour ozone NAAQS. The plan was due to EPA on June 15, 2007, and was required to demonstrate compliance with the 1997 8-hour ozone NAAQS no later than June 15, 2010.

The purpose of this plan was to show the progress being made to improve air quality in the metropolitan Washington nonattainment area and the efforts underway to reach the 1997 federal health standard for ground level ozone by the summer of 2009. The plan was prepared in conjunction with the Metropolitan Washington Air Quality Committee (MWAQC), the lead planning organization certified by the Governors of Virginia and Maryland and the Mayor of Washington, D.C. to carry out air quality planning endeavors.

This plan was submitted to EPA on June 12, 2007, and included all elements as required by EPA guidance to ensure the approvability of the plan by EPA. In addition to establishing new mobile source budgets for both NO_X and VOC, the plan calls for the implementation of three new regulations in the area. These regulations will further limit air emissions from portable fuel containers and consumer products, and the regulations will implement new controls on air emissions from the use of industrial adhesives and sealants. This plan relied heavily upon the significant NO_X reductions achieved through the Virginia-specific regulation requiring the imposition of emissions caps on facilities

subject to CAIR that are located within nonattainment areas. The Court of Appeals of Virginia, in a June 23, 2009, decision, reversed the trial court's ruling regarding these emission caps as required by 9 VAC 5-140-1061 and struck down the emission cap requirements. This matter currently is under appeal to the Virginia Supreme Court. Work in this area is on-going.

3.1.3. 1997 $PM_{2.5}$ NAAQS

Particulate matter (PM) is the term for particles found in the air, including dust, dirt, soot, smoke, and liquid droplets. Many manmade and natural sources emit PM directly or emit other pollutants that react in the atmosphere to form PM. These solid and liquid particles come in a wide range of sizes. Particles less than 10 micrometers in diameter (PM_{10}) pose a health concern because they can be inhaled into, and accumulate in, the respiratory system. Particles less than 2.5 micrometers in diameter ($PM_{2.5}$) are referred to as "fine" particles and pose the greatest health risks.

In 1997, after reviewing air quality criteria and standards, EPA established two new $PM_{2.5}$ standards: an annual standard of 15.0 ug/m^3 and a 24-hour standard of 65 ug/m^3. On January 5, 2005, EPA published the final $PM_{2.5}$ designations in the Federal Register (70 Fed. Reg. 944) with an effective date of April 5, 2005. The Virginia localities designated by EPA as nonattainment for $PM_{2.5}$ were the Northern Virginia counties of Fairfax, Loudon, Prince William, and Arlington as well as the cities of Fairfax, Manassas, Manassas Park, Falls Church, and Alexandria. EPA designated Northern Virginia nonattainment for the 1997 annual $PM_{2.5}$ standard based on its findings that pollution was being transported and contributing to nonattainment monitoring sites in the District of Columbia and Maryland.

After the designation of the metropolitan Washington, D.C. area as a nonattainment area for the 1997 $PM_{2.5}$ NAAQS, air quality in the region improved to the point that the area demonstrated compliance with the standards. This improvement in air quality allowed the metropolitan Washington, D.C. region significant flexibility when creating the necessary state implementation plan revisions to address the nonattainment designation.

Table 3-1: Metro DC Annual $PM_{2.5}$ Concentrations

Time Frame	Design Value
1999-2001	17.3 ug/m^3
2000-2002	17.1 ug/m^3
2001-2003	15.8 ug/m^3
2002-2004	15.1 ug/m^3
2003-2005	14.6 ug/m^3
2004-2006	14.5 ug/m^3
2005-2007	14.3 ug/m^3
2006-2008*	13.1 ug/m^3

**2008 data is preliminary*

Since this area's air quality complies with the 1997 $PM_{2.5}$ NAAQS, redesignation of the area to attainment for this standard is possible. Redesignation allows an area to alleviate some of the more burdensome permitting requirements for new and modified sources while ensuring maintenance of good air quality into the future. However, the unique characteristics of the metropolitan Washington, D.C. area make application of current federal redesignation guidance very difficult. VDEQ is working with EPA to determine the best approach for the creation of a redesignation request and maintenance plan. Once EPA provides guidance that can be implemented in the metropolitan Washington, D.C. area for this purpose, both Washington, D.C. and Maryland also will need to agree to submit a redesignation request and air quality maintenance plan for the area.

3.1.4. 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.

EPA issued guidance for states and localities to use in designating areas that attain or do not attain the revised 2006 24-hour standard for $PM_{2.5}$ on June 11, 2007. On December 17, 2007, Virginia submitted to the EPA Regional Administrator a letter requesting that all areas in the Commonwealth be designated attainment for the 2006 $PM_{2.5}$ NAAQS. This request was based on data from monitors showing all sites in Virginia measuring values beneath the 2006 $PM_{2.5}$ NAAQS levels. Also provided were future year modeling results further supporting the request for an attainment designation and inventory data demonstrating expected reductions in $PM_{2.5}$ precursors in the coming years. In an August 18, 2008, letter to Governor Kaine, EPA agreed that the entire Commonwealth is currently attaining the 2006 $PM_{2.5}$ NAAQS. Final designations are expected to be published in the Federal Register by the end of 2009.

3.1.5. 2008 NAAQS for Ozone

On March 12, 2008, EPA revised both the primary and the secondary NAAQS for ozone to 0.075 ppm. To attain the 1997 standard of 0.08 ppm, monitors needed to record data no higher than 0.084 ppm on an 8-hour average due to the rounding conventions used by EPA. Therefore, the 0.075 ppm standard, as measured over an 8-hour average, is a considerable strengthening of the standard.

VDEQ submitted recommendations to EPA on March 11, 2009, regarding area designations for this standard in the Commonwealth. Air quality data for the 2006 – 2008 period indicates that Richmond-Petersburg, Hampton Roads, Northern Virginia, and Fredericksburg exceed the 2008 ozone NAAQS. Caroline County also contains a monitor that exceeds the 2008 ozone NAAQS. At the request of the Caroline County Board of Supervisors, VDEQ evaluated the option of recommending to EPA that only a portion of Caroline County be designated nonattainment. After evaluation of several

factors, including population, traffic patterns, geography, and emissions density, VDEQ determined that requesting a partial area designation was indeed appropriate. Figure 3-1 shows the recommended nonattainment areas for Virginia. Jurisdictions recommended to be nonattainment are denoted by green (Northern Virginia), purple (Fredericksburg), orange (Richmond-Petersburg), and yellow (Hampton Roads) colors.

EPA was expected to publish final designations in March of 2010, however, on September 16, 2009, EPA announced that it was reconsidering the 2008 ozone NAAQS to ensure that the standards are scientifically sound and protective of human health. EPA is proposing to stay the 2008 ozone NAAQS for purposes of attainment and nonattainment designations during the period of its reconsideration.

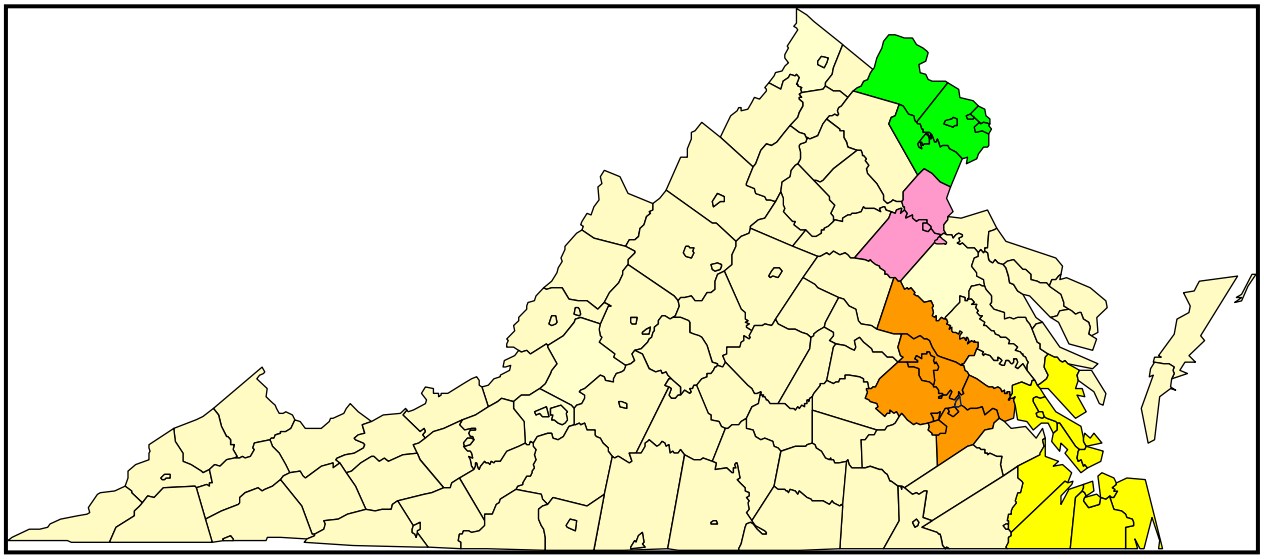


Figure 3-1: 2008 Ozone NAAQS Recommendations

3.1.6. Proposed 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 prime component of $PM_{2.5}$. NO_2 also is a building block of ozone. Current scientific evidence links short-term NO_2 exposures, ranging from 30 minutes to 24 hours, with an array of adverse respiratory effects including increased asthma symptoms, worsened control of asthma, and an increase in respiratory illnesses and symptoms. These effects are particularly important for asthmatics. Studies also show a connection between short term exposure and increased visits to emergency departments and hospital admissions for respiratory illnesses, particularly in at-risk populations including children, the elderly, and asthmatics.

On June 26, 2009, EPA proposed to strengthen the primary NAAQS for NO_2 by establishing a new 1-hour NO_2 standard at a level between 0.080 – 0.100 parts per

million (ppm). EPA also is taking comment on alternative levels for the 1-hour standard down to 0.065 ppm and up to 0.150 ppm. EPA is proposing to retain the current annual average NO_2 standard of 0.053 ppm.

Current air quality data from the Virginia NO_2 monitoring network is compliant with the proposed standards. The existing NO_2 monitoring network may need a significant amount of revision, however, because the proposed NAAQS regulation also suggests changes to the ambient air monitoring and reporting requirements for NO_2. The proposed regulation requires monitors in locations near major roads in urban areas because cars, trucks, and other mobile sources are key contributors to the maximum outdoor NO_2 concentrations. EPA found that NO_2 concentrations in vehicles and near major roads are appreciably higher than those measured at monitors in the current network. In-vehicle concentrations can be two to three times higher than those measured by nearby community-wide monitors. Near-road, within approximately 50 meters, concentrations of NO_2 have been measured to be approximately 30% to 100% higher than concentrations away from major roads. The proposed regulation also would require monitors in large urban areas to measure the highest concentrations of NO_2 that occur over wider areas.

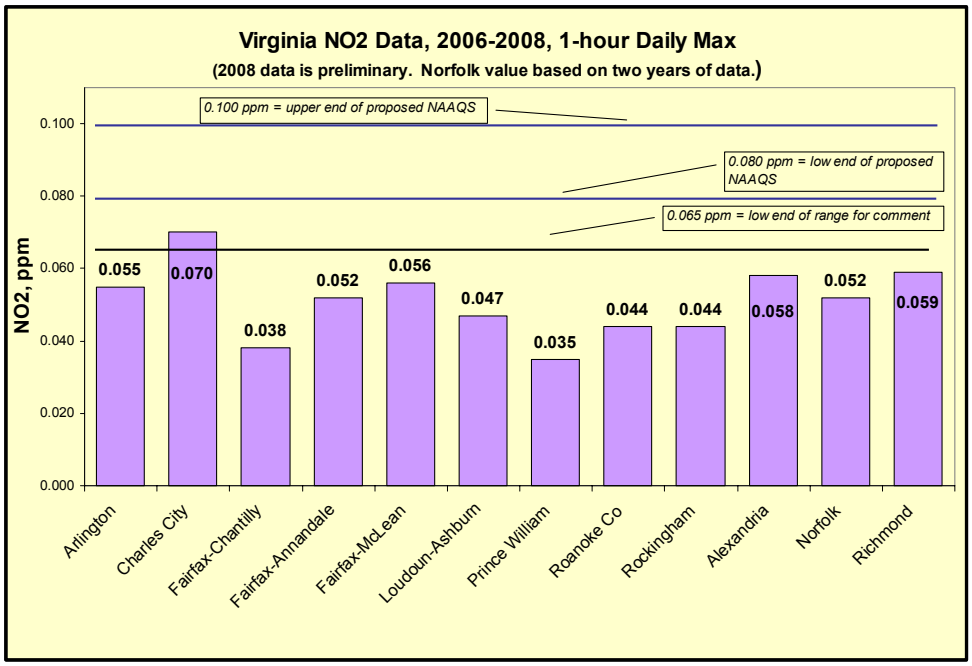


Figure 3-2: Virginia NO_2 Data, 4th Highest Daily Max

EPA accepted public comments on the proposal through September 14, 2009, and is under a court order to issue final standards by January 22, 2010.

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 is developing 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 must establish goals and emission reduction strategies based on trends from various sources of emissions. Emissions from point sources, such as electric generating units (EGUs) and other industrial operations; area sources; mobile sources; biogenic sources; wildfires; and agriculture are all included in this plan. This plan must 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) regional planning organization (RPO), VDEQ has developed a draft SIP to address visibility impairment in these two Class I areas. The draft SIP addresses reasonable progress requirements of the CAA, long term strategies, and Best Available Retrofit Technology (BART) requirements for certain industrial facilities.

The BART requirements of the Regional Haze Rule apply to facilities built between 1962 and 1977 that have the potential to emit more than 250 tons per year of visibility-impairing pollution. Those facilities fall into 26 categories, including utility and industrial boilers, and large industrial plants such as pulp mills, refineries, and smelters. Many of these facilities have not previously been subject to federal pollution control requirements.

Virginia has three (non-EGU) facilities subject to BART requirements: Georgia Pacific Big Island, Meadwestvaco Covington, and Carmeuse Strasburg. Necessary permitting has been completed for Georgia Pacific-Big Island and Meadwestvaco Covington. The permit for Carmeuse is being processed. For BART units that are also EGUs, the requirements for the CAIR rule (see paragraph 4.1) were deemed to be at least as stringent as BART. As a result of the D.C. Circuit's remand of CAIR, as described in paragraph 4.1, a different BART strategy may be required for EGUs.

The Regional Haze SIP was due to EPA by December 17, 2007. Unexpected issues within the BART process and the reasonable progress process, however, prevented many states, including Virginia from completing these requirements and submitting the SIP to EPA consistent with its initial timeframe. Additionally, the remand

of CAIR has called into question several analyses within the Regional Haze SIP, including reasonable progress analyses, future year emissions inventories, and BART analyses for EGUs. VDEQ is working with EPA and VISTAS to resolve these very significant issues.

Figure 3-3: 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, often called 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 currently 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 1 area. The second program is the non-attainment major NSR program that applies to major sources that are 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 2009 fiscal year, 256 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 2009. 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-one general permits were issued in Virginia during fiscal year 2009.

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 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. Additionally, the State Air Pollution Control Board has the authority to issue a SOP if such a permit is deemed necessary due to a modeled or actual exceedence of a NAAQS or to meet a Clean Air Act requirement such as a SIP requirement. Thirty SOPs were issued during fiscal year 2009.

The Title V permit program applies to sources that meet the criteria for being "major" under Title V of the 1990 Clean Air Act Amendments. 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. The Title V permit does not place any new substantive requirements on a source. 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). There were four federal operating permits (Title V and Title IV) issued during fiscal year 2009 and 38 operating permit renewals.

3.2.1. Revision of Minor NSR Regulation

Pursuant to Senate Bill 748 (2008 General Assembly Session), on December 31, 2008, the applicability test that facilities use to determine whether they are required to obtain a minor NSR permit changed. Under the new test, sources compare pre-change uncontrolled emissions with post-change uncontrolled emissions. The previous test required that a facility making a change or expansion (modification) to their operations

had to perform a “net emissions increase” calculation to determine whether a permitting action was required. The old test proved to be confusing for both the regulated community and staff. The new test is simpler and easier to understand and to implement.

In fiscal year 2010, it is anticipated the State Air Pollution Control Board will take final action on the currently proposed minor NSR regulation. The proposed rule, in addition to incorporating the new applicability test, proposes changes that include clarifications and incorporation of the most recent federal and state policies and guidance.

3.2.2. Development of General Permits

The 2008 General Assembly amended the Code of Virginia (Air Pollution Control Law) by adding section 10.1-1308.1, requiring the development of a general permit for qualified energy generators that use biomass and produce up to five megawatts (MW) of energy. General permits are subject to the same Administrative Process Act (APA) requirements as a regulation. A regulatory advisory group (RAP) has been formed, and work on this project will be ongoing in the coming year.

House Bill 2531/Senate Bill 1348 (2009 General Assembly Session) require the State Air Pollution Control Board to develop two general permits. One general permit is for certain sources that generate electricity during Independent Systems Operator (ISO)-declared emergencies. HB 2531/SB 1348 added 10.1-1307.02 to the Code of Virginia and amended the definition of emergency to include generators that are part of an emergency load response program (ELRP). This general permit will apply to sources above the minor source permitting exemption levels but below the major source permitting exemption levels. The second general permit will apply to generators that are used for load curtailment, demand response, or peak shaving. Both general permits are subject to the APA process. Work has started on both permits with the goal of having both general permits finalized in the coming year.

3.2.3. Revision of the State Toxics Regulations

An advisory group was established to evaluate the current methodology used to determine significant ambient air concentrations (SAACs) under the Virginia Air Toxics Regulations (9 VAC 5-60-200 et al. and 9 VAC 5-60-300 et al.). The current methodology was put in place in the mid 1980’s and has not been revisited since that time. The Virginia Inhalation Toxicology Advisory Group (VINTAG) membership includes academia, industry, and citizen groups. The group is developing a recommendation to VDEQ on what concentration values should be used when evaluating potential health effects caused by hazardous air pollutant emissions. Their evaluation includes the review of toxicity factors being used by other entities such as EPA. The

recommendations put forth by the group will be used during the revision of the air toxics regulations. Any revision of the air toxics regulations will be subject to the APA process for regulatory development.

3.3. Air Compliance Activities

The goal of the compliance program is to have every facility in the Commonwealth operating in compliance with applicable state and federal air regulations, standards, and statutes. Short of 100% compliance, the alternative goal is to provide the necessary compliance and enforcement assistance to facilities deemed non-compliant in order to correct violations. These goals help the agency in its mission to protect the environment and human health of its citizens.

The primary compliance objective is to minimize the environmental footprint of industry and protect the human health of all who work, live, play, and go to school in Virginia. VDEQ's air compliance program operates consistent with EPA's 2001 National Compliance Monitoring Strategy (CMS), which ensures that the largest potential emitters of air pollution in Virginia are, at a minimum, subject to full compliance evaluations (FCE) biannually. A FCE consists of a comprehensive evaluation of all aspects of a facility that are related to pollutant emissions, including the examination of throughputs, recordkeeping, testing, and reporting documents, to determine the facility's 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) website. VDEQ's air compliance program also implements Virginia's initiatives under the recently developed and implemented Risk Based Inspection Strategy (RBIS) and Virginia Productivity Measures (VPM).

The RBIS selects facilities for FCE inspections that are not necessarily a focus of the national CMS strategy. When needed, the RBIS can be used to justify increases or decreases in the frequency of a facility's inspections. Determinations of increased or decreased inspection frequencies are based on risk qualifiers such as environmental enhancement program participation, compliance history, facility type, environmental sensitivity, multi-media applicability, environmental justice concerns, and agency initiatives.

The VPM requires each of the six VDEQ regional air compliance programs to re-evaluate a percentage of facilities in their area that have been determined non-compliant and subsequently issued formal enforcement actions (i.e. Warning Letters, Notices of Violation) from the previous inspection cycle. This methodology promotes a risk-based concept to inspection planning by focusing on facilities with subpar compliance performance to verify whether corrective action was taken and sustained. VPM is an outgrowth of the RBIS strategy.

The compliance program, in collaboration with the permitting program, works to reduce the amount of air pollution generated. Virginia has an estimated 5,538 registered facilities operating within its borders, not including approximately 1,192

gasoline dispensing stage II vapor recovery facilities. In addition, VDEQ signed a June 30, 2009, Memorandum of Understanding (MOU) with EPA accepting delegation to enforce 23 of the 26 recently promulgated area source MACT federal regulations. These regulations apply to a substantial number of facilities emitting toxic pollutants below major source thresholds. As part of the MOU, VDEQ agreed to support EPA through outreach activities for the remaining three area source MACT regulations although EPA retains delegation of the three regulations. 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 20,000 or more in Virginia.

For the 2008 federal fiscal year, the air compliance program completed a total of 7,448 partial and full compliance inspection reports, conducted a total of 2,601 on-site inspections including complaint investigations, observed 77 stack tests, and issued 483 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.

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. Enforcement as it is related to the air program 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 2009, 29 consent orders were issued (seven of which were HPVs) and resulted in the collection of $435,933 in civil charges and $81,450 of mitigated charges through the implementation of Supplemental Environmental Projects (SEPs).

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 (through visual inspection, emissions testing, and/or the downloading of fault codes from a vehicle's onboard computer) 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 various criteria, such as air quality classification, population, and/or geographic location. With significant input from stakeholders, 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.

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 3-4, in 2008 almost 43,000 vehicles failed the initial test and received repairs.

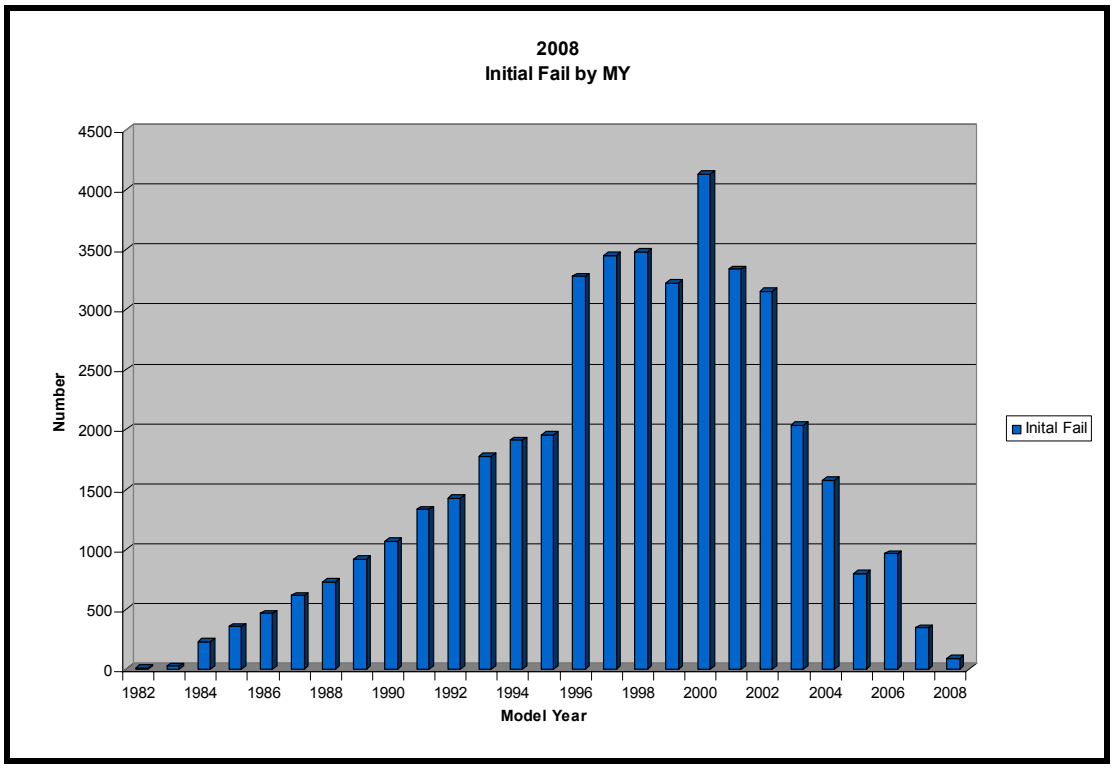


Figure 3-4: 2008 Initial Failures by Vehicle Model Year

In 2005, DEQ updated the program to allow for testing the on-board diagnostic (OBD) system 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. The information from the diagnostic trouble codes can be used by the repair technician to facilitate effective and efficient repairs. For most vehicles, the OBD test takes the place of a tailpipe test and greatly reduces the amount of time for an emissions test. Diesel vehicles up to 10,000 pounds GVWR will be tested starting in 2011 for model years 2009 and newer. Beginning with model year 2009, all vehicles up to 14,000 pounds are required by federal mandate to be OBD-compliant. By 2010 about 90% of the vehicles in the fleet will receive an OBD test rather than the tailpipe tests. New technologies are emerging that provide more convenient testing options for OBD vehicles.

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 2008, over 779,000 vehicles were inspected. MSOS personnel conducted nearly 2,500 separate audits during that time frame, including 172 covert audits of approximately 480 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 response to this requirement, the General Assembly passed legislation in 1996 to authorize VDEQ to perform remote sensing of vehicle emissions throughout the Northern Virginia area. Additional legislation was adopted in 2002 to promote the remote sensing program and to authorize VDEQ to establish a repair subsidy program for low-income vehicle owners that fail the remote sensing test.

An exploratory study indicated that remote sensing had the potential to identify gross polluting vehicles operating on roadways and supported a program requiring that such vehicles be repaired. The State Air Pollution Control Board adopted regulations to implement a remote sensing or on-road emissions (ORE) monitoring program to identify gross polluting vehicles and require out-of-cycle retesting and repair, as needed. A contractor was hired to provide remote sensing services beginning late 2004, and data procedures were coordinated with the Virginia Department of Motor Vehicles (DMV).

In August of 2006 DEQ began implementation of ORE. 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. At the same time, VDEQ implemented procedures to provide repair assistance to low-income vehicle owners whose vehicles were found to be high emitters through remote sensing.

After three years of operation, the ORE program has identified over 530 vehicles as gross emitters and issued 519 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. Moreover, analysis of the data indicates that the ORE standards can be made more stringent. Recently VDEQ tightened the standards to identify more high polluting vehicles. In addition, unmanned remote sensing units may soon be available, which would greatly increase the number of observations being recorded. Currently only about 10% of the Northern Virginia fleet is observed.

Recent 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 recently initiated a pilot program to notify owners of such vehicles that they may have a gasoline leak, which could be a potential safety issue. The notice is advisory only and the owner is invited to bring the vehicle to VDEQ's referee facility in Woodbridge for a free evaluation.

3.6. Governor's NAAQS Initiative

On June 23, 2009, Governor Timothy M. Kaine announced an initiative to survey air pollution from facilities throughout the Commonwealth that were initially "grandfathered" by the 1970 federal Clean Air Act. VDEQ will determine whether older facilities previously not subject to direct reviews currently comply with NAAQS. VDEQ will work with each facility to examine nearby air quality levels using computer models and air quality measurements. VDEQ will also implement any emissions reductions necessary to ensure compliance with air quality standards.

This project is designed to systematically evaluate air quality impacts of SO_2, NO_2, and PM_{10}. The evaluations will begin in late 2009 at three facilities that rank among the 15 largest emitters of air pollution in Virginia: Dominion's Chesterfield Power Station, American Electric Power's Glen Lyn Power Station in Giles County, and the MeadWestvaco Packaging Resource Group facility in Covington. Dominion, AEP, and MeadWestvaco have agreed to work with VDEQ to provide the necessary data. As part of this process, certain companies may need to collect site-specific data for a period of one year (e.g., meteorological data) prior to performing the air quality analyses.

While the three initial facilities will comprise a starting point for a larger systematic assessment, the selection of these facilities for evaluation does not indicate they are out of compliance with the NAAQS. Over the next five years, VDEQ will evaluate these sources and take on the evaluation of additional sources in priority order

as resources become available. The studies will be prioritized by considering the amount of pollution from each plant, the number of Virginians potentially affected by air quality near each plant, the cost to the companies, and the existence of any other studies.

3.7. Virginia Mercury Study

On October 21, 2008, VDEQ issued the Virginia Mercury Study. This report was prepared pursuant to the requirements of Chapter 867 of the 2006 Acts of Assembly (House Bill 1055). The Act directed VDEQ to conduct a detailed assessment of mercury deposition in Virginia in order to determine whether particular circumstances exist that justify, from a health, cost, and benefit perspective, requiring additional steps to be taken to control mercury emissions within Virginia. The assessment included (i) an evaluation of the state of mercury control technology for coal fired boilers, including the technical and economic feasibility of such technology and (ii) an assessment of the mercury reductions and benefits expected to be achieved by the implementation of the CAIR and CAMR regulations.

VDEQ used a contractor experienced with performing mercury deposition modeling to assist with identifying the mercury reductions and benefits to be achieved in Virginia as a result of implementation of the CAIR and CAMR. As part of Virginia's study, the emission inventory for sources in Virginia was reviewed and modified to reflect the most up-to-date information concerning mercury emissions from stationary sources located within Virginia. Additionally, VDEQ worked with EGUs to obtain information on the specific pollution control equipment planned for installation and the predicted emission reductions related to the installation and operation of those pollution control tools. Virginia's report focuses closely on impacts to Virginia fish, the number of fish consumption advisories issued for Virginia fish, and the potential for reduced fish advisories in the future as a result of less mercury deposition occurring in Virginia waters.

This study began in 2006 once the regulatory details of CAIR and CAMR were known. Pursuant to the House Bill 1055 (2006), the report examines modeling results anticipated to be achieved through the implementation of CAIR and CAMR requirements. Any reductions of mercury deposition and average mercury fish tissue concentrations identified in this report are based on modeling results and may not ultimately be achieved.

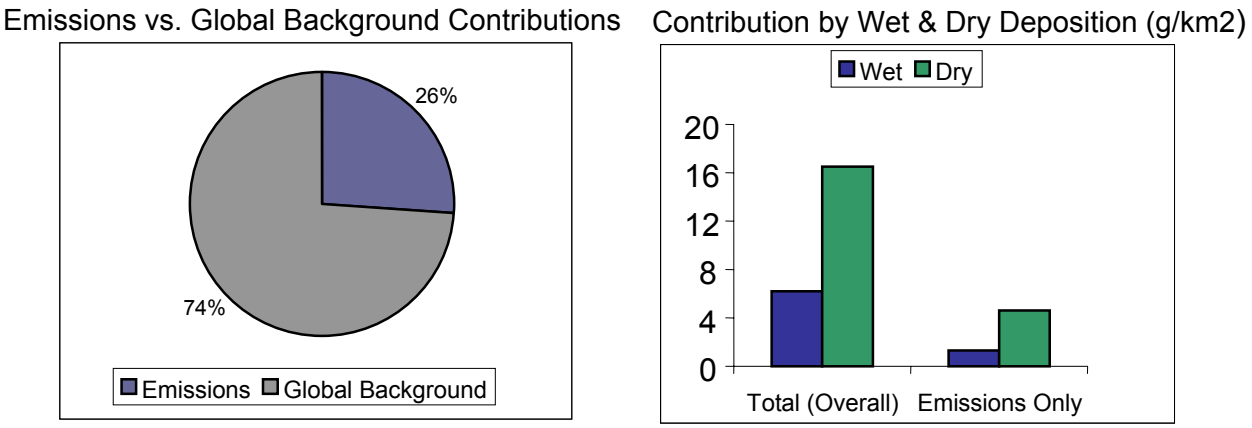
Mercury deposition occurring within Virginia originates from many places, ranging from locations around the globe to sources located within the Commonwealth. The mercury deposition modeling examined the contribution of mercury emissions from these different geographic regions. The modeling categorized the origin of the mercury deposition as global, national, regional, natural, or Virginia emission sources. In general, global background refers to mercury that is circulated around the earth. Global background will include mercury emitted from sources outside of the continental United States, such as those in Asia. National emissions sources are those sources that are

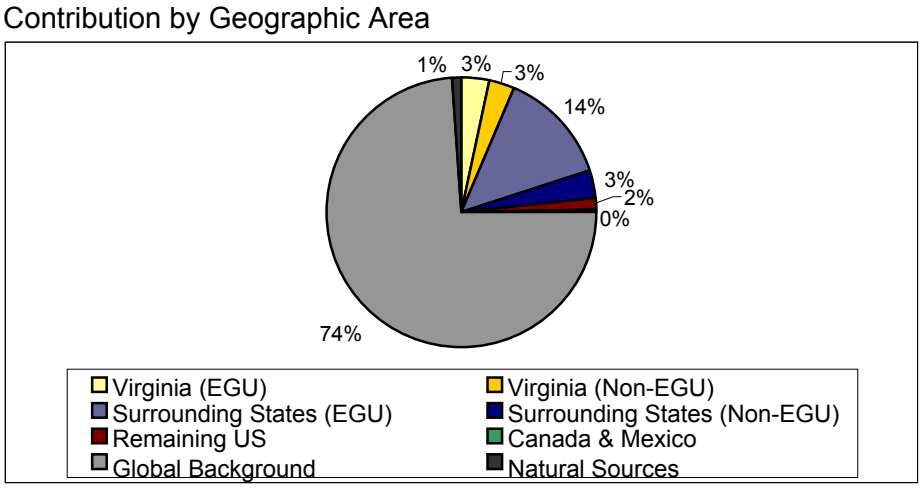
located within the continental United States and portions of Canada and Mexico that are near the United States border. Regional emission sources include emissions from states immediately surrounding Virginia. Natural sources include those mercury emissions caused from such occurrences as volcanic activity. Virginia emissions sources include all emission sources that are located within the Commonwealth of Virginia.

The breakdown of the geographic areas contributing to mercury deposition in Virginia during the base year for this study is shown in Figure 3-5 below. Deposition is given in terms of the grams of mercury deposition per square kilometer. The base year was established by using 2001 and 2002 emissions inputs. The first pie chart illustrates that 74% of the annual deposition in Virginia for the base year can be attributed to global background and 26% of the deposition occurring in Virginia is from emission sources. The pie chart labeled “Contribution by Geographic Area” provides the breakdown of the origin of the emission sources that contribute to mercury deposition within Virginia. For example, 3% of the mercury deposition occurring within Virginia can be attributed to EGUs located within Virginia. The third pie chart labeled “Contribution by Geographic Area w/o background and natural sources” further illustrates the contribution of emissions by geographic area that contribute to mercury deposition within Virginia without the inclusion of global background and natural emissions. This pie chart redistributes the 26% emissions contribution in the first pie chart (i.e., “Contribution by Geographic Area”). Specifically, this pie chart illustrates that of the 26% attributed to emission sources, 54% is attributed to EGUs in surrounding states, 14% is attributed to Virginia EGUs, 13% to non-EGUs in surrounding states and 12% to non-EGUs located in Virginia.

As part of the mercury modeling study, emissions and deposition information from the 15 largest mercury emitters in the state were modeled using the AERMOD model to examine the direct impact of these facilities within a three kilometer area surrounding each source. This analysis yielded three key findings: (1) dry deposition is greater than wet deposition for all facilities, (2) maximum wet deposition tends to occur at locations closest to the facility, and (3) maximum dry deposition tends to occur farther away from the facility location. The AERMOD model also corroborated the findings of the regional-scale modeling. Specifically, individual facilities located in Virginia contribute to mercury deposition within the state, and the greatest impacts from the in-state sources are simulated near the source locations. This includes EGU sources and non-EGU sources.

As mercury deposition into water bodies is reduced, each individual water body is expected to react differently due to natural variances in the chemical and physical conditions and differences in food web structure. Lakes are expected to respond most quickly (within a few years to decades) to reduced mercury deposition, with wetlands requiring more time to equilibrate to the lowered mercury inputs.





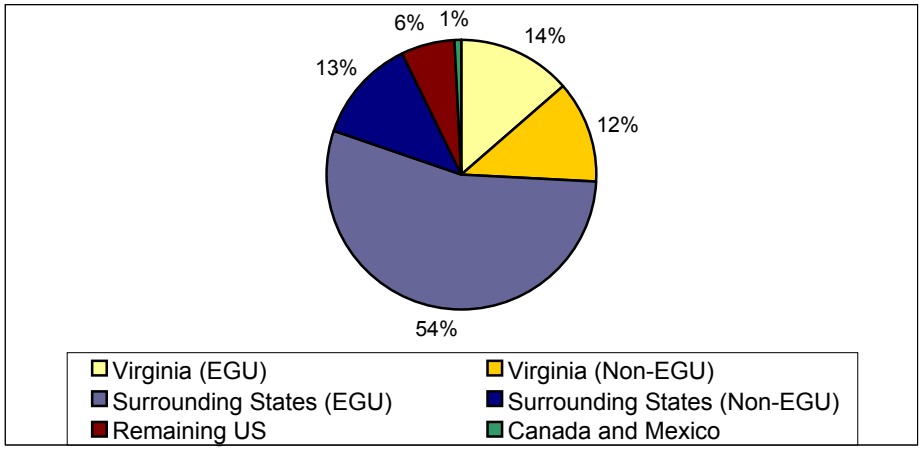


Figure 3-5: Breakdown of Mercury Contributions

A complete copy of the Virginia Mercury Study is available at the following link: http://www.deq.virginia.gov/regulations/reports.html

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 in the years 2009 and 2018, even though growth in both vehicle miles traveled and population continue throughout this time frame. These 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, and the legal and technical challenges they pose, are described in the following paragraphs.

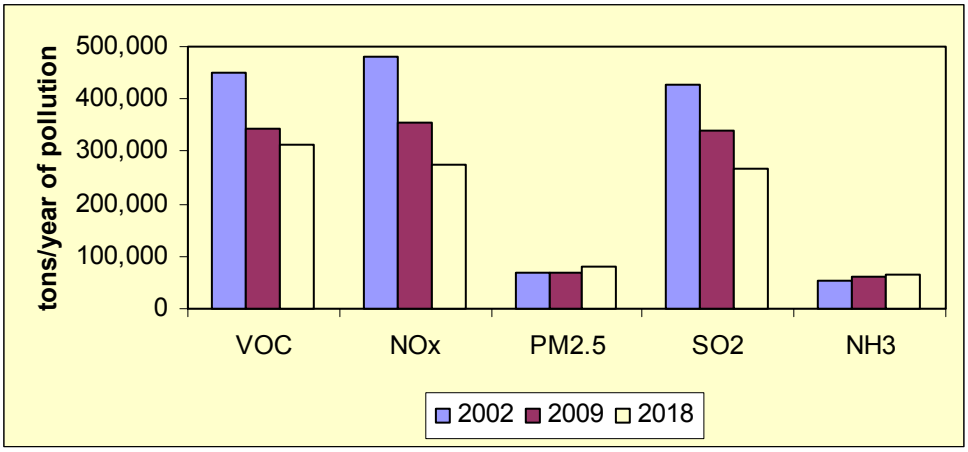


Figure 4-1: Anthropogenic Emission Estimates for the Commonwealth

4.1. Clean Air Interstate Rule

On May 12, 2005, EPA published the final CAIR (70 Fed. Reg. 25162). CAIR is designed to reduce the interstate transport of SO_2 and NO_X from EGUs across the eastern portion of the United States via a cap-and-trade program. These reductions are necessary to help states and localities attain the 1997 8-hour ozone and the 1997 $PM_{2.5}$ standards. CAIR covers 23 states and the District of Columbia for $PM_{2.5}$ and 25 states and the District of Columbia for 8-hour ozone. Emissions of NO_X are capped at 2.5 million tons in 2009 and 1.3 million tons in 2015. Emissions of SO_2 are capped at 3.6 million tons in 2010 and 2.5 million tons in 2015. The program is designed to function as a trading program, where facilities can choose to comply through the addition of control technology or through the purchase of allowances.

The State Air Pollution Control Board adopted its final regulation to implement the federal CAIR program on December 6, 2006. The regulation became effective on April 18, 2007. Final EPA approval of the Virginia CAIR SIP was published in the Federal Register on December 28, 2007 (72 Fed. Reg. 76302).

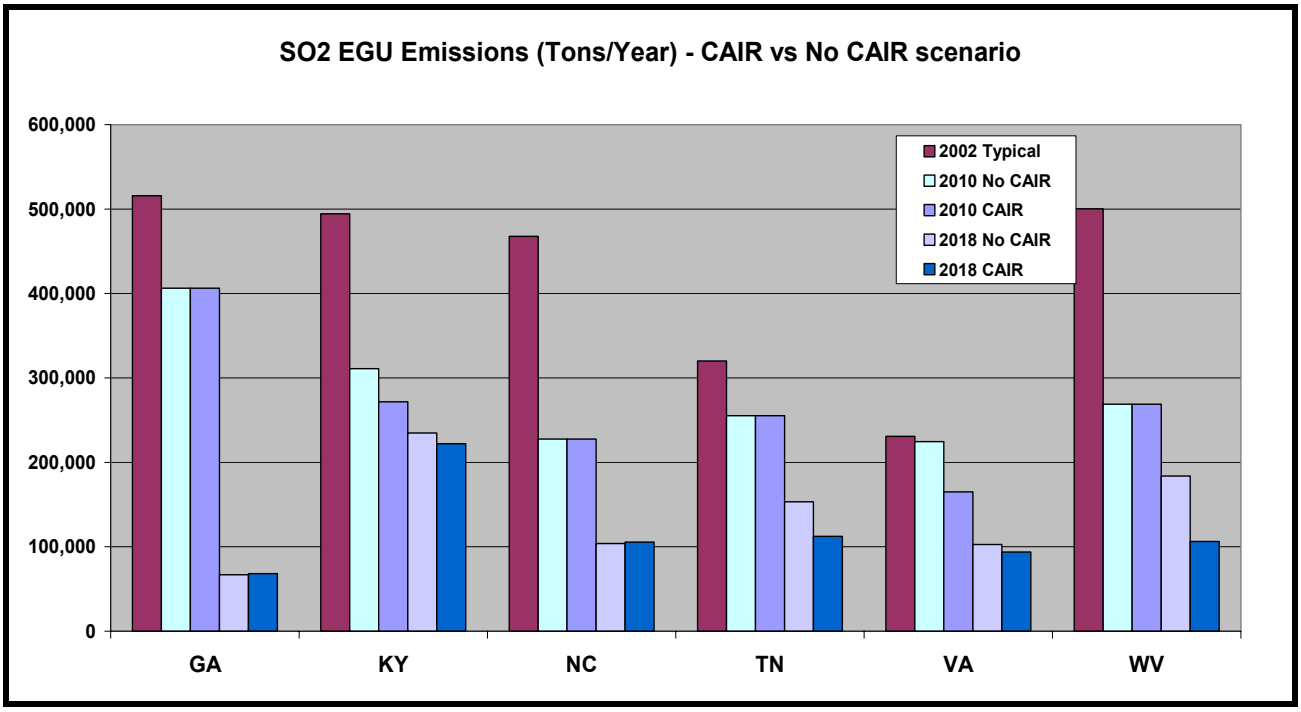


Figure 4-2: Estimates of CAIR SO_2 Reductions for Virginia and Surrounding States

On July 11, 2008, the U.S. Court of Appeals for the D.C. Circuit issued an opinion vacating the CAIR. On December 23, 2008, the court reconsidered its decision to vacate the rule and issued an order remanding CAIR without vacatur to EPA to conduct further proceedings consistent with the court's July 11, 2008, decision. This remand leaves CAIR in place until EPA issues a new rule to replace CAIR in accordance with the July 11, 2008, decision, thus protecting the environmental benefits expected to be achieved by CAIR. Figure 4-2 shows estimated SO_2 emission reductions from the first phase of CAIR from Virginia and surrounding states. EPA advised the court that development and finalization of a CAIR replacement rule could take approximately two years.

4.2. Clean Air Mercury Rule

In March 2005, EPA delisted EGUs from §112 of the Clean Air Act in what is often referred to as the "Delisting Rule." EPA then developed CAMR, a program to regulate mercury emissions from coal-fired EGUs under §111 of the Clean Air Act. CAMR set emissions standards for new coal-fired EGUs and established a cap-and trade program for mercury emissions from new and existing EGUs. On February 8, 2008, the D.C. Circuit vacated EPA's rule removing power plants from the Clean Air Act

list of sources of hazardous air pollutants. At the same time, the court vacated the Clean Air Mercury Rule. On February 6, 2009, the Department of Justice, on behalf of EPA, asked the Supreme Court to dismiss EPA's request that the Court review the D.C. Circuit Court's vacatur of CAMR. EPA has decided to develop emissions standards for power plants under §112 of the Clean Air Act, consistent with the D.C. Circuit's opinion on CAMR. On February 23, 2009, the Court also denied the Utility Air Regulatory Group's request to review the U.S. Circuit Court of Appeals decision.

4.3. 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 main reasons for the expected decreases in this emissions sector are the federal regulatory programs described below.

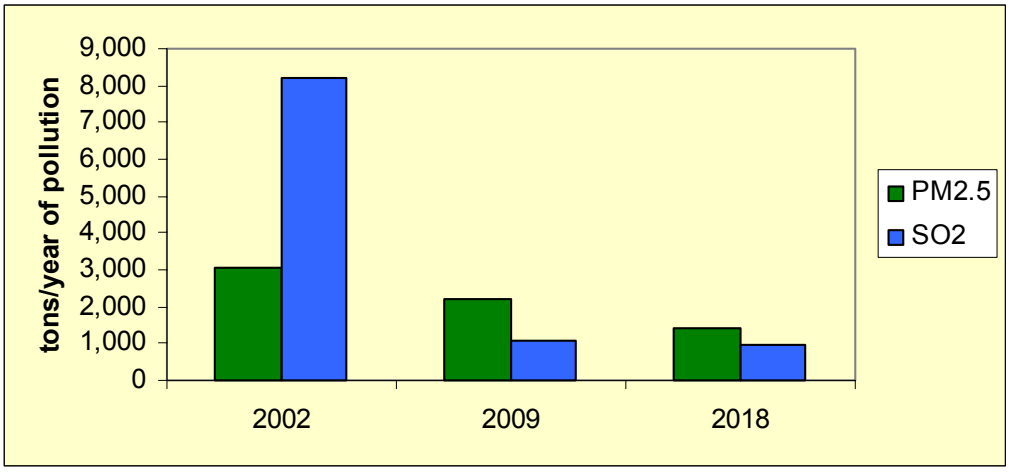


Figure 4-3: $PM_{2.5}$ and SO_2 Emissions from Mobile Sources in Virginia

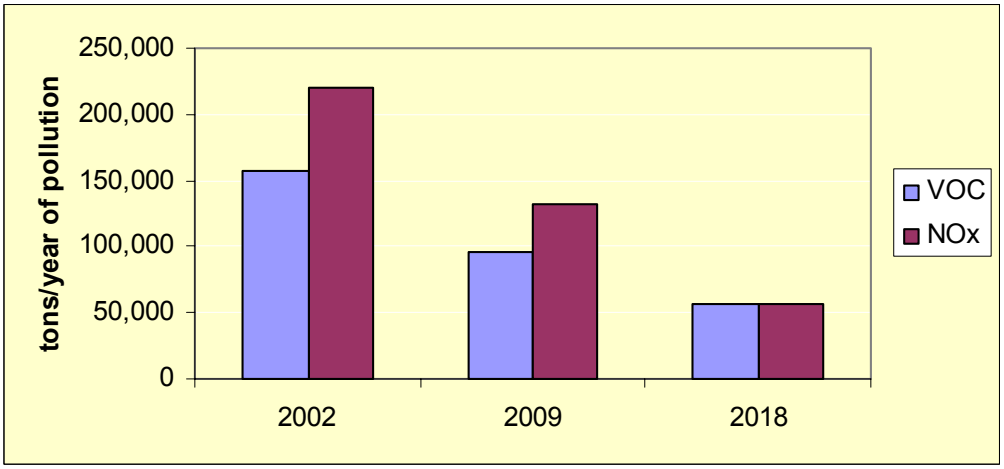


Figure 4-4: VOC and NO_X Emissions from Mobile Sources in Virginia

4.3.1. Automobiles

The realized and expected reductions in emissions from automobiles are due to several federal and state programs that are now in place. In January 1998, Virginia opted-in to the National Low Emission Vehicle (NLEV) program. NLEV was a voluntary program through which the automobile industry and many eastern states jointly agreed to adopt and implement more stringent automobile emissions standards beginning in the 1999 model year. The NLEV standards reduced the emissions of ozone forming emissions by more than 50% and applied to all vehicles up to 6,000 pounds GVWR, which include about 70% of the SUVs and pickup trucks on the road today. These vehicles, many of which are still on the road, continue to emit less pollution than those not subject to the program.

In January 2000, EPA promulgated the Tier II vehicle emissions regulation, marking the first time that SUVs, other light-duty trucks, and the largest passenger vehicles were subject to the same national pollution standards as cars. The rule became effective in the 2004 model year and reduced ozone-forming emissions of VOC and NO_X about 95% when compared to many earlier model vehicles. As older vehicles are scrapped and new vehicles are purchased, Tier II ensures an overall emissions reduction from vehicles in the Commonwealth's passenger fleet.

Tier II regulations also require that gasoline be manufactured with much lower levels of sulfur. Beginning in 2004, refiners and importers of gasoline had the flexibility to manufacture gasoline with a range of sulfur levels as long as all production was capped at 300 ppm sulfur and the annual corporate average sulfur levels were no more than 120 ppm. In 2005, the refinery average was set at 30 ppm, with a corporate average of 90 ppm, and a maximum cap of 300 ppm. Finally in 2006, refiners met a 30 ppm average sulfur level with a maximum cap of 80 ppm. Reduced sulfur in gasoline allowed better catalytic converter operations and also greatly reduced the amount of SO_2 formed by automobiles.

4.3.2. Heavy Duty Diesel On-Road Engines

The Heavy-Duty Diesel Engine Rule required that new heavy-duty vehicles and engines comply with stringent $PM_{2.5}$ tail pipe emission standards in 2007. The rule also finalized strict NO_X and VOC standards that are phased-in during the period 2007 - 2010. New engines purchased after 2007 must be equipped with state-of-the-art emissions controls for pollutants like NO_X, VOC, and $PM_{2.5}$. Similar to the Tier II regulation for passenger vehicles, the diesel rule also requires the sulfur level in diesel fuel to be reduced about 97% to a level of 15 ppm sulfur so that state-of-the-art control technologies could be installed on new engines. These new diesel engine standards will reduce the emissions of $PM_{2.5}$ and NO_X by about 90% compared to pre-2007 diesel engines. As older engines are taken out of the fleet and new trucks purchased, the fleet emissions will continue to decrease even though vehicle miles traveled are expected to increase.

4.4. Product Based Programs

A variety of both state and federal control programs are being implemented that are reducing emissions from product-based categories. These types of controls reduce emissions from activities such as the use of portable fuel containers; the coating of architectural supports and 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 controls have been implemented in the northern Virginia area and the Fredericksburg area. These regulations are being proposed for implementation within the Richmond-Petersburg area as contingency measures necessitated by poor ozone air quality in the summers of 2007 and 2008. These regulations generally target VOC emissions but can also help decrease public exposure to harmful chemicals.

4.5. 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 of these types of engines 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. Final standards are quite stringent and result in between 60 percent and 90 percent reduction in air pollutants. Additionally, air pollution benefits are related to the purchase of new equipment, thus 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 will allow more efficient engine operation, will facilitate the use of state-of-the-art emissions controls on new units, and will directly result in greatly reduced SO_2 emissions from such equipment.

4.6. Voluntary and Episodic Control Programs

Virginia has numerous voluntary programs designed to promote environmental stewardship. VDEQ provides daily predictions for many areas of the Commonwealth by forecasting air quality. This information is used to encourage the citizenry to behave differently. Large companies, small businesses, institutions, and private citizens are all encouraged to participate in keeping the air clean. Such voluntary measures can help Virginia avoid activities mandated by the federal government. For example, Virginians

have adjusted their routines on the hot summer days that help raise ozone levels. Citizens have reduced unnecessary driving, lawn mowing, and other activities on extremely hot, still, sunny, summer days when weather conditions make unhealthy ozone levels possible.

State agencies such as VDOT also participate. In the Richmond-Petersburg area, VDOT shuts down fueling pumps on predicted poor air quality days at stations lacking air pollution control equipment.

Commercial gas stations in Roanoke offer incentives to motorists to fuel up in early morning or late evening hours on predicted poor air quality days. The Roanoke area and the northern Virginia area have programs that allow free or reduced rate transit trips on predicted poor air quality days.

Localities within the Northern Virginia jurisdictions have been very proactive about implementing voluntary reduction programs. Fairfax County, Loudoun, Alexandria, Arlington, and Stafford have retrofitted or are in the process of retrofitting school bus and other heavy duty diesel equipment fleets with pollution control devices designed to reduce nitrogen oxides and volatile organic compounds. These devices have the added benefit of reducing children's exposure to air toxic emissions when aboard school buses. Several counties in the Northern Virginia area have committed to using very low VOC paints and coatings in the maintenance of buildings and other county structures. All of these programs help to reduce the amount of pollution to which citizens are exposed each day.

APPENDIX A
Description of Air Quality Plans and Programs

STATE IMPLEMENTATION PLAN

Among the primary goals of the CAA are the attainment and maintenance of the NAAQS and the prevention of significant deterioration of air quality in areas cleaner than the NAAQS.

The NAAQS, developed and promulgated by EPA, establish the maximum limits of pollutants that are permitted in the outside ambient air. The CAA requires that each state submit a plan (called a State Implementation Plan or SIP), including any laws and regulations necessary to enforce the plan, showing how the air pollution concentrations will be reduced to levels at or below these standards (i.e. attainment). Once the pollution levels are within the standards, the plan must also demonstrate how the state will maintain the air pollution concentrations at the reduced levels (i.e., maintenance). The Virginia SIP was submitted to EPA in early 1972. More than 100 revisions (mostly regulation revisions) to the plan have been made since the original submittal in 1972. Generally, the plan is revised, as needed, based upon changes to the CAA and its requirements.

A state implementation plan is the key to the air quality programs. The CAA is specific concerning the elements required for an acceptable SIP. If a state does not prepare such a plan, or EPA does not approve a submitted plan, then EPA itself is empowered to take the necessary actions to attain and maintain the air quality standards - that is, it would have to promulgate and implement an air quality plan for that state. EPA is also, by law, given authority to impose sanctions in cases where there is no approved plan or the plan is not being implemented. The sanctions may include loss of federal funds for highways and other projects and/or more restrictive requirements for new industry.

The basic approach to developing a SIP is to examine air quality across the state, delineate areas where air quality needs improvement, determine the degree of improvement necessary, inventory the sources contributing to the problem, develop a control strategy to reduce emissions from contributing sources enough to bring about attainment of the air quality standards, implement the strategy, and take the steps necessary to ensure that the air quality standards are not violated in the future.

The heart of the SIP is the control strategy. The control strategy describes the emission reduction measures to be used by the state to attain and maintain the air quality standards. There are three basic types of measures: stationary source control measures, mobile source control measures, and transportation source control measures. Stationary source control measures are directed at limiting emissions primarily from commercial/industrial facilities and operations. Mobile source control

measures are directed at limiting tail pipe and other emissions primarily from motor vehicles and include the following: Federal Motor Vehicle Emission Standards, fuel volatility limits, reformulated gasoline, emissions control system anti-tampering programs, and inspection and maintenance programs. Transportation source control measures are directed at limiting the location and use of motor vehicles and include the following: carpools, special bus lanes, rapid transit systems, commuter park-and-ride lots, bicycle lanes, signal system improvements, and many others.

Most of Virginia's air regulations are designed to provide the means for implementing and enforcing SIP control measures (primarily stationary source and some mobile source) necessary to obtain emissions reductions. Most of Virginia's air regulations fall into this category and are, therefore, subject to EPA approval.

In addition, development and enforcement of regulations under the Virginia SIP must be continually pursued, as well as development of new plan revisions as federal laws and regulations change.

REGULATORY PROGRAMS

The state's air quality programs are developed in order to implement the provisions of the Virginia Air Pollution Control Law and to fulfill the Commonwealth's mandates under the federal CAA (originally enacted in 1970) to implement air quality programs required by the Act. The regulations are adopted in order to provide a legally enforceable means to implement air quality programs required by the CAA.

The basic approach and content of these two laws greatly influence agency program development. The state law provides the agency with latitude in developing the state air program and addresses the general development and processing of regulations. The federal law, however, differs sharply by laying out, often in explicit detail, the exact requirements for an air quality program. In cases where the law is not explicit, the accompanying federal regulations fill in the gap in even greater detail, in some cases, going as far as actually requiring states to adopt certain federal regulations verbatim. The chief influences on the Commonwealth's air quality programs are the federal law and the regulations drawn pursuant to it. For any air quality program to become acceptable under the CAA, it must be submitted to and approved by the EPA. Although the programs of the State Air Pollution Control Board are heavily influenced by federal legislation, it is state law that provides the legal basis for programs developed by the Board and VDEQ. Below is a summary of the basic programs established by the laws, both federal and state.

State Implementation Plan Regulatory Programs. The SIP is designed to attain and maintain the ambient air quality standards throughout the Commonwealth. The standards prescribe limits for six "criteria pollutants": carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur oxides. Regulations are one element of

the plan and are included to provide a legal basis to restrict the emissions of air pollution from individual sources. The Board's SIP regulations may be divided into four general categories as follows:

Stationary Source Regulatory Program. Covers existing sources and requires compliance with emission standards based on emission limits achievable through the use of reasonably available control technology.

New and Modified Source Permit Program. Covers new facilities and expansions to existing ones and requires a permit be obtained prior to beginning construction of the new facility or the expansion of the existing one.

Motor Vehicle Emissions Control Programs. The emissions inspection program covers motor vehicles in the Northern Virginia area and requires compliance with tailpipe emission limits or diagnostic checks. Compliance is determined by a periodic inspection of the vehicle emissions.

Air Pollution Episode Prevention Program. Covers certain sources subject to the SIP regulatory program and requires the filing of plans to prescribe steps to be taken should air quality levels exceed the standards by a substantial amount.

Conformity Program. Establishes criteria and procedures for federal agencies to determine that federal non-transportation related actions or transportation plans and projects are in conformance with the SIP in the Northern Virginia, Richmond-Petersburg, Fredericksburg, and Hampton Roads areas.

Other Clean Air Act Regulatory Programs.

New Source Performance Standards (NSPS). Nationwide technology-based performance standards consisting of emission limits and other limitations to control certain pollutants from certain newly built plants and modifications to existing ones. Enforced by the state through delegation of authority from EPA and designed to provide a minimum level for consistency among the states in requirements for new industrial development.

National Emission Standards for Hazardous Air Pollutants (NESHAP). Nationwide health-based emission standards consisting of emission limits and other limitations to control certain pollutants from certain industry and other activities which emit hazardous air pollutants. Enforced by the state through delegation of authority from EPA and designed to provide a minimum level for consistency among the states.

Maximum Achievable Control Technology Standards (MACTs). Nationwide technology based emission standards consisting of emission limits and other limitations to control

certain pollutants from certain industry and other activities which emit hazardous air pollutants. Enforced by the state through delegation of authority from EPA and designed to provide a minimum level for consistency among the states.

Designated Pollutant Plan Regulatory Program. Similar to a SIP but applies only to designated pollutants. These are pollutants for which a NSPS has been promulgated but are not criteria pollutants or hazardous pollutants (NESHAP). Covers existing sources and requires compliance with emission standards based on emission limits achievable through the use of reasonably available control technology.

Operating Permit (Title V) Program. Covers major regulated industrial/commercial facilities and requires a renewable permit be obtained to operate the facility.

Acid Deposition Control Program. Designed to reduce sulfur dioxide and nitrogen oxide emissions from electric utilities by 10 million tons per year nationwide in two stages by the year 2000.

State-Only Regulatory Programs.

Toxic Pollutant Control Program. Provides for case-by-case source-specific assessment and establishment of control requirements after evaluation against threshold levels derived from occupational health and safety standards.

Medical Waste Incinerator Emissions Control program. Designed to limit emissions of dioxins/furans, particulate matter, carbon monoxide, and hydrogen chloride from regulated medical waste incinerators.

Odor Emissions Control Program. Provides a general standard for odor and a general approach to use in determining whether an odor is objectionable. The purpose is to require the source to take action to eliminate or reduce the odorous emissions if deemed to be objectionable to individuals of ordinary sensibility. However, unlike most other emission standards, there are no definitive requirements in the standard itself; the standard merely provides a mechanism for VDEQ, on a case-by-case basis, to require the owner to reduce emissions after investigation by VDEQ.