

# Hampton Roads Ozone Advance Action Plan

Annual Report  
04-30-2015



## Abbreviations

CMAQ	Congestion, Mitigation, and Air Quality
DMME	Virginia Department of Mines, Minerals, and Energy
EGU	electrical generating unit
EPA	United States Environmental Protection Agency
EV	electric vehicles
FAMPO	Fredericksburg Area Metropolitan Planning Organization
FGD	flue gas desulfurization unit
FRM	Federal reference method
HRTPO	Hampton Roads Transportation Planning Organization
LEED	Leadership in Energy and Environmental Design
MATS	Mercury and Air Toxics Rule
$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
MW	megawatts
NAAQS	National Ambient Air Quality Standard
$\text{NO}_x$	nitrogen oxides
ORE	On Road Emissions Program
$\text{PM}_{2.5}$	fine particulate matter less than 2.5 micrometers in diameter
ppb	parts per billion
RAMPO	Richmond Area Metropolitan Planning Organization
SCR	selective catalytic reduction
SF	square foot
$\text{SO}_2$	sulfur dioxide
VCC	Virginia Clean Cities, Inc.
VCU	Virginia Commonwealth University
VDEQ	Virginia Department of Environmental Quality
VEMP	Virginia Energy Management Program
VOC	volatile organic compounds
VPA	Virginia Port Authority

## Virginia Ozone and PM<sub>2.5</sub> Air Quality, April 2015 Update

The Ozone Advance program is a collaborative effort between federal, state, and local governments as well as area stakeholders to develop an Action Plan for a particular area. Action Plans encourage programs and practices that facilitate emission reductions of ozone and fine particulate (PM<sub>2.5</sub>) precursors so that citizens may continue to benefit from healthy air quality. These Action Plans help to ensure that covered areas remain compliant with federal National Ambient Air Quality Standards (NAAQS) and provide a roadmap for progress toward compliance with any future NAAQS updates, such as the newly proposed ozone NAAQS published on December 17, 2014 (79 FR 75104). The U.S. Environmental Protection Agency (EPA) provided programmatic guidance concerning the Ozone Advance program in April 2012. After reviewing air quality data and considering the information in the guidance document, leaders in the Hampton Roads area and the Commonwealth of Virginia developed the Hampton Roads Ozone Advance Action Plan to promote continued good air quality.

The Action Plan, which EPA received in April 2013, provided information on the air quality in the Hampton Roads area and across Virginia. The plan is available on the Virginia Department of Environmental Quality (VDEQ) website at <http://www.deq.virginia.gov/Programs/Air/AirQualityPlans/OzoneandPM25RegionalPlanningActivities.aspx>. This document updates the air quality information in the Action Plan and shows that air quality improvements are continuing. The improvements are the result of the emission reductions achieved from the many state, federal, and local air pollution control programs and voluntary efforts being implemented as well as the favorable meteorology during the summers of 2013 and 2014.

### Ozone

Photochemical reactions between volatile organic compounds (VOC) and nitrogen oxides (NO<sub>x</sub>) create ozone when they combine in the presence of sunlight. Ozone is the primary component of smog and a lung irritant. Populations that are especially susceptible to impacts from this pollutant include elderly people, children, and those with lung ailments such as asthma and emphysema. Ozone also interferes with plants' abilities to process food and ward off diseases.

Emission reductions of NO<sub>x</sub>, the primary precursor to ozone in the Commonwealth, have been significant in recent years. More reductions are expected, as detailed in the Action Plan, due to the new Tier 3 Motor Vehicle Emission and Fuel Standards that EPA finalized on April 28, 2014 (79 FR 23414).

Meteorology also plays a key role in ozone formation. The meteorology in 2009 and 2013 was not conducive to ozone formation due to cooler temperatures and more precipitation. Both years had cooler-than-average daily maximum temperatures during the May through September ozone season and higher-than-average precipitation, contributing to decreased ozone concentrations. The meteorology during the summers of 2010, 2011, and 2012 was more conducive to ozone formation. The 2010 ozone season in Virginia was the warmest on record with a maximum daily temperature averaging 84.9°F (+3.8°F above normal) and had below average precipitation (-0.71 inches). The 2011 and 2012 ozone seasons also had higher-than-average maximum daily temperatures although precipitation in 2011 and 2012 was near or above normal levels. During

## Virginia Ozone and PM<sub>2.5</sub> Air Quality, April 2015 Update

the summer of 2014, Virginia experienced cooler-than-normal temperatures and above normal rainfall, which again was not conducive to ozone formation.

Figure 1 below shows the ozone air quality as measured at the Hampton Roads area monitors. Air quality in this part of the Commonwealth has greatly improved over the last decade. This long term improvement indicates that the emission reductions achieved both locally and regionally have been successful in improving air quality to the point where ozone air quality complies with, and is significantly beneath, the 2008 ozone NAAQS of 75 parts per billion (ppb).

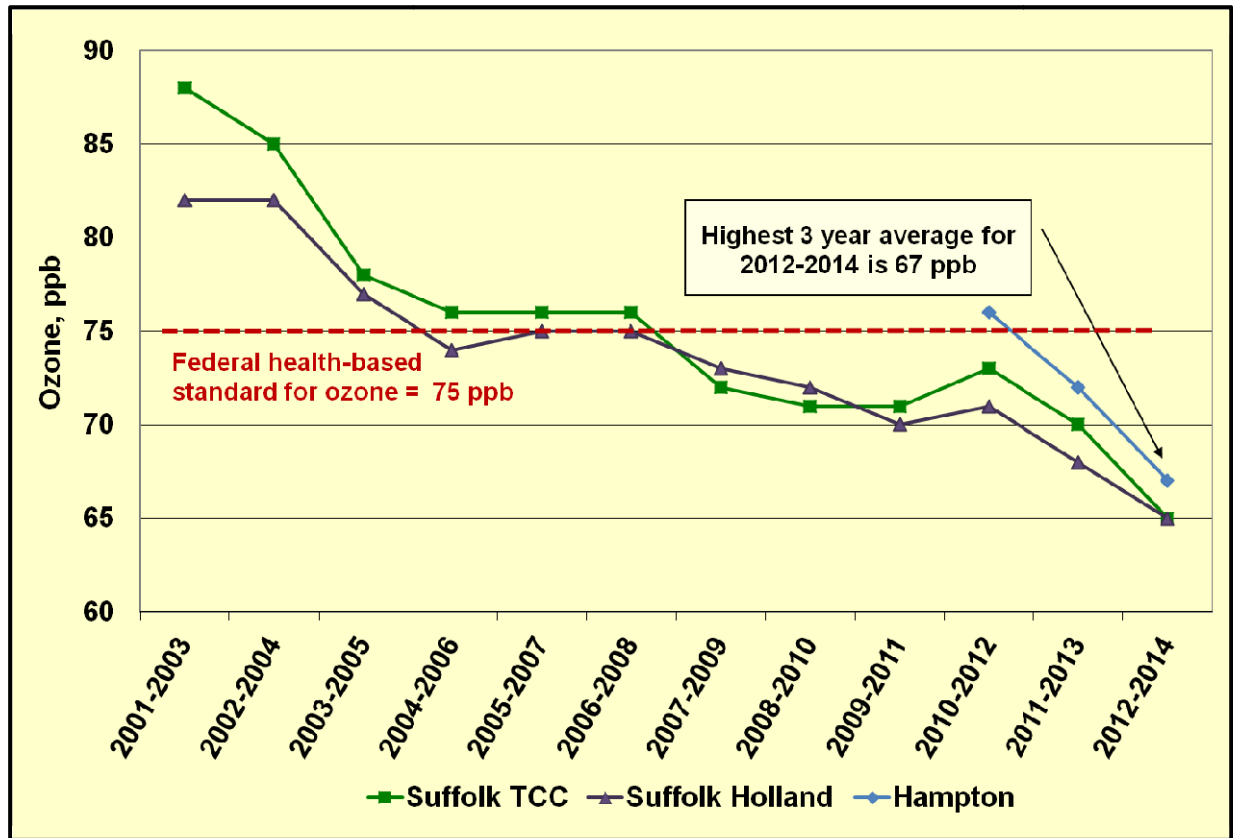


Figure 1: Hampton Roads Ozone Air Quality

Monitoring data across Virginia follow similar patterns as seen in Figure 2. All areas of the Commonwealth are benefitting from the ozone precursor emission reductions generated by federal, state, and local control programs, and the Commonwealth has seen tremendous improvements in ozone air quality over the last decade.

Figure 3 shows the number of ozone air quality exceedence days in Virginia since 1997. In 1998, Virginia recorded 82 exceedence days statewide. In 2010, the hottest and one of the driest summers on record, this value dropped to 25 exceedence days. The 2014 data shows only three exceedence days recorded.

# Virginia Ozone and PM<sub>2.5</sub> Air Quality, April 2015 Update

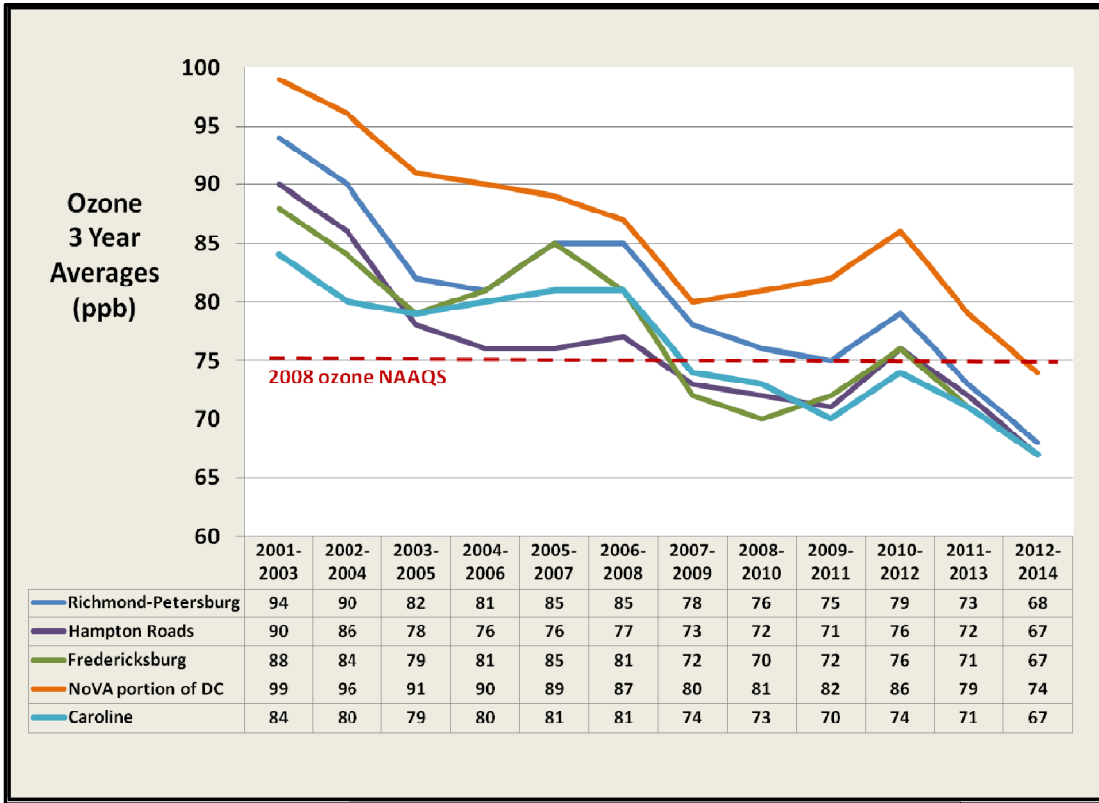


Figure 2: Ozone 3-Year Average in Virginia Areas

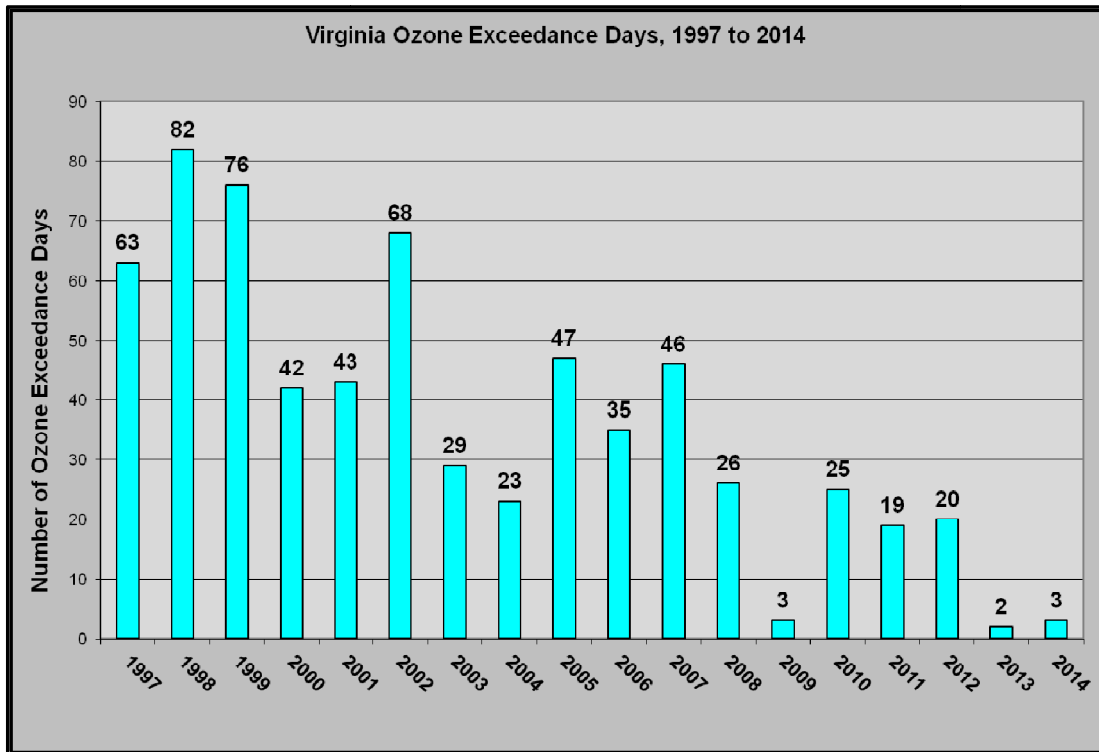


Figure 3: Virginia Ozone Exceedance Day Trends

## Virginia Ozone and PM<sub>2.5</sub> Air Quality, April 2015 Update

### PM<sub>2.5</sub>

The federal regulations define PM<sub>2.5</sub> as any airborne particle of solid or liquid matter that is less than or equal to 2.5 micrometers in diameter, approximately 1/30<sup>th</sup> the width of a human air. Exposure to high levels of PM<sub>2.5</sub> adversely affects human health, and the main impacts of PM<sub>2.5</sub> are on the respiratory system and the cardiovascular system. Children, the elderly, and individuals with pre-existing pulmonary or cardiac disease are the most susceptible to PM<sub>2.5</sub> pollution.

Federal regulations provide two health-based standards for PM<sub>2.5</sub>. The first is a daily, or 24-hour, standard of 35 µg/m<sup>3</sup>, established in 2006. The second is an annual average of 12.0 µg/m<sup>3</sup>, established in 2013. All monitors in Virginia comply with the 2006 daily PM<sub>2.5</sub> NAAQS and the 2013 annual PM<sub>2.5</sub> NAAQS. Recorded data is well below the federal standards. On October 6, 2014, EPA finalized a redesignation request for the only PM<sub>2.5</sub> nonattainment area in Virginia, the Metropolitan Washington, D.C. 1997 PM<sub>2.5</sub> NAAQS nonattainment area (79 FR 60081), which became effective November 5, 2014. Due to remarkable improvement in air quality over the last 10 years, EPA now recognizes the entire Commonwealth of Virginia as attaining all PM<sub>2.5</sub> NAAQS.

Table 1 provides information from one PM<sub>2.5</sub> Federal Reference Method (FRM) monitoring site in each area of the Commonwealth. These data show that PM<sub>2.5</sub> air quality continues to improve and that a significant buffer exists between the monitored values and the health-based standards of 35 µg/m<sup>3</sup> on a 24-hour basis and 12.0 µg/m<sup>3</sup> on an annual basis. This improvement is largely due to SO<sub>2</sub> emission reductions because SO<sub>2</sub> forms sulfates, a component of PM<sub>2.5</sub>, in the atmosphere. Reductions in VOC have also helped PM<sub>2.5</sub> air quality, by reducing the organic carbon portion of PM<sub>2.5</sub>.

**Table 1: Annual and 24-Hour PM<sub>2.5</sub> Three-Year Averages Across the Commonwealth**

3 Year Period	Arlington 51-013-0020		Chesterfield 51-041-0003		Bristol 51-520-0006		Virginia Beach 51-810-0008	
	Annual	24-Hour	Annual	24-Hour	Annual	24-Hour	Annual	24-Hour
2001-2003	14.6 µg/m <sup>3</sup>	38 µg/m <sup>3</sup>	13.6 µg/m <sup>3</sup>	34 µg/m <sup>3</sup>	14.3 µg/m <sup>3</sup>	33 µg/m <sup>3</sup>	12.6 µg/m <sup>3</sup>	33 µg/m <sup>3</sup>
2002-2004	14.5 µg/m <sup>3</sup>	37 µg/m <sup>3</sup>	13.4 µg/m <sup>3</sup>	33 µg/m <sup>3</sup>	13.9 µg/m <sup>3</sup>	31 µg/m <sup>3</sup>	12.5 µg/m <sup>3</sup>	32 µg/m <sup>3</sup>
2003-2005	14.6 µg/m <sup>3</sup>	36 µg/m <sup>3</sup>	13.6 µg/m <sup>3</sup>	33 µg/m <sup>3</sup>	14.0 µg/m <sup>3</sup>	30 µg/m <sup>3</sup>	12.6 µg/m <sup>3</sup>	30 µg/m <sup>3</sup>
2004-2006	14.2 µg/m <sup>3</sup>	34 µg/m <sup>3</sup>	13.4 µg/m <sup>3</sup>	30 µg/m <sup>3</sup>	13.9 µg/m <sup>3</sup>	31 µg/m <sup>3</sup>	12.5 µg/m <sup>3</sup>	30 µg/m <sup>3</sup>
2005-2007	14.0 µg/m <sup>3</sup>	32 µg/m <sup>3</sup>	13.3 µg/m <sup>3</sup>	31 µg/m <sup>3</sup>	13.9 µg/m <sup>3</sup>	30 µg/m <sup>3</sup>	12.1 µg/m <sup>3</sup>	30 µg/m <sup>3</sup>
2006-2008	12.9 µg/m <sup>3</sup>	30 µg/m <sup>3</sup>	12.4 µg/m <sup>3</sup>	28 µg/m <sup>3</sup>	12.7 µg/m <sup>3</sup>	28 µg/m <sup>3</sup>	11.9 µg/m <sup>3</sup>	30 µg/m <sup>3</sup>
2007-2009	11.9 µg/m <sup>3</sup>	27 µg/m <sup>3</sup>	11.2 µg/m <sup>3</sup>	24 µg/m <sup>3</sup>	11.2 µg/m <sup>3</sup>	25 µg/m <sup>3</sup>	10.7 µg/m <sup>3</sup>	26 µg/m <sup>3</sup>
2008-2010	10.8 µg/m <sup>3</sup>	24 µg/m <sup>3</sup>	10.3 µg/m <sup>3</sup>	21 µg/m <sup>3</sup>	10.2 µg/m <sup>3</sup>	22 µg/m <sup>3</sup>	10.3 µg/m <sup>3</sup>	24 µg/m <sup>3</sup>
2009-2011	10.1 µg/m <sup>3</sup>	22 µg/m <sup>3</sup>	9.6 µg/m <sup>3</sup>	21 µg/m <sup>3</sup>	9.9 µg/m <sup>3</sup>	21 µg/m <sup>3</sup>	9.6 µg/m <sup>3</sup>	23 µg/m <sup>3</sup>
2010-2012	9.9 µg/m <sup>3</sup>	22 µg/m <sup>3</sup>	9.5 µg/m <sup>3</sup>	21 µg/m <sup>3</sup>	9.8 µg/m <sup>3</sup>	20 µg/m <sup>3</sup>	9.3 µg/m <sup>3</sup>	24 µg/m <sup>3</sup>
2011-2013	9.4 µg/m <sup>3</sup>	21 µg/m <sup>3</sup>	8.7 µg/m <sup>3</sup>	21 µg/m <sup>3</sup>	9.0 µg/m <sup>3</sup>	18 µg/m <sup>3</sup>	8.5 µg/m <sup>3</sup>	22 µg/m <sup>3</sup>
2012-2014	9.0 µg/m <sup>3</sup>	21 µg/m <sup>3</sup>	8.5 µg/m <sup>3</sup>	19 µg/m <sup>3</sup>	8.6 µg/m <sup>3</sup>	16 µg/m <sup>3</sup>	8.0 µg/m <sup>3</sup>	20 µg/m <sup>3</sup>

*Data Source: VDEQ-Air Quality Monitoring Division*

## Virginia Ozone and PM<sub>2.5</sub> Air Quality, April 2015 Update

Figures 4 and 5 provide the annual and daily PM<sub>2.5</sub> monitoring information, respectively, from the PM<sub>2.5</sub> monitors located in the Hampton Roads area. All PM<sub>2.5</sub> monitors in the Hampton Roads area follow the downward trend seen across the Commonwealth and in Table 1.

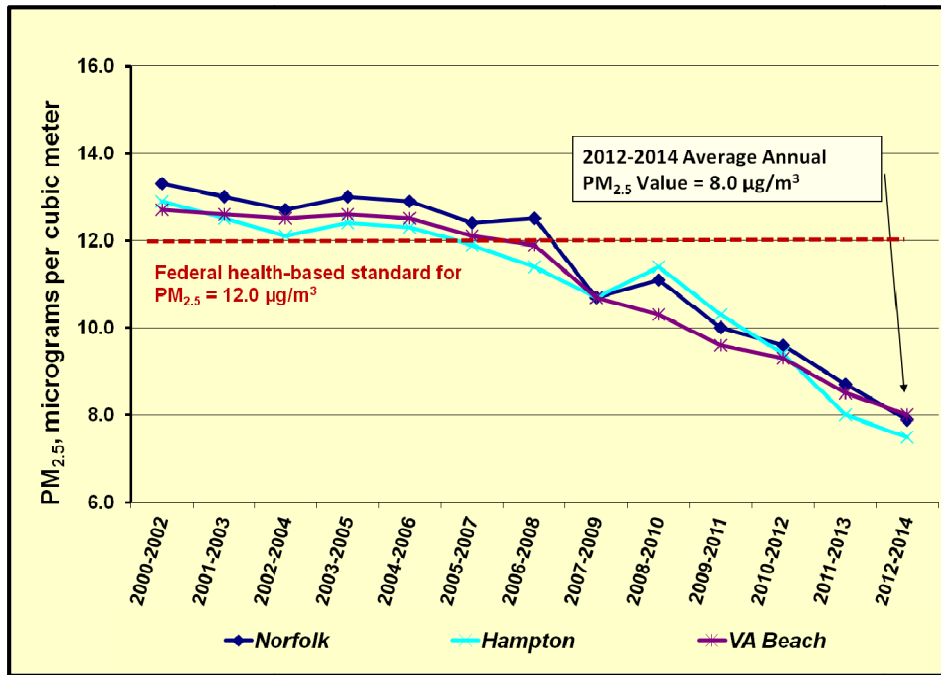


Figure 4: Hampton Roads Annual PM<sub>2.5</sub> Air Quality Data

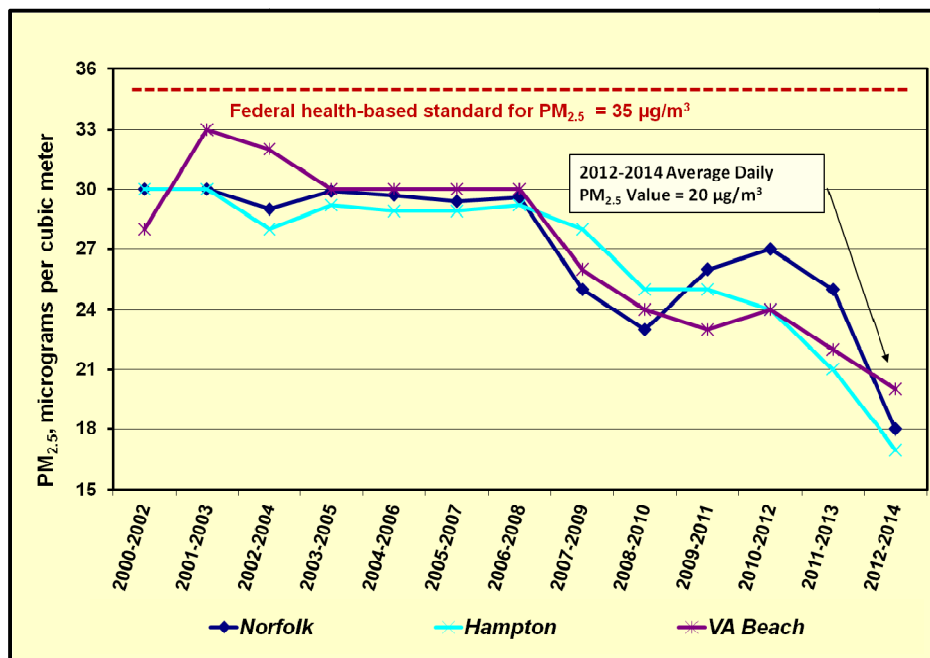


Figure 5: Hampton Roads Daily PM<sub>2.5</sub> Air Quality Data

## Virginia Ozone and PM<sub>2.5</sub> Air Quality, April 2015 Update

Figure 6 shows the improvement in monitored sulfate concentrations over the last several years, as measured by the PM<sub>2.5</sub> speciation monitor located in Henrico, Virginia. This monitor has the ability to measure the components of PM<sub>2.5</sub> pollution. The sulfate portion of PM<sub>2.5</sub> has decreased markedly, as has the organic carbon portion.

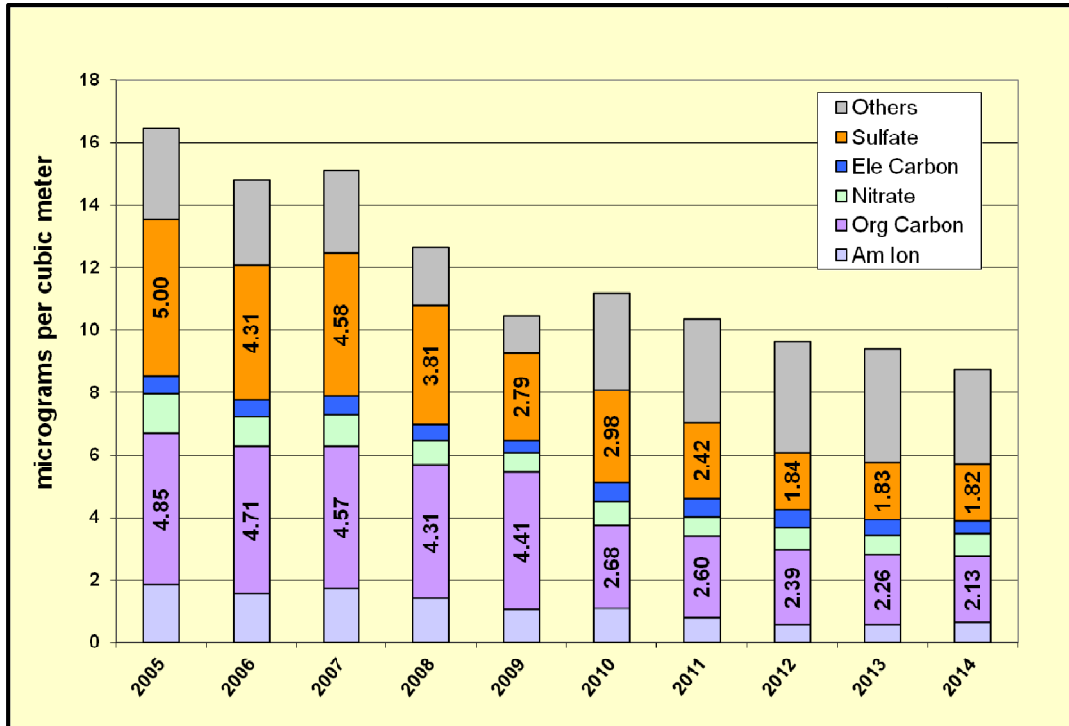


Figure 6: Henrico Speciation Data

### Emission Reduction Programs

Existing control programs are reducing pollution and improving air quality. These programs are helping Virginia get a head start on meeting the new, health-based ozone standard, which is due to be finalized by the end of 2015. Upcoming control programs, such as the Tier 3 vehicle standards, should continue improving ozone air quality in the Commonwealth of Virginia.

The following table provides an update on the programs described in the Hampton Roads Ozone Advance Action Plan. These programs are progressing well and will help to lower the overall emissions in coming years. During the summer of 2015, several NO<sub>x</sub> emission reductions will have occurred that warrant highlighting. Within the Hampton Roads region, for example, the Dominion-Chesapeake Energy Center, located in Chesapeake, Virginia, retired four coal-fired units in December 2014. Outside of the Hampton Roads region, the Honeywell-Hopewell facility has completed work on two additional selective catalytic reduction (SCR) control devices and began operating the new SCRs in October 2014. These units will reduce NO<sub>x</sub> emissions by approximately 1,500 tons during 2015, as compared to previous years. The Invista facility in Waynesboro, Virginia, has permanently retired the coal-fired power house units and replaced them with new, natural gas-fired units. These changes will help reduce the amount of NO<sub>x</sub> and SO<sub>2</sub> transported into the Hampton Roads region. VDEQ has provided a CD containing supporting information, including the various documents referenced in Table 2 below.



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**Table 2: Emission Reduction Programs**

Control Program	Stakeholders	Time Frame	Milestones	Program Type	Feedback & Comments
<b>Virginia Port Authority</b>					
GO Program	VPA	On going	Vehicles retrofitted or repowered	Voluntary	<ul style="list-style-type: none"> <li>Program is ongoing</li> <li>DERA2 funds received for 2013</li> </ul>
Maersk Low Sulfur Fuel	VPA	2012-2015	Program report	Voluntary	<ul style="list-style-type: none"> <li>Program is ongoing</li> </ul>
Terminal Operations	VPA	On going	Program Report	Voluntary	<ul style="list-style-type: none"> <li>Program is ongoing</li> </ul>
<b>Metropolitan Planning Organizations</b>					
I-64 Express/Inter-Terminal Barge Service	VPA, RAMPO, HRTPO	On going	TEUs transported annually	Voluntary	<ul style="list-style-type: none"> <li>In 2013, 7,965 containers moved by the barge service.</li> <li><a href="http://64express.com/about/">http://64express.com/about/</a></li> </ul>
TRAFFIX	TRAFFIX	On going	VMT avoided annually Trips avoided annually	Voluntary	<ul style="list-style-type: none"> <li>See TRAFFIX January-2015-Presentation-Ridership.pdf</li> </ul>
The Tide	HRTPO	On going	Program Report	Voluntary	<ul style="list-style-type: none"> <li>Program is on going</li> <li><a href="http://www.gohrt.com/services/the-tide/">http://www.gohrt.com/services/the-tide/</a>.</li> </ul>
<b>DMME-Division of Energy</b>					
VEMP	DMME	On going	SF of public buildings retrofitted? Private capital deployed? Energy savings?	Voluntary	<ul style="list-style-type: none"> <li>Total value of contracts through FY 2014 is \$685 million. Cumulative estimated CO<sub>2</sub> emission reductions through calendar year 2014 are 271,732 tons.</li> <li>See VEMP – Performance Contracting.docx.</li> </ul>
Energize Virginia	DMME	2011-2016	Funds awarded? Programs to be implemented?	Voluntary	<ul style="list-style-type: none"> <li>More than \$10M awarded in 2012. Projects include energy performance contracts, and a solar thermal system.</li> <li>More than \$1.7M has been repaid as of 01/31/2015.</li> <li>See Energize Virginia.docx.</li> </ul>

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Control Program	Stakeholders	Time Frame	Milestones	Program Type	Feedback & Comments
<i>Dominion Virginia Power</i>					
Energy Conservation Programs	Dominion	On going	Program ongoing?	Voluntary	<ul style="list-style-type: none"> <li>Company currently offers several energy conservation programs to its residential and non-residential utility customers in Virginia and continues to evaluate opportunities to redesign current, and develop new, demand-side management initiatives. <a href="https://www.dom.com/dominion-virginia-power/customer-service/energy-conservation/ec-programs.jsp">https://www.dom.com/dominion-virginia-power/customer-service/energy-conservation/ec-programs.jsp</a></li> </ul>
Generating unit retrofits and fuel switches	Dominion	2012-2016	Retrofits installed? Units where fuels have been successfully changed?	Permit	<ul style="list-style-type: none"> <li>Permits received for Hopewell, Altavista, and Southampton fuel switch from coal to biomass. Units have begun burning biomass and no longer burn coal.</li> </ul>
				MATS	<ul style="list-style-type: none"> <li>Dominion will retire two coal-fired units at the Yorktown Power Station contingent upon the completion of a transmission upgrade project expected to be in service by January 2017.</li> </ul>
				MATS; 2010 SO <sub>2</sub> NAAQS	<ul style="list-style-type: none"> <li>Chesapeake Energy Center retired all coal-fired units in December 2014.</li> </ul>
				Permit	<ul style="list-style-type: none"> <li>Bremo Bluff ceased burning coal in fall of 2013. Facility is now burning solely natural gas.</li> </ul>
				MATS; Consent Agreement	<ul style="list-style-type: none"> <li>Installation of SO<sub>2</sub> scrubbers has been completed for all coal units at the Chesterfield Power Station near Richmond, VA.</li> </ul>
Solar Partnership Program	Dominion	2013-2018	Program ongoing.  1.2 MW in operation to date.?	Voluntary	<ul style="list-style-type: none"> <li>Dominion announced 12/9/2013 the installation of more than 2,000 solar panels on the rooftop of Canon Virginia Inc, in Gloucester County, VA. The panels will generate more than 500 kw of electricity.</li> <li>Company has installed 600 rooftop solar panels on the campus of Old Dominion University in Norfolk, VA that generate 132 kW of electricity.</li> <li>In September 2014, Dominion announced selection of the Capital One facility in Chester, VA for the installation of nearly 2500 ground-mounted solar panels, which will be capable of generating up to 500 KW of electricity.</li> <li><a href="http://dom.mediaroom.com/2014-09-15-Dominion-Virginia-Power-Selects-Capital-One-for-First-Ground-Mounted-Solar-Panel-Installation-in-Central-Virginia">http://dom.mediaroom.com/2014-09-15-Dominion-Virginia-Power-Selects-Capital-One-for-First-Ground-Mounted-Solar-Panel-Installation-in-Central-Virginia</a></li> </ul>

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Control Program	Stakeholders	Time Frame	Milestones	Program Type	Feedback & Comments
Renewable Generation – Schedule RG	Dominion	Ongoing	Program approval received	Voluntary	<ul style="list-style-type: none"> <li>Company received approval of program from SCC in December 2013.</li> <li>Company began accepting applications in April 2014.</li> <li><a href="https://www.dom.com/business/dominion-virginia-power/ways-to-save/renewable-energy-programs/schedule-rg">https://www.dom.com/business/dominion-virginia-power/ways-to-save/renewable-energy-programs/schedule-rg</a></li> </ul>
Renewable Energy Pilot Program	Dominion	Ongoing	SCC established program guidelines in November 2013	Voluntary	<ul style="list-style-type: none"> <li>As of December 1, 2013, qualified customers may participate in the Virginia State Corporation Commission’s Renewable Energy Pilot Program. This pilot program allows qualified customers to enter into a Power Purchase Agreement (PPA) with a third party renewable energy supplier. The energy supplied must come from a wind or solar generator located on the customer’s premise.</li> <li><a href="https://www.dom.com/business/dominion-virginia-power/ways-to-save/renewable-energy-programs/renewable-energy-pilot-program">https://www.dom.com/business/dominion-virginia-power/ways-to-save/renewable-energy-programs/renewable-energy-pilot-program</a></li> </ul>
Alternative Vehicles and Fuels Program	Dominion	Ongoing	% of fleet powered by alternative fuels?	Voluntary	<ul style="list-style-type: none"> <li>Vehicles powered by alternative fuels (AVFs) now make up about 28% of Company’s on-road fleet of about 5,700 cars and trucks.</li> <li><a href="https://www.dom.com/corporate/our-commitments/environment/what-we-are-doing/greening-our-vehicle-fleet">https://www.dom.com/corporate/our-commitments/environment/what-we-are-doing/greening-our-vehicle-fleet</a></li> </ul>
<b>Virginia Clean Cities</b>					
Virginia Get Ready	VCC	On going	Statewide network of chargers	Voluntary	<ul style="list-style-type: none"> <li>Deployed two EV planning docs in 2013 as well as tools for advancing electric vehicles and infrastructure.</li> <li>VA registrations of electric vehicles increased from 1,257 in 2013 to 1,837 in 2014.</li> <li>VA public charging stations increased in number from 212 in 2013 to 275 in 2014.</li> <li>Deployed dozens of DC Fast Chargers in major cities in 2014</li> <li>See <a href="http://www.virginiaev.org/">http://www.virginiaev.org/</a></li> <li>See va_electric+hybrid_vehicles_and_stations_2008-2014.xlsx</li> </ul>
Propane Autogas Program	VCC	2009-2013	Successful national deployment	Voluntary	<ul style="list-style-type: none"> <li>Program concluded in 2013.</li> <li>Converted 117 vehicles to autogas in VA</li> <li>Alternative fuel vehicles estimated to reduce NO<sub>x</sub> emissions 273 tons annually in VA</li> </ul>
<b>Virginia Department of Environmental Quality – Ozone Forecasting</b>					
Ozone Forecasting	VDEQ	Ongoing	Program funded?	Voluntary	<ul style="list-style-type: none"> <li>Program continues to be funded and operating</li> </ul>

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Control Program	Stakeholders	Time Frame	Milestones	Program Type	Feedback & Comments
<b>Regional Reductions</b>					
Invista Powerhouse Project	VDEQ	2013-2014	Construction begun? New units operational? Coal units retired?	Permit	<ul style="list-style-type: none"> <li>New boilers started operation in January of 2014.</li> <li>Shutdown request for existing boilers 1 and 2 effective January 9, 2014.</li> <li>Shutdown request for existing boiler 3 effective March 12, 2014.</li> </ul>
Celco Powerhouse Project	VDEQ	2015	Construction begun? New units operational? Coal units retired?	Permit	<ul style="list-style-type: none"> <li>The facility informed VDEQ that construction commenced for the six natural gas boilers on 7/16/2013.</li> </ul>
Honeywell SCR Installation	VDEQ	12/2012 through 06/2019	# of SCR installed? Annual emissions of NO <sub>x</sub> ?	Permitting; Consent Agreement	<ul style="list-style-type: none"> <li>Two SCR commenced operation December 2012.</li> <li>Two additional SCR began operating October of 2014.</li> </ul>
<b>Other</b>					
New, low-emitting EGU facilities	Dominion	2015	Commercial operation commenced	Permit	<ul style="list-style-type: none"> <li>Dominion began commercial operation of the Warren County Power Station in December of 2014. This operation is a combined cycle facility rated at about 1,329 MW burning natural gas and equipped with state of the art controls. <a href="https://www.dom.com/residential/dominion-virginia-power/news/customer-newsletters/feb15-meeting-steeper-power-peaks">https://www.dom.com/residential/dominion-virginia-power/news/customer-newsletters/feb15-meeting-steeper-power-peaks</a></li> </ul>
Hybrid Shuttle Carrier Demonstration Project	VPA	2014-2016	n/a	Permit	<ul style="list-style-type: none"> <li>In February of 2014 the VPA submitted a DERA proposal for a hybrid shuttle carrier demonstration project. The project will replace eight straddle carriers equipped with Tier 1 engines. The replacement equipment will have Tier 4 hybrid engines. VPA is providing \$7.1M in funding, and requested \$2M from DERA. This equipment will save over 32,000 gallons of fuel per year and will reduce NO<sub>x</sub> emissions by nearly 6 tons annually.</li> </ul>

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Ocean-going Vessel Hybridization & Fuel Switching Demo Project	HRTPO, VPA	Ongoing	n/a	Voluntary	<ul style="list-style-type: none"> <li>Two commercial container vessels entering the Port of Virginia will be hybridized with either FlexGen Energy Management System or to use alternative fuels</li> <li>50-100 containerships will be incentivized to use ultra-low sulfur marine diesel fuel (0.1%) while at berth.</li> </ul>
Virginia Offshore Wind Technology Advancement Project	Dominion	2017-2018	n/a	Voluntary	<ul style="list-style-type: none"> <li>Dominion is planning an offshore wind technology testing facility, which will consist of two offshore wind turbines with a combined capacity of approximately 12 MW. <a href="https://www.dom.com/about/stations/renewable/vowtap.jsp">https://www.dom.com/about/stations/renewable/vowtap.jsp</a></li> <li>On September 4, 2013, Dominion bid \$1.6 million to win the lease for 112,800 acres off the Virginia coast to develop an off-shore wind farm capable of generating up to 2,000 MW of electricity, and is actively developing this large-scale commercial off-shore wind project. <a href="https://www.dom.com/about/stations/renewable/commercial-offshore-wind-development-project.jsp">https://www.dom.com/about/stations/renewable/commercial-offshore-wind-development-project.jsp</a></li> <li>On March 13, 2015 DMME submitted a signed lease offer to the Bureau of Ocean Energy Management for counter signature, along with documents designating Dominion Virginia Power as the Lease Operator - a major milestone clearing the way for construction of the 12 MW VOWTAP project.</li> </ul>