## 6.0 CONTROL MEASURES

Chapters 5 presents the emission reduction estimates and target levels of emissions for the 2008 Rate of Progress and 2009 attainment demonstrations. Table A is an overall summary table of emission reductions from each control measure that will be in effect for the reasonable further progress and attainment demonstrations. The remainder of this chapter documents the methodologies used and provides example calculations for the emission reduction estimates for each control measure listed in Table A.

When the Washington DC-MD-VA Nonattainment Area SIP was first developed and submitted, the first section of the control measures chapter contained Table A, a summary of emission control measures.

The second through fifth sections of the chapter contained detailed descriptions of the measures listed in Table A. The second section of the chapter contained federally mandated measures that had already been implemented, and the third section contained federally mandated measures that would be implemented in the future. The fourth section contained state and local government measures, and the fifth section included Transportation Control Measures (TCMs).

As time has passed and the original "future" measures have been implemented, the numbering of the control measures is no longer as logical as it once was. However, the original numbering of the control measures has been retained to enable readers to easily track control measures between SIP revisions. Both Sections 6.2 and 6.3 of this SIP contain implemented federal measures. Section 6.4 contains state and local measures. Section 6.5 contains TCMs and vehicle, fuel, and maintenance measures, while Section 6.6 discusses the region's voluntary measures package.

## 6.1 Reductions for Control Measures

[INSERT TABLE A from EXCEL FILE]

## 6.2 Detailed Descriptions of Emission Control Measures

This section describes each of the control measures appearing in Table A. Each control measure is described and emission reduction calculations are presented in the remainder of this chapter. Actual implementation dates and regulation names were supplied by the states and are included in Chapter 9. Actual emission reductions may vary slightly from the estimates appearing in this chapter since these estimates are based on EPA guidance, and not necessarily actual data from the in-situ emission control measures.

## On-Road Measures

The following onroad emission reduction measures that are discussed in this section are calculated using the MOBILE6 emission factor model:

- Enhanced I/M, 6.2.1
- Federal Tier 1 Vehicle Standards, 6.2.3
- Federal Tier 2 Vehicle Standards, 6.2.4
- National Low Emission Vehicle Standards, 6.3.3
- Reformulated Gasoline for On-road Applications, 6.4.1
- Heavy Duty Diesel Engine Rule, 6.3.6
- Chip Reflash [?]

Past SIP documents for the Washington region have presented the emission reductions from each of the above measures individually, and then summed the reductions to create a controlled on road inventory for each milestone year. MOBILE5b, the mobile emissions model used in previous SIPs, was designed to calculate the benefits of each of the above control measures individually. In the update to MOBILE6, changes were made to the model, creating synergistic effects between the six mobile control measures listed above. These effects do not lend themselves to isolating credit from one control program, and make it very difficult to calculate incremental benefits from implementation of individual control measures. As a result, this and future SIP revisions will not enumerate the benefits of individual mobile control measures, with the exception of the transportation control measures (TCMs), which are quantified outside of the MOBILE6 model. The table below summarizes the combined benefits from the above control measures by jurisdiction.

[baseline control run pending]

| | **VOC Emission Reductions (tons per day)** | | | |
|---|---|---|---|---|
| | **District of Columbia** | **Maryland** | **Virginia** | **Total** |
| 2008 VOC Reductions | | | | |
| 2009 VOC Reductions | | | | |

| | **NOx Emission Reductions (tons per day)** | | | |
|---|---|---|---|---|
| | **District of Columbia** | **Maryland** | **Virginia** | **Total** |
| 2008 NOx Reductions | | | | |
| 2009 NOx Reductions | | | | |

## Non-Road Measures

The following non-road emission reduction measures that are discussed in this section are calculated using the NONROAD2005 emission factor model:

- EPA Non-road Gasoline Engines Rule, 6.2.7
- EPA Non-road Diesel Engines Rule, 6.2.8
- Emissions Standards For Spark Ignition Marine Engines, 6.2.10
- Emissions Standards for Large Spark Ignition Engines, 6.2.11
- Reformulated Gasoline for Off-Road Applications, 6.4.2

Past SIP documents for the Washington region have presented the emission reductions from each of the above measures individually, and then summed the reductions to create a controlled on road inventory for each milestone year. NONROAD2005, the current non-road emissions model approved for use by the EPA, is not designed to calculate the benefits of each of the above control measures individually. It is not possible to isolate credit from one control program, and make it very difficult to calculate incremental benefits from implementation of individual control measures. As a result, this and future SIP revisions will not enumerate the benefits of individual non-road control measures. The table below summarizes the combined benefits from the above control measures by jurisdiction.

[baseline control run pending]

| | **VOC Emission Reductions (tons per day)** | | | |
|---|---|---|---|---|
| | **District of Columbia** | **Maryland** | **Virginia** | **Total** |
| 2008 VOC Reductions | | | | |
| 2009 VOC Reductions | | | | |

| | **NOx Emission Reductions (tons per day)** | | | |
|---|---|---|---|---|
| | **District of Columbia** | **Maryland** | **Virginia** | **Total** |
| 2008 NOx Reductions | | | | |
| 2009 NOx Reductions | | | | |

### 6.2.1 Enhanced Vehicle Emissions Inspection and Maintenance (Enhanced I/M)

This measure involves requiring a regional vehicle emissions inspection and maintenance (I/M) program with requirements stricter than "basic" programs, as required under 42 U.S.C. § 7511a(c)(3) and 7521. Before 1994, "basic" automobile emissions testing checked only tailpipe emissions while idling and sometimes at 2,500 rpm. The new procedures include a dynamometer (treadmill) test checks the car's emissions under driving conditions. In addition, evaporative emissions and the on-board diagnostic computer are checked.

**Source Type Affected**

This measure affects light-duty gasoline vehicles and light-duty gasoline trucks.

**Control Strategy**

Maryland, the District of Columbia, and Virginia committed to EPA Performance Standard Enhanced I/M programs in the 15% VOC Emissions Reduction Plan. Each affected vehicle in the region is given a high-tech emissions test every two years. In Maryland and the District of Columbia, emissions tests are performed at test-only stations. Virginia tests vehicles in stations that may also perform repairs.

**Implementation**

District of Columbia - Department of Public Works, Dept. of Consumer and Regulatory Affairs
Maryland - Motor Vehicles Administration
Virginia - Department of Environmental Quality

[Appendix] B contains detailed information regarding implementation of I/M programs in the District, Maryland, and Virginia.

**Projected Reductions and Emission Benefit Calculations**

Changes made to the mobile model during the development of MOBILE6 create synergistic effects between the different mobile control measures, making it difficult to isolate credit from one control program or calculate incremental benefits from implementation of individual control measures. As a result, this document does not enumerate the benefits of individual mobile control measures. See [Appendix] B for documentation of the MOBILE 6 modeling process.

**References**

U.S. Environmental Protection Agency, "Inspection/ Maintenance Program Requirements," Final Rule, 57 *Federal Register* 52950 (November 5, 1992).
U.S. Environmental Protection Agency, "I/M Costs, Benefits, and Impacts Analysis," Draft, February 1992.

### 6.2.2 Stage II Vapor Recovery

As a serious ozone nonattainment area, Washington was required, under 42 U.S.C. § 7511a(b)(3) and 7511a(c), to install stage II vapor recovery systems at gasoline pumps.

**Source Type Affected**

This measure affects gasoline service stations and will reduce vehicle refueling emissions. Refueling emissions are attributed to the evaporation of gasoline-rich vapors displaced from the storage tank during refueling. The system is composed of a nozzle covering the fill-pipe and a vapor line returning from the fill-pipe to the storage tank. The stage II system captures the fuel rich vapors from the vehicle fill-pipe and returns them to the storage tank. Returning saturated vapors to the storage tank reduces emissions by maintaining liquid/vapor equilibrium in the storage tank, thereby decreasing the evaporation potential.

**Control Strategy**

Stage II nozzles have been in place in the District of Columbia since 1977. Implementation of stage II is required in the Washington nonattainment regions of Maryland and Virginia by operation of the Clean Air Act Amendments of 1990, 42 U.S.C. § 7511a(b)(3) and 7511a(c). Those sections require adherence to a schedule of implementation, and set forth a standard for applicability (i.e., to stations of what size or what amount of gasoline sold per month). Maryland and Virginia adopted stage II regulations as a part of their November 15, 1992 SIP revisions.

**Projected Reductions**

The benefits of this program are reflected in the baseline inventory. No additional reductions are calculated.

**Emission Benefit Calculations**

Not applicable.

**References**

U.S. Environmental Protection Agency, *Technical Guidance -- Stage II Vapor Recovery Systems for Control of Vehicle Refueling Emissions at Gasoline Dispersing Facilities*, Volume 1, EPA-450/3-91-022a, November 1991.

1990 Base Year Emissions Inventory for Stationary, Anthropogenic, Biogenic Sources and Highway Vehicle Emissions of Ozone Precursors in the Washington, DC-MD-VA Metropolitan Statistical Nonattainment Area, Prepared for The District of Columbia, Maryland, and Virginia by the Metropolitan Washington Council of Governments, September 22, 1993.

### 6.2.3 Federal "Tier I" New Vehicle Emission and New Federal Evaporative Emissions Standards

Under 42 U.S.C. §7521, EPA issued a new and cleaner set of federal motor vehicle emission standards (Tier I standards), which were phased in beginning with model year 1994.

**Source Type Affected**

These federally implemented programs affected light-duty vehicles and trucks.

**Control Strategy**

The Federal Motor Vehicle Control Program requires more stringent exhaust emission standards as well as a uniform level of evaporative emission controls, demonstrated through the new federal evaporative test procedures. Under 42 U.S.C. §7521(g), all post-1995 model year cars must achieve the Tier I (or Phase I) exhaust standards, which are as follows. Emissions are in grams per mile, and are related to durability timeframes of 5 yrs/50,000 miles and 10 yrs/100,000 miles.

| Vehicle Type | *5 yrs/50,000 mi* | | | *10 yrs/100,000 mi* | | |
|---|---|---|---|---|---|---|
| | VOCs | CO | NOx | VOCs | CO | NOx |
| Light-duty vehicles; light-duty trucks (loaded weight 3,750 lbs) | 0.25 | 3.4 | 0.4* | 0.31 | 4.2 | 0.6* |
| Light-duty trucks (loaded weight of 3,751 to 5,750 lbs) | 0.32 | 4.4 | 0.7** | 0.40 | 5.5 | 0.97 |

*For diesel-fueled light-duty vehicles and for LDTs at 3,750 lbs, before model year 2004, the applicable NOx standards shall be 1.0 at 5 yrs/50,000 mi and 1.25 at 10 yrs/100,000.
**This NOx standard does not apply to diesel-fueled trucks of 3,751 to 5,750 lbs.

**Implementation**
This program is implemented by the EPA under 42 U.S.C. §7521.

**Projected Reductions and Emission Benefit Calculations**

On average, Tier I cars will emit 0.077 fewer grams of VOCs per mile than their predecessors. Changes made to the mobile model during the development of MOBILE6 create synergistic effects between the different mobile control measures, making it difficult to isolate credit from one control program or calculate incremental benefits from implementation of individual control measures. As a result, this and future SIP revisions do not enumerate the benefits of individual mobile control measures. See [Appendix] B for documentation detailing emission reductions for mobile source controls.

**References**

U.S. Environmental Protection Agency, Office of Mobile Sources, *User's Guide to MOBILE5*, Chapter 2, March 1993.

### 6.2.4 Tier 2 Motor Vehicle Emission Regulations

The U.S. EPA promulgated a rule on February 10, 2000 requiring more stringent tailpipe emissions standards for all passenger vehicles, including sport utility vehicles (SUVs), minivans, vans and pick-up trucks. These regulations also require lower levels of sulfur in gasoline, which will ensure the effectiveness of low emission-control technologies in vehicles and reduce harmful air pollution.

**Source Type Affected**
These federally implemented programs affect light-duty vehicles and trucks.

**Control Strategy**

The new tailpipe and sulfur standards require passenger vehicles to be 77 to 95 percent cleaner than those built before the rule was promulgated and will reduce the sulfur content of gasoline by up to 90 percent. The new tailpipe standards are set at an average standard of 0.07 grams per mile for NOx for all classes of passenger vehicles beginning in 2004. This includes all light-duty trucks, as well as the largest SUVs. Vehicles weighing less than 6000 pounds will be phased-in to this standard between 2004 and 2007.

Beginning in 2004, the refiners and importers of gasoline have the flexibility to manufacture gasoline with a range of sulfur levels as long as all of their production is capped at 300 parts per million (ppm) and their annual corporate average sulfur levels are 120 ppm. In 2005, the refinery average was set at 30 ppm, with a corporate average of 90 ppm and a cap of 300 ppm. Finally, in 2006, refiners met a 30 ppm average sulfur level with a maximum cap of 80 ppm.

As newer, cleaner cars enter the national fleet, the new tailpipe standards will significantly reduce emissions of nitrogen oxides from vehicles by about 74 percent by 2030.

**Implementation**
EPA implements this program under 40 CFR Parts 80, 85, and 86.

**Projected Reductions and Emission Benefit Calculations**
Changes made to the mobile model during the development of MOBILE6 create synergistic effects between the different mobile control measures, making it difficult to isolate credit from one control program or calculate incremental benefits from implementation of individual control measures. As a result, this and future SIP revisions do not enumerate the benefits of individual mobile control measures. See [Appendix] B for documentation of the MOBILE6 modeling process.

**References**

U.S. Environmental Protection Agency, "Control of Air Pollution from New Motor Vehicles: Tier 2 Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements," Final Rule, 65 *Federal Register 6697,* February 10, 2000.

### 6.2.5 Non-CTG VOCs RACT Greater Than 50 Tons Per Year

This measure involves requiring Reasonably Available Control Technology (RACT) standards to point sources emitting in excess of 25 tons per year (tpy) of VOCs. The Washington, D.C. metropolitan area, when designated as severe nonattainment for ozone, was obligated under the CAAA to implement RACT for major sources (25 tpy) not covered by EPA's Control Technique Guidance (CTG) documents. Under this measure, "reasonably available" control technologies were determined and implemented for industry sources with the potential to emit greater than 25 tpy. Maryland's RACT implementation involved three types of standards: 1) identification of major source categories and establishment of RACT for both major and non major sources in those categories; 2) RACT for categories that did not have major sources but together with all small sources were above major source threshold; and 3) specific RACT for sources that emitted more than 20 lbs of VOC day.

[States are currently in the process of recertifying RACT for point sources with the potential to emit greater than 50 tpy.]

**Source Type Affected**

RACT consists of a variety of control techniques that are generally available and cost-effective. Usually the EPA will issue a CTG, which documents the cost per ton of the control method and the size of the source that can best benefit from the control based on cost and technological feasibility. A CTG can include add-on equipment as well as emissions limits. If a CTG is not issued for a category that contains a major source, the state must develop a RACT regulation for that category.

This measure affects point sources with the potential to emit 25 tpy or more of VOCs. In Maryland, it affects both major and non major sources that together constitute emissions above 25 tons per day, small sources that together emit greater than 25 tons and point sources that emit more than 20 lbs of VOCs per day.

**Control Strategy**

Point sources are regulated through a state permit process in Maryland, Virginia and D.C. The states were required to develop and implement new RACT regulations for all non-CTG point sources emitting more than 25 tpy, which had not been previously regulated. All three states are in the process of recertifying RACT for the point sources emitting more than 50 tpy in the region. Each state has to determine which sources are affected and determine the emission reductions that will result from implementation of this rule. [data pending from states]

## Implementation

District of Columbia – Department of Environment
Maryland - Air and Radiation Management Administration
Virginia - Department of Environmental Quality

## Projected Reductions

| | VOC Emission Reductions (tons per day) | | | |
|---|---|---|---|---|
| | **District of Columbia** | **Maryland** | **Virginia** | **Total** |
| 2008 VOC Reductions | | | | |
| 2009 VOC Reductions | | | | |

## Emission Benefit Calculations

The benefits of requiring RACT to point sources with potential to emit greater than 25 tpy is already reflected in the 2002 baseline inventory. Emission benefits of RACT recertification will be calculated by identifying point sources emitting greater than 50 tpy that require an updated RACT, and applying a reduction potential to the baseline emissions. Table 6-1 lists the applicable point sources, the estimated reduction potential, and the expected reductions for sources in Virginia. Tables 6-2 and 6-3 present similar information for Maryland and the District, respectively.

**Table 6-1**
**Non-CTG VOC RACT Greater than 50 tpy (Virginia)**

[states to provide updated information, if any]

| Source Name | Uncontrolled Emissions (tpd) | Reduction Potential (%) | Reductions (tpd) |
|---|---|---|---|
| **2008** | | | |
| | | | |
| | | | |
| | | | |
| **2008 Totals** | | | |
| **2009** | | | |
| | | | |
| | | | |
| | | | |
| **2009 TOTALS** | | | |

**Table 6-2**
**Non-CTG VOC RACT greater than 50 tpy (Maryland)**

[states to provide updated information, if any]

| Source Name | Uncontrolled Emissions (tpd) | Reduction Potential (%) | Reductions (tpd) |
|---|---|---|---|
| **2008** | | | |
| | | | |
| | | | |
| **2008 Totals** | | | |
| **2009** | | | |
| | | | |
| | | | |
| **2009 TOTALS** | | | |

**Table 6-3**
**Non-CTG VOC RACT greater than 50 tpy (DC)**

[states to provide updated information, if any]

| Source Name | Uncontrolled Emissions (tpd) | Reduction Potential (%) | Reductions (tpd) |
|---|---|---|---|
| **2008** | | | |
| | | | |
| | | | |
| **2008 Totals** | | | |
| **2009** | | | |
| | | | |
| | | | |
| **2009 TOTALS** | | | |

**References**

Staff engineers at the Virginia Department of Environmental Quality, the Maryland Department of the Environment, and the District of Columbia Department of Environment supplied reduction potential estimates.

### 6.2.6 Phase II Gasoline Volatility Controls

This measure takes credit for lower refueling emissions resulting from the effects of federally mandated reductions in gasoline volatility, as required under 42 U.S.C. §§7545 (h) and (k). The measure affects emissions from light-duty gasoline vehicles and light-duty gasoline trucks.

**Control Strategy**

The volatility reductions under §7545 (h) became effective in summer 1992. Further volatility reductions required under §7545 (k) are associated with the reformulated gasoline (see measures 6.4.1 and 6.4.2) that began selling in the Washington nonattainment area on January 1, 1995.

**Implementation**

This program is implemented by the EPA under 42 U.S.C. §§7545 (h) and (k).

**Projected Reductions and Emission Benefit Calculations**

Changes made to the mobile model during the development of MOBILE6 create synergistic effects between the different mobile control measures, making it difficult to isolate credit from one control program or calculate incremental benefits from implementation of individual control measures. As a result, this and future SIP revisions do not enumerate the benefits of individual mobile control measures. See [Appendix] B for documentation of the MOBILE6 modeling process.

**References**

1990 Clean Air Act Amendments, 42 U.S.C. §§7545 (h) and (k).

### 6.2.7 Phase I and Phase II Emissions standards for gasoline-powered non-road utility engines

This measure takes credit for VOC emissions reductions attributable to emissions standards promulgated by the EPA for small non-road, spark-ignition (i.e., gasoline-powered) utility engines, as authorized under 42 U.S.C. §7547. The measure affects gasoline-powered (or other spark-ignition) lawn and garden equipment, construction equipment, chain saws, and other such utility equipment as chippers and stump grinders, wood splitters, etc., rated at or below 19 kilowatts (an equivalent of 25 or fewer horsepower). Phase 2 of the rule applied further controls on handheld and non-handheld outdoor equipment.

**Control Strategy**

Federal emissions standards promulgated under §7547 (a) apply to spark-ignition non-road utility engines. The EPA's Phase 1 Spark Ignition Nonroad final rule on such emissions standards was published in 60 *Federal Register 34581* (July 3, 1995), and was effective beginning August 2, 1995. Compliance was required by the 1997 model year. The Phase 2 final rule for handheld nonroad equipment was published in 65 *Federal Register* 24267 (April 25, 2000). The Phase 2 final rule for non-handheld equipment was published in 64 *Federal Register* 36423 (July 6, 1999).

**Implementation**

This program is implemented by the EPA, under 42 U.S.C. §7547 (a).

**Projected Reductions and Benefit Calculations**

Changes made to the model during the development of NONROAD2005 create synergistic effects between the different non-road control measures, making it difficult to isolate credit from one control program or calculate incremental benefits from implementation of individual control measures. As a result, this and future SIP revisions do not enumerate the benefits of individual non-road control measures. [A detailed non-road inventory is contained in Appendix C. ]

[The benefits of this program are reflected in the baseline inventory. No additional reductions are calculated.]

**References**

EPA Guidance Memorandum, "Future Nonroad Emission Reduction Credits for Court-Ordered Nonroad Standards" from Emission Planning and Strategies Division, Memorandum from Phil Lorang, Director, Emission Planning and Strategies Division, November 28, 1994.

U.S. Environmental Protection Agency, "Emission Standards for New Nonroad Spark-Ignition Engines at or Below 19 Kilowatts", Final Rule, 60 *Federal Register* 34581 (July 3, 1996).

U.S. Environmental Protection Agency, "Phase 2 Emission Standards for New Nonroad Spark-Ignition Nonhandheld Engines At or Below 19 Kilowatts", Final Rule, 64 *Federal Register* 36423, (July 6, 1999)

U.S. Environmental Protection Agency, "Phase 2 Emission Standards for New Nonroad Spark-Ignition Handheld Engines at or Below 19 Kilowatts", Final Rule, 65 Federal Register 24267 (April 25, 2000)

1990 Clean Air Act Amendments, 42 U.S.C. §7547 (a).

### 6.2.8 Emissions standards for diesel-powered non-road utility engines of 50 or more horsepower

This measure takes credit for NOx emissions reductions attributable to emissions standards promulgated by the EPA for non-road, compression-ignition (i.e., diesel-powered) utility engines, as authorized under 42 U.S.C. § 7547. The measure affects diesel-powered (or other compression-ignition) construction equipment, industrial equipment, etc., rated at or above 37 kilowatts (37 kilowatts is approximately equal to 50 horsepower).

**Control Strategy**

Federal emissions standards applicable to compression-ignition non-road utility engines were promulgated under §7547 (a). The EPA's final rule on such emissions standards was published in 59 *Federal Register* 31306 (June 17, 1994), and was effective on July 18, 1994.

**Implementation**

This program is implemented by the EPA under 42 U.S.C. § 7547 (a).

**Projected Reductions and Benefit Calculations**

Changes made to the model during the development of NONROAD2005 create synergistic effects between the different non-road control measures, making it difficult to isolate credit from one control program or calculate incremental benefits from implementation of individual control measures. As a result, this and future SIP revisions do not enumerate the benefits of individual non-road control measures. [A detailed nonroad inventory is contained in Appendix C. ]

[The benefits of this program are reflected in the baseline inventory. No additional reductions are calculated.]

**References**

1990 Clean Air Act Amendments, 42 U.S.C. §7547 (a).

EPA Guidance Memorandum, "Future Nonroad Emission Reduction Credits for Court-Ordered Nonroad Standards" from Emission Planning and Strategies Division, Memorandum from Phil Lorang, Director, Emission Planning and Strategies Division, November 28, 1994.

U.S. Environmental Protection Agency," Determination of Significance for Nonroad Sources and Emission Standards for New Nonroad Compression-Ignition Engines At or Above 37 Kilowatts", Final Rule, 59 *Federal Register* 31306 (June 17, 1994).

### 6.2.9 NOx RACT and Regional NOx Transport Requirements

This section documents credit for NOx emissions reductions attributable to federal and regional NOx requirements on point sources. These credits include:

- Reasonably Available Control Technology ("RACT"), as required under 42 U.S.C. § 7511a (f) (read in conjunction with §§ 7511a (b)(2) and (c));
- "NOx Budget" rules that required a second phase of stationary source NOx reductions as part of a coordinated regulatory initiative by the Ozone Transport Region (OTR) states to further reduce NOx emissions in the Northeast;
- the "NOx SIP Call" to reduce ozone transport in the Eastern United States;
- EPA's Clean Air Interstate Rule (CAIR); and
- Maryland's Healthy Air Act and Clean Power Regulations.

**Control Strategy**

RACT

Major point sources of NOx are subject to RACT requirements created by D.C., Maryland and Virginia in response to §7511a (f). In the Washington DC region, NOx reduction controls must be applied to sources that have the potential to emit 25 tons per year or more of NOx.

Maryland, Virginia, and DC completed the requirements of RACT under the 1-hour ozone standard in the late 1990's. EPA is requiring that the states review and recertify RACT under the 8-hour ozone standard. This recertification is due to EPA by September 15, 2006. In this process, each state is reviewing existing RACT rules, existing sources and potentially new source categories to ensure RACT requirements are being met. Additional emission reductions from this recertification process are expected to be small and the exact quantity of additional reductions is uncertain at this time.

NOx OTC Phase II Budget Rules

In the late 1990's Maryland and the District adopted "NOx Budget" rules to require a second phase of stationary source NOx reductions as part of a coordinated regulatory initiative by the OTR states to further reduce NOx emissions in the Northeast. The rules required large stationary sources to reduce summertime NOx emissions by approximately 65% from 1990 levels. The regulation also included provisions allowing sources to comply by trading "allowances." This regulation required affected sources to reduce their emissions to meet these requirements by May 2001.

NOx SIP Call

In late 1998, the U.S. EPA adopted a rule called the "NOx SIP Call" to reduce ozone transport in the Eastern United States. This regional NOx reduction program required 22 states, including Maryland and Virginia, and the District of Columbia, to further reduce large point source NOx emissions to EPA identified state emission budget levels by 2007. State regulation adoption timelines notwithstanding the majority of the 22 SIP call states had these regulations in place by 2003/2004.

Clean Air Interstate Rule (CAIR)

In 2004, the U.S. EPA promulgated the Clean Air Interstate Rule, which requires reductions in emissions of NOx and SO2 from large fossil fuel-fired electric generating units. The rule is set up in several phases with the first phase of NOx reductions to come by 2009. The rule sets up both an annual emissions budget and an ozone season emissions budget. The rule requires that units with nameplate capacity greater than 25 megawatts emit no more NOx than their allocations determined by the state either through emission controls or banking and trading.

Virginia CAIR

Virginia has adopted state regulations codifying the requirements of the Clean Air Interstate Rule. Virginia does not allow trading of NOx allowances for facilities that operate in ozone nonattainment areas.

Maryland Healthy Air Act and Clean Power Rule

In April of 2006 the Maryland General Assembly and Governor Ehrlich adopted the Healthy Air Act (HAA), a law that will require reductions in NOx, SO2, and Mercury emissions from Maryland's largest and oldest coal fired power plants. This law mirrors proposed regulations called the Maryland Clean Power Regulations, which were also being developed during the spring of 2006. Maryland is in the process of implementing the HAA through regulations.

When finally adopted, these regulations will require reductions in NOx emissions from coal-fired electric generating units (excluding fluidized bed combustion units) starting in 2009. By 2009 Maryland expects an approximate 80% reduction in NOx emissions from these regulations when compared to 2002 emissions. To meet the requirements of Maryland's regulations a company's "system" (covered units owned by the same company) must meet a system-wide cap by 2009. Compliance cannot be achieved through the purchase of allowances under the HAA.

District of Columbia CAIR

The District of Columbia is currently drafting its Clean Air Interstate Rule (CAIR). The District of Columbia's CAIR regulations do not allow trading of NOx allowances for achieving the reductions for the facilities within its jurisdiction.

Summary

The point source NOx controls are a phased approach to controlling emissions of NOx from power plants and other large fuel combustion sources. The programs resulting in emission reductions from point sources in the region include:

- The NOx SIP Call rule
- EPA's Clean Air Interstate Rule
- Maryland's Healthy Air Act and Clean Power Rule

NOx reductions resulting from these controls are presented by source for Maryland in Tables 6-4 and 6-5, for Virginia in Tables 6-6 and 6-7, and for the District in Tables 6-8 and 6-9. Table 6-10 summarizes emission reductions by jurisdiction and for the region for each of the NOx point source controls listed in Tables 6-4 through 6-9.

In Maryland, the expected emission reductions for 2008 and 2009 were calculated using the emissions estimates consistent with annual allocations anticipated under the proposed Emergency Clean Power Rule. The program does not allow trading of NOx allowances. The expected emissions reductions are listed in Tables 6-4 and 6-5.

In Virginia, the expected emission reductions for 2008 and 2009 from electric generating utilities were calculated using knowledge of historical NOx emission rates, adjusted by the expected control efficiencies achieved from various control devices that have been installed, or by estimating the amount of allowances the facility would receive under the Virginia CAIR rule. The expected emissions reductions are listed in Tables 6-6 and 6-7.

In the District, the expected emission reductions for 2008 and 2009 were calculated using the listed allowances within the Clean Air Interstate Rule. The expected emissions reductions are listed in Tables 6-8 and 6-9.

See Appendix E for further point source documentation. [states to provide updated documentation]

**Table 6-4**
**2008 NOx Point Source Reductions for Maryland (tons per day)**

| Facility | 2008 Uncontrolled Emissions | Reductions | | | Total Emission Red. |
|---|---|---|---|---|---|
| | | RACT | NOx SIP Call | Healthy Air Act/Clean Power Rule | |
| Dickerson | 25.613 | 0 | 0 | 0 | 0 |
| Chalk Point | 50.586 | 0 | 0 | 0 | 0 |
| Morgantown | 78.512 | 0 | 0 | 0 | 0 |
| **Total 2008 Reductions** | | **0** | **0** | **0** | **0** |

**Table 6-5**
**2009 NOx Point Source Reductions for Maryland (tons per day)**

| Facility | 2009 Uncontrolled Emissions | Reductions | | | Total Emission Red. |
|---|---|---|---|---|---|
| | | RACT | NOx SIP Call | Healthy Air Act/Clean Power Rule[1] | |
| Dickerson | 25.902 | 0 | 0 | 18.813 | 18.813 |
| Chalk Point | 50.525 | 0 | 0 | 34.836 | 34.836 |
| Morgantown | 78.207 | 0 | 0 | 51.025 | 51.025 |
| **Total 2009 Reductions** | **154.634** | **0** | **0** | **104.674** | **104.674** |

[1] Healthy Air Act/Clean Power Rule emission reduction estimates based on a draft regulation that imposes ozone season limits on the affected sources.

**Table 6-6**
**2008 NOx Point Source Reductions for Virginia (tons per day)**

| Facility ID | Facility Name | 2008 Baseline Emissions Tons/day | Reductions Tons/day | | | Total Emission Reductions Tons/day | 2008 Estimated Emissions Tons/day |
|---|---|---|---|---|---|---|---|
| | | | NSR | RACT | NOx SIP Call | | |
| 51-153-0002 70225 | Dominion Possum Point Power Station | 16.217 | 3.435[(1)] | | | 3.435 | 12.782 |
| 51-510-0003 70228 | Mirant-Potomac River Power Plant | 20.158 | | | 4.194 | 4.194 | 15.964 |
| 51-153-0139 72340 | Prince William County Department of Public Works | 0.115 | | 0.01 | | 0.01 | 0.105 |
| | | | | | | 7.639 | 28.851 |

[(1)]70225 went through a PSD netting exercise resulting in a permit that required emission reductions of NOx. See permit dated 10/5/01.

**Table 6-7**
**2009 NOx Point Source Reductions for Virginia (tons per day)**

| Facility ID | Facility Name | 2009 Baseline Emissions Tons/day | Reductions Tons/day | | | | Total Emission Reduced Tons/day | 2009 Estimated Emissions Tons/day |
|---|---|---|---|---|---|---|---|---|
| | | | NSR | RACT | NOx SIP Call | CAIR | | |
| 51-153-0002 70225 | Dominion Possum Point Power Station | 16.240 | 3.435 | | | 4.485[(1)] | 7.920[(1)] | 8.320 |
| 51-510-0003 70228 | Mirant-Potomac River Power Plant | 20.415 | | | 4.194 | 8.914[(1)] | 13.108 | 7.307[(1)] |
| 51-153-0139 72340 | Prince William County Department of Public Works | 0.115 | | 0.01 | | | 0.01 | 0.105 |
| | | | | | | | 21.038 | 15.732 |

[(1)]Actual CAIR allocations have not yet been calculated by VA staff. These reductions and emission rates are estimates based on past heat input rates and the CAIR emission rate of 0.15 lbs NOx/mmbtu.

**Table 6-8**
**2008 NOx Point Source Reductions for the District of Columbia (tpd)**

| Facility | 2008 Uncontrolled Emissions | Reductions | | | Total Emission Red. |
|---|---|---|---|---|---|
| | | RACT | NOx SIP Call | CAIR | |
| Pepco - Benning | 4.04 | - | 2.62 | N/A | 2.62 |
| Pepco - Buzzard | 2.82 | - | 0 | N/A | 0 |
| Capitol Power Plant | 0.51 | - | 0 | 0 | 0 |
| GSA West & Central Heating | 0.26 | - | 0.10 | 0 | 0.10 |
| Georgetown Univ. Power Plant | 0.08 | - | 0 | 0 | 0 |
| U.S. Soldiers Home | 0.03 | - | 0 | 0 | 0 |
| **Total 2008 Reductions** | | - | **2.72** | **0** | **2.72** |

**Table 6-9**
**2009 NOx Point Source Reductions for the District of Columbia (tpd)**

| Facility | 2009 Uncontrolled Emissions | Reductions | | | Total Emission Red. |
|---|---|---|---|---|---|
| | | RACT | NOx SIP Call | CAIR | |
| Pepco - Benning | 6.28 | - | 4.35 | 1.11 | 5.46 |
| Pepco - Buzzard | | - | | | |
| Capitol Power Plant | 0.51 | - | 0 | 0 | 0 |
| GSA West & Central Heating | 0.27 | - | 0.11 | 0 | 0.11 |
| Georgetown Univ. Power Plant | 0.08 | - | 0 | 0 | 0 |
| U.S. Soldiers Home | 0.03 | - | 0 | 0 | 0 |
| **Total 2009 Reductions** | | - | **4.46** | **1.11** | **5.57** |

The CAIR reductions reflect the allotted allowances for the District of Columbia (95% of 112 tps); The District is not separating the allowances between the two Pepco sources.

**Table 6-10**
**Point Source NOx Reductions Summary (tons per day)**

| Control | District of Columbia | Maryland | Virginia | Total |
|---|---|---|---|---|
| **2008** | | | | |
| NSR | - | 0 | 3.435 | 3.435 |
| NOx RACT | - | 0 | 0.01 | 0.01 |
| NOx SIP Call | 2.82 | 0 | 4.194 | 7.014 |
| CAIR | - | 0 | 0 | |
| Healthy Air Act/Clean Power Rule | - | 0 | 0 | |
| **Total 2008 Reductions** | **2.82** | **0** | **7.639** | **10.459** |
| **2009** | | | | |
| NSR | - | 0 | 3.435 | 3.435 |
| NOx RACT | - | 0 | 0.01 | 0.01 |
| NOx SIP Call | 4.56 | 0 | 4.194 | 8.754 |
| CAIR | 1.11 | 0 | 13.399 | 14.509 |
| Healthy Air Act/Clean Power Rule | - | 104.674 | 0 | 104.674 |
| **Total 2009 Reductions** | **5.67** | **104.674** | **21.038** | **131.382** |

**Implementation**

District Department of the Environment
Maryland - Air and Radiation Management Administration
Virginia - Department of Environmental Quality

**Projected Reductions**

| | NOx Emission Reductions (tons per day) | | | |
|---|---|---|---|---|
| | **District of Columbia** | **Maryland** | **Virginia** | **Total** |
| 2008 NOx Reductions | | 0 | 7.639 | |
| 2009 NOx Reductions | | 104.674 | 21.015 | |

**Emission Benefit Calculations**

The emission reductions associated with the state NOx requirements on point sources were supplied by the staffs of the Maryland Air and Radiation Management Administration, the District Department of the Environment, and the Virginia Department of Environmental Quality Air Division.

**References**

1990 Clean Air Act Amendments, 42 U.S.C. §§7511a (f), (b)(2), and (c).

### 6.2.10 Emissions standards for spark ignition marine engines

This EPA measure controls exhaust VOC emissions from new spark-ignition (SI) gasoline marine engines, including outboard engines, personal watercraft engines, and jet boat engines. Of nonroad sources studied by EPA, gasoline marine engines were found to be one of the largest contributors of hydrocarbon (HC) emissions (30% of the nationwide nonroad total).

**Control Strategy**

EPA is imposing emission standards for 2 – stroke technology, outboard and personal watercraft engines. This will involve increasingly stringent HC control over the course of a nine-year phase-in period beginning in model year 1998. By the end of the phase-in, each manufacturer must meet an HC and NOx emission standard that represents a 75% reduction in HC compared to unregulated levels. These standards do not apply to any currently owned engines or boats.

**Implementation**

This program is implemented by the EPA under 42 U.S.C. § 7547 (a).

**Projected Reductions and Benefit Calculations**

Changes made to the model during the development of NONROAD2005 create synergistic effects between the different non-road control measures, making it difficult to isolate credit from one control program or calculate incremental benefits from implementation of individual control measures. As a result, this and future SIP revisions do not enumerate the benefits of individual non-road control measures. [A detailed nonroad inventory is contained in Appendix C. ]

[The benefits of this program are reflected in the baseline inventory. No additional reductions are calculated.]

**References**

1990 Clean Air Act Amendments, 42 U.S.C. §7547 (a).

Code of Federal Register (40 CFR Parts 89, 90 and 91) rule entitled Control of Air Pollution; Final Rule for New Gasoline Spark-Ignition Marine Engines; Exemptions for New Nonroad Compression-Ignition Engines at or Above 37 Kilowatts and New Nonroad Spark-Ignition Engines at or Below 19 Kilowatts

Regulatory Impact Analysis "Control of Air Pollution Emission Standards for New Nonroad Spark-Ignition Marine Engines", U.S. EPA, June 1996

### 6.2.11 Emissions standards for large spark ignition engines

This EPA measure controls VOC and NOx emissions from several groups of previously unregulated nonroad engines, including large industrial spark-ignition engines.

**Control Strategy**

The new EPA requirements vary depending upon the type of engine or vehicle, taking into account environmental impacts, usage rates, the need for high performance models, costs and other factors. The emission standards apply to all new engines sold in the United States and any imported engines manufactured after these standards begin.

Controls on the category of large industrial spark-ignition engines are first required in 2004. Controls on the other engine categories are required beginning in years after 2005. Large industrial spark-ignition engines are those rated over 19 kW used in a variety of commercial applications; most use liquefied petroleum gas, with others operating on gasoline or natural gas.

EPA adopted two tiers of emission standards for Large SI engines. The first tier of standards, scheduled to start in 2004, are based on a simple laboratory measurement using steady-state procedures. The Tier 1 standards are the same as those adopted earlier by the California Air Resources Board for engines used in California. As Tier 2 standards will not become effective until 2007, they are not included in this document.

**Implementation**

This program is implemented by the EPA under 42 U.S.C. § 7547 (a).

**Projected Reductions and Benefit Calculations**

Changes made to the model during the development of NONROAD2005 create synergistic effects between the different non-road control measures, making it difficult to isolate credit from one control program or calculate incremental benefits from implementation of individual control measures. As a result, this and future SIP revisions do not enumerate the benefits of individual non-road control measures. [A detailed nonroad inventory is contained in Appendix C. ]

[The benefits of this program are reflected in the baseline inventory. No additional reductions are calculated.]

**References**

1990 Clean Air Act Amendments, 42 U.S.C. §7547 (a).

U.S. Environmental Protection Agency, "Control of Emissions From Nonroad Large Spark-Ignition Engines, and Recreational Engines (Marine and Land-Based)," Final Rule, 67 Federal Register 68241 (November 8, 2002).

U.S. Environmental Protection Agency, Final Regulatory Support Document: Control of Emissions from Unregulated Nonroad Engines," EPA420-R-02-022, September 2002.

## 6.3 Federal programs

### 6.3.1 Reformulated surface coatings

This measure involved adopting the federal rule resulting from the National Regulatory Negotiation for Architectural and Industrial Maintenance (AIM) Coatings, which restricts the VOC content of architectural, industrial maintenance, special industrial, and highway markings surface coatings sold and used in the Washington, D.C. ozone nonattainment area. This rule was adopted on September 11, 1998 (63 FR 48819), corrected on June 30, 1999 (64 FR 34997) and amended on February 16, 2000 (65 FR 7736). Compliance was required by September 13, 1999, or March 10, 2000.

**Source Type Affected**

This measure affects makers of architectural, industrial maintenance, special industrial, and highway markings surface coatings.

**Control Strategy**

The measure is based on the national regulatory negotiation for AIM coatings. According to EPA guidance, the final rule yields a 20% reduction in VOC emissions from AIM coating sources. This estimate includes consideration of rule effectiveness and rule penetration.

Reductions for AIM coatings are achievable through product reformulations, product substitution, and consumer education. Reformulations include altering the components of the coating to achieve a lower VOC content, replacing VOC solvents with water or alternative non-VOC solvents, and increasing the solids content of the coating thereby reducing the volume applied. Product substitution is accomplished by replacing higher-VOC coatings with currently available lower-VOC coatings. Consumer education will provide information on the relative cost of lower-VOC coatings and encourage careful, efficient use of such products.

**Implementation**

This program is implemented by the EPA under 42 U.S.C. §7511 (b).

**Projected Reductions**

The benefits of this program are reflected in the baseline inventory. No additional reductions are calculated.

**Emission Benefit Calculations**

Not applicable.

**References**

National Volatile Organic Compound Emission Standards for Architectural, Preamble Section IV.A.1 (63 FR 48819), September 11, 1998.

U.S. Environmental Protection Agency, "Credit for the 15% rate-of-progress Plans for Reductions from Architectural and Industrial Maintenance Coating Rule ", Memorandum from John S. Seitz, Director, to directors of Air Divisions of EPA Regional Offices, March 22, 1995.

U.S. Environmental Protection Agency, "Credit for the 15% rate-of-progress Plans for Reductions from Architectural and Industrial Maintenance Coating Rule and the Autobody Refinishing Rule", Memorandum from John S. Seitz, Director, to directors of Air Divisions of EPA Regional Offices, November 21, 1994.

*Meeting the 15-Percent Rate-of-Progress Requirement Under the Clean Air Act: A Menu of Options*, STAPPA/ALAPCO, September 1993.

### 6.3.2 Reformulated Consumer Products

This measure required that certain consumer products sold in the Washington, D.C. ozone nonattainment area be reformulated to reduce their VOC content. The measure is based upon regulations that EPA was required to publish by November 15, 1995 under 42 U.S.C. 7511b(e)(3). The final regulation was adopted on September 11, 1998 (63 FR 48848).

**Source Type Affected**

The measure affects manufacturers of the various specialty chemicals that EPA selected, after conducting a study consistent with 42 U.S.C. 7511b(e)(2).

**Control Strategy**

The measure relies upon federal implementation of a rule mandating reformulation of certain "consumer or commercial products" (as that term is defined under 42 U.S.C. 7511b(e)(1)(B)). Under §7511b(e)(3), EPA was required to create by November 15, 1995, regulations to require reformulation of one-fourth of the "consumer or commercial products" that are responsible for at least 80% of photochemically reactive VOC emissions from such products.

EPA guidance from John Seitz specifies a 10% total reduction of emissions from a regulated subset of consumer products. EPA estimated the regulated subset to be approximately 3.9 pounds per capita annually. Consequently, a total of 10% of the "commercial or consumer products" were expected to be subject to reformulation requirements by November 15, 1999. EPA guidance also allows states to retain emission reduction estimates for consumer and commercial product reformulations in their 15% Plans.

**Implementation**

This measure was federally implemented under a federal regulatory calendar initially issued in *60 Federal Register 15264*, finalized in *63 Federal Register 48791* and amended in *64 Federal Register 13422* (March 18, 1999). This program is implemented by the EPA under 42 U.S.C. §7511 (b).

**Projected Reductions**

The benefits of this program are reflected in the baseline inventory. No additional reductions are calculated.

**Emission Benefit Calculations**

Not applicable.

**References**

National Volatile Organic Compound Emission Standards for Consumer Products, Preamble Section III.A. (63 FR 48848), September 11, 1998.

1990 Clean Air Act Amendments, 42 U.S.C. 7511b(e).

U.S. Environmental Protection Agency, "Regulatory Schedule for Consumer and Commercial Products under Section 183 (e) of the Clean Air Act", Memorandum from John S. Seitz, Director, to directors of Air Divisions of EPA Regional Offices, June 21, 1995.

Commercial and Consumer Products: Schedule for Regulation (64 FR 13422), March 18, 1999.

### 6.3.3 National Low Emission Vehicle Program

Under the National Low-Emission Vehicle (LEV) program, auto manufacturers have agreed to comply with tailpipe standards that are more stringent than EPA can mandate prior to model year (MY) 2004. Once manufacturers committed to the program, the standards became enforceable in the same manner that other federal motor vehicle emissions control requirements are enforceable. The program went into effect throughout the Ozone Transport Region (OTR), including Maryland, Virginia, and the District of Columbia, in model year 1999 and was in place nationwide in model year 2001.

**Source Type Affected**

These federally implemented programs affect light-duty vehicles and trucks.

**Control Strategy**

The National Low Emission Vehicle Program requires more stringent exhaust emission standards than the Federal Motor Vehicle Control Program Tier I (or Phase I) exhaust standards.

**Implementation**

This program is implemented by the EPA, under 40 CFR Part 86 Subpart R. Nine states within the OTR, including the MWAQC states, have opted-in to the program as have all the auto manufacturers. EPA found the program to be in effect on March 2, 1998.

**Projected Reductions and Emission Benefit Calculations**

[The benefits of this program are reflected in the baseline inventory. No additional reductions are calculated.]

[Changes made to the mobile model during the development of MOBILE6 create synergistic effects between the different mobile control measures, making it difficult to isolate credit from one control program or calculate incremental benefits from implementation of individual control measures. As a result, this and future SIP revisions do not enumerate the benefits of individual mobile control measures. See [Appendix] B for documentation of the MOBILE6 modeling process.]

**References**

U.S. Environmental Protection Agency, Office of Mobile Sources, *User's Guide to MOBILE5*, Chapter 2, March 1993.

### 6.3.4 Reformulation of Industrial Cleaning Solvents

This measure required that certain industrial cleaning solvents sold in the Washington, D.C. ozone nonattainment area be reformulated to reduce their VOC content. The measure is based upon regulations that, under 42 U.S.C. 7511b(e)(3), EPA was required to publish by November 15, 1995. The industrial cleaning solvent standards were adopted in 2001.

**Source Type Affected**
The measure affects manufacturers of the various specialty chemicals that EPA will select, after conducting a study consistent with 42 U.S.C. § 7511b(e)(2).

**Control Strategy**

The measure relies upon federal implementation of a rule mandating reformulation of certain "consumer or commercial products" (as that term is defined under 42 U.S.C. § 7511b(e)(1)(B)). Under § 7511b(e)(3), EPA must create by November 15, 1995, regulations to require reformulation of one-fourth of the "consumer or commercial products" that are responsible for at least 80% of photochemically reactive VOC emissions from such products.

EPA guidance from John Seitz specifies a 10% total reduction of emissions from a regulated subset of consumer products. This is used as a benchmark for estimating reductions in industrial cleaning solvents.

**Implementation**
This program was implemented by the EPA in 2001 under a schedule adopted on March 18, 1999. The program is implemented under 42 U.S.C. §7511 (b).

**Projected Reductions**

The benefits of this program are reflected in the baseline inventory. No additional reductions are calculated.

**Emission Benefit Calculations**

Not applicable.

**References**

1990 Clean Air Act Amendments, 42 U.S.C. 7511b(e).

U.S. Environmental Protection Agency, "Regulatory Schedule for Consumer and Commercial Products under Section 183 (e) of the Clean Air Act", Memorandum from John S. Seitz, Director, to directors of Air Divisions of EPA Regional Offices, June 21, 1995.

Federal Register Vol. 64 No. 52, Thursday, March 18, 1999 (AD FLR-6311-9) p. 13422 – 13424

### 6.3.5 Standards for Locomotives

This sets NOx standards for locomotive engines remanufactured and manufactured after 2001.

**Source Type Affected**

This program includes all locomotives originally manufactured from 2002 through 2004. It also applies to the remanufacture of all engines built since 1973. Regulation of the remanufacturing process is critical because locomotives are generally remanufactured 5 to 10 times during their total service lives, which are typically 40 years or more.

**Control Strategy**

Three separate sets of emissions standards have been adopted, with the applicability of the standards dependent on the date a locomotive is first manufactured. The first set of standards (Tier 0) applies to locomotives and locomotive engines originally manufactured from 1973 through 2001, any time they are manufactured or remanufactured. The second set of standards (Tier 1) apply to locomotives and locomotive engines originally manufactured from 2002 through 2004. These locomotives will be required to meet the Tier 1 standards at the time of manufacture and at each subsequent remanufacture. The final set of standards (Tier 2) apply to locomotives and locomotive engines originally manufactured in 2005 and later. Electric locomotives, historic steam-powered locomotives and locomotives manufactured before 1973 do not significantly contribute to the emissions problem and, therefore, are not included in the regulation.

**Implementation**

This program is implemented by the EPA under the *Final Emissions Standards for Locomotives* (EPA420-F-97-048) published in December 1997.

**Projected Reductions**

| | NOx Emission Reductions (tons per day) | | | |
|---|---|---|---|---|
| | **District of Columbia** | **Maryland** | **Virginia** | **Total** |
| 2008 NOx Reductions | | | | |
| 2009 NOx Reductions | | | | |

| | NOx Emission Reductions (tons per day) | | | |
|---|---|---|---|---|
| | District of Columbia | Maryland | Virginia | Total |
| 2008 VOC Reductions | | | | |
| 2009 VOC Reductions | | | | |

## Emission Benefit Calculations

Emission benefits are based on EPA guidance on emission factors for locomotives. In 2008, the reductions are 10.3% for VOC and 30.7% for NOx. In 2009, the reductions are 13.5% for VOC and 32.35% for NOx.

## References

*Regulatory Update, EPA's Nonroad Engine Emissions Control Programs,* EPA, Air and Radiation, EPA420-F-99-001, January 1999.

*Final Emissions Standards for Locomotives,* EPA420-F-97-048, December 1997.

*Emission Factors for Locomotives*, EPA420-F-97-051, December 1997, Table 9.

### 7.3.6 Heavy-Duty Diesel Engine Rule

Under the Heavy-Duty Diesel Engine Rule, truck manufacturers must comply with more stringent tailpipe standards by 2004 and 2007. The standards are enforceable in the same manner that other federal motor vehicle emissions control requirements are enforceable.

**Source Type Affected**

These federally implemented programs affect heavy-duty diesel engines used in trucks.

**Control Strategy**

The Heavy-Duty Diesel Engine Rule requires more stringent exhaust emission standards.

**Implementation**

This program is implemented by the EPA, under 40 CFR Parts 9 and 86 Control of Emissions of Air Pollution From Highway Heavy-Duty Engines; Final Rule.

**Projected Reductions and Emission Benefit Calculations**

Changes made to the mobile model during the development of MOBILE6 create synergistic effects between the different mobile control measures, making it difficult to isolate credit from one control program or calculate incremental benefits from implementation of individual control measures. As a result, this and future SIP revisions do not enumerate the benefits of individual mobile control measures. See [Appendix] B for documentation of the MOBILE6 modeling process.

**References**

U.S. Environmental Protection Agency, Office of Mobile Sources, *User's Guide to MOBILE5*, Chapter 2, March 1993.

40 CFR Parts 9 and 86 Control of Emissions of Air Pollution from Highway Heavy-Duty Engines; Final Rule (62 FR 54694), October 21, 1997.

## 6.4 State and local measures

### 6.4.1 Reformulated gasoline use in on-road vehicles

This measure requires the use of federal reformulated gasoline in the Washington nonattainment area. This is accomplished through an opt-in to the federal program, which is mandatory in more severe ozone nonattainment areas.

**Source Type Affected**

All gasoline-powered vehicles (non-road source benefits are documented under Section 6.4.2) are affected by this measure. Vehicle refueling emissions at service stations are also reduced.

**Control Strategy**

Federal reformulated gasoline has been sold in the Washington, DC-MD-VA ozone nonattainment area since January 1, 1995.

**Implementation**

Implementation occurs through a state "opt-in" process. The governors of Maryland and Virginia and the mayor of the District of Columbia have "opted in" for, and EPA has approved, delivery of reformulated gasoline in their respective portions of the Washington, DC-MD-VA ozone nonattainment area. All gasoline sold in the nonattainment area on or after January 1, 1995, must be reformulated gasoline.

**Projected Reductions and Emission Benefit Calculations**

Changes made to the mobile model during the development of MOBILE6 create synergistic effects between the different mobile control measures, making it difficult to isolate credit from one control program or calculate incremental benefits from implementation of individual control measures. As a result, this document does not enumerate the benefits of individual mobile control measures, nor will future SIP revisions. See [Appendix] B for documentation detailing emission reductions for mobile source controls.

[The benefits of this program are reflected in the baseline inventory. No additional reductions are calculated.]

**References**

U.S. Environmental Protection Agency, Office of Mobile Sources, *User's Guide to MOBILE6.0*, Chapter 2, January 2002.

### 6.4.2 Reformulated gasoline use in non-road motor vehicles and equipment

This measure involves taking credit for reductions due to the use of federally reformulated gasoline in non-road mobile sources. The reformulated gasoline will be available as a result of Virginia's, Maryland's, and the District of Columbia's "opting-in" on delivery of reformulated gasoline in the Washington, D.C. ozone nonattainment area. Areas that opt-in on delivery of reformulated gasoline receive such gasoline beginning in 1995.

**Source Types Affected**

This measure affects the various non-road mobile sources that burn gasoline.

**Control Strategy**

Federal reformulated gasoline has been sold in the Washington, DC-MD-VA ozone nonattainment area since January 1, 1995.

**Projected Reductions**

[The benefits of this program are reflected in the baseline inventory. No additional reductions are calculated.]

**Emission Benefit Calculations**

Not applicable.

**Implementation**

District of Columbia - Implemented by EPA via mayor's formal request to opt-in to federal program.
Maryland - Implemented by EPA via governor's formal request to opt-in to federal program.
Virginia - Implemented by EPA via governor's formal request to opt-in to federal program.

**References**

U.S. Environmental Protection Agency, "Regulation of Fuels and Fuel Additives: Standards for Reformulated Gasoline", Proposed Rule, 58 *Federal Register* 11722, February 26, 1993.

"VOC Emission Benefits for Non-Road Equipment with the Use of Federal Phase I Reformulated Gasoline", memorandum from Phil Lorang, U.S. EPA Office of Mobile Sources to Air Directors, EPA Regions 1-10, August 18, 1993.

### 6.4.3 Surface cleaning and degreasing for machinery and automobiles repair

This measure amended regulations for surface cleaning (often called "cold cleaning and degreasing") devices and operations, to require more stringent emissions control techniques, and to require, where possible, the use of low- or no-VOC solvents.

**Source Type Affected**

All cold cleaning and degreasing equipment and operations.

**Control Strategy**

Maryland has regulations on cold cleaning and degreasing equipment and operations (COMAR 26.11.19.09). The regulations require a decrease in vapor pressure of degreasing material for cold degreasers, installation of a condenser or air pollution control device, and good operating practices to minimize VOC losses.

The District of Columbia and Virginia have adopted regulations on cold cleaning and degreasing equipment and operations. Credit is taken for two types of control measures. (1) The first measure proposes the following equipment controls: solvent tank evaporation controls, carry-out emission controls, and enclosure/add-on controls; and the following operational controls: proper equipment use, and reduced disturbance of solvent-air interface. (2) The second measure will require the use, where feasible, of alternative solvents.

**Implementation**

District of Columbia - Department of Environment
Maryland - Air and Radiation Management Administration
Virginia - Department of Environmental Quality

**Projected Reductions**

The benefits of this program are reflected in the baseline inventory. No additional reductions are calculated.

**Emission Benefit Calculations**

Not applicable.

### 6.4.4 Landfill regulations

Landfills emit gases as a result of decomposition of materials buried in them. While most of these gases are methane, which is not photochemically reactive, landfills do contribute to VOC emissions, and, thus, ozone formation. A federal rule for the control of new landfills and guidelines for existing landfills has been proposed under Section 111 of the Clean Air Act Amendments.

**Source Type Affected**
Municipal landfills are those that receive primarily household and/or commercial waste.

**Control Strategy**

The 15% VOC Reduction Plan required adoption of the federal guidelines for municipal landfills (see 56 *Federal Register* 24468). The proposed guidelines require installation of gas collection systems followed by flares, to either destroy the VOCs or burn them for fuel. The rule would require capture and control systems to capture at least 80% of the VOC emissions and route them to a 98% destruction efficiency control device.

**Implementation**

Federal standards for existing landfills will be promulgated under Section 111 of the Clean Air Act Amendments. The following state agencies will have to independently adopt regulations consistent with the federal standards:

Maryland - Air and Radiation Management Administration - MD 26.11.19.20, 3/9/98
Virginia - Department of Environmental Quality – 9 VAC 5-40-5800, 4/1/96

**Projected Reductions**

The benefits of this program are reflected in the baseline inventory. No additional reductions are calculated.

**Emission Benefit Calculations**

Not applicable.

**References**

U.S. Environmental Protection Agency, *Standards of Performance for New Stationary Sources and Guidelines for Existing Sources: Municipal Solid Waste Landfills,* 56 *Federal Register* 24468, May 30, 1991.

U.S. Environmental Protection Agency, *Air Emissions from Municipal Solid Waste Landfills - Background Information for Proposed Standards and Guidelines,* EPA-450/3-90-011a, March 1991.

### 6.4.5 Seasonal open burning restrictions

This measure involves amending and/or adopting state regulations to ban the open burning of such items as trees, shrubs, and brush from land clearing, trimmings from landscaping, and household or business trash, during the peak ozone season. The measure is authorized by state regulations, but is enforced by the local governments.

**Source Type Affected**

The measure affects all citizens and businesses that burn solid waste.

**Control Strategy**

Under the 15% VOC Reduction Plan, Maryland and Virginia adopted state regulations to prohibit open burning during peak ozone season in the Washington, D.C. ozone nonattainment area. The emissions benefits will remain constant through 2009.

**Implementation**

District of Columbia - Department of Environment.
Maryland - Air and Radiation Management Administration; local government enforcement.
Virginia - Department of Environmental Quality; local government enforcement.

**Projected Reductions**

The benefits of this program are reflected in the baseline inventory. No additional reductions are calculated.

**Emission Benefit Calculations**

Not applicable.

**References:**

"Open Burning in Residential Areas, Emissions Inventory Development Report," E.H. Pechan & Associates, Inc., January 31, 2003. Prepared for the Mid-Atlantic/Northeast Visibility Union.

"Northern Virginia Open Burning Rule Effectiveness Evaluation," E.H. Pechan & Associates, Inc., December 8, 2003. Prepared for the County of Fairfax.

### 6.4.6 Stage I vapor recovery system expansion

This measure involves applying the federal Control Technique Guideline's "balanced submerged" underground storage tank refilling method at gas stations located in newly designated nonattainment counties.

**Source Type Affected**

All filling of underground storage tanks not controlled were affected.

**Control Strategy**

In the 15% VOC Reduction Plan, balanced submerged fill requirements were extended to Calvert, Charles and Frederick counties in Maryland and Stafford counties in Virginia. All other counties in the nonattainment area already were required to use balanced submerged fills.

**Implementation**

Maryland - Air and Radiation Management Administration
Virginia - Department of Environmental Quality

**Projected Reductions**

The benefits of this program are reflected in the baseline inventory. No additional reductions are calculated.

**Emission Benefit Calculations**

Not applicable.

**References**

Maryland Department of the Environment, Air Management Administration, *Stage I Vapor Recovery Inspection Program*, (Beth Murray, September 30, 1991).

### 6.4.7 Extend Non-CTG RACT and state point source regulations to sources of 25 tons VOC per year

This measure involves extending emission standards to point sources with the potential to emit in excess of 25 tons per year (tpy) of VOCs. Because of its designation as a severe nonattainment area, the Washington D.C. metropolitan area was obligated by law under the CAAA to implement regulations for major sources (greater than 25 tpy) not covered by EPA's Control Technique Guidance (CTG) documents. Under this measure, "reasonably available" control technologies were determined and implemented for industry sources emitting between 25 and 50 tpy.

**Source Type Affected**

Point sources with the potential to emit between 25 and 50 tpy.

**Control Strategy**

Under the 15% VOC Reduction Plan, Maryland and the District of Columbia agreed to develop and implement new regulations for point sources with the potential to emit between 25 and 50 tpy not already regulated or required to be regulated under the previous major source definition (50 tpy). The Commonwealth of Virginia is now implementing this control measure as well, as required under the Clean Air Act. This control measure includes two parts: extension of non-CTG RACT rules to point sources emitting over 25 tpy, and extension of other state regulations applicable to major sources. The latter reductions are found only in Maryland.

**Implementation**

District of Columbia - Department of Environment (no applicable sources)
Maryland - Air and Radiation Management Administration
Virginia – Department of Environmental Quality

**Projected Reductions**

The benefits of this program are reflected in the baseline inventory. No additional reductions are calculated.

**Emission Benefit Calculations**

Not applicable.

### 6.4.8 Graphic arts controls

Controls for offset lithography have been adopted as a new CTG. These controls apply to small printers and sources. VOCs are emitted from the inks used for printing, fountain solutions, and from the solvents used to clean the printing equipment.

**Source Type Affected**

This regulation affects small printers not currently regulated under RACT measures. Lithographic printing facilities include heatset web, non-heatset web, non-heatset sheet-fed, and newspaper non-heatset web sources.

**Control Strategy**

The 15% VOC Reduction Plan contained measures based on the draft CTG, which included the following controls:

| Emission Source | Recommended Control |
|---|---|
| Inks | 90% control (condenser filters) for heatset plants |
| Fountain Solution | 1.6% isopropyl alcohol (IPA) for heatset plants (90% reduction)<br>alcohol substitution for non-heatset (99% reduction)<br>5% IPA for sheet-fed (50% reduction) |
| Cleaning Solutions | 30% VOC content limit (70% reduction) |

**Implementation**

District of Columbia - Department of Environment: 20 DCMR Sec. 716, 5/1/99
Maryland - Air and Radiation Management Administration: 26.11.19.11 & .18, 6/5/95 & 11/7/94
Virginia - Department of Environmental Quality: 9 VAC 5-40-7800, 4/1/96

**Projected Reductions**

The benefits of this program are reflected in the baseline inventory. No additional reductions are calculated.

**Emission Benefit Calculations**

Not applicable.

**References**

U.S. Environmental Protection Agency, *Control Techniques Guideline for Offset Lithographic Printing*, Draft, December 14, 1992.

### 6.4.9 Auto body refinishing

EPA has crafted a national rule for emissions from auto body refinishing. The rule requires reformulated auto body coatings. This source category was originally targeted as a new Control Technique Guideline (CTG), and a draft CTG is available for use in creating a state rule.

**Source Type Affected**

EPA expects all auto body refinishing facilities to be affected. This category includes the application of base coats, primer coats, finish coats, and sealer/clear coats.

**Control Strategy**

The 15% VOC Reduction Plan contained a measure that required reduced-solvent coatings for precoats, primer surfaces, primer sealers, and topcoats. The measure also required the use of spray gun cleaners that recycle solvents, and the use of high-volume, low- pressure application equipment.

**Implementation**

EPA adopted a National Rule for Autobody Refinishing on August 14, 1998.
Maryland - Air and Radiation Management Administration

**Projected Reductions**

The benefits of this program are reflected in the baseline inventory. No additional reductions are calculated.

**Emission Benefit Calculations**

Not applicable.

**References**

U.S. Environmental Protection Agency, Chemicals and Petroleum Branch, Research Triangle Park, North Carolina, *Automobile Refinishing Control Techniques Guideline*, Final

EPA Reference Docket Number A-95-18

Maryland Department of the Environment, Air and Radiation Management Administration, Baltimore, Maryland, *Summary and Economic Impact of New Regulation .23 under COMAR 26.11.19, Control of VOC Emissions from Vehicle Refinishing* (October 18, 1994)

### 6.4.10 Mobile Repair and Refinishing Rule

This rule establishes VOC limits for paints using in mobile repair and refinishing. The VOC limits are consistent with federal limits for mobile equipment refinishing materials. The rule also requires improved transfer efficiency application equipment, enclosed spray gun cleaning, and minimal training.

**Source Type Affected**

All manufacturers of paints used in mobile repair and refinishing and operators of mobile repair and refinishing facilities.

**Control Strategy**

Virginia adopted the Ozone Transport Commission (OTC) Model Rule for Mobile Repair and Refinishing in November 2003. This rule became effective in the District of Columbia in February 2004. The rule applies to all counties in the nonattainment area. The State of Maryland had rules in place by 1996 that contain limits comparable to the OTC model rule.

**Implementation**

District of Columbia - Department of Environment
Virginia - Department of Environmental Quality

**Projected Reductions**

| | VOC Emission Reductions (tons per day) | | | |
|---|---|---|---|---|
| | District of Columbia | Maryland | Virginia | Total |
| 2008 VOC Reductions | | | | |
| 2009 VOC Reductions | | | | |

**Emission Benefit Calculations**

Projected reductions are based on an emission reduction factor of 38 percent, based on Pechan (2001).

**References**

E.H. Pechan, "Control Measure Development Support Analysis for the Ozone Transport Commission Model Rules", March 31, 2001.

### 6.4.11 Portable Fuel Containers Rule: Phase I

This measure introduces performance standards for portable fuel containers and spouts. The standards are intended to reduce emissions from storage, transport and refueling activities. The rule also included administrative and labeling requirements. Compliant containers must have: only one opening for both pouring and filling, an automatic shut-off to prevent overfill, an automatic sealing mechanism when not dispensing fuel and specified fuel flow rates, permeation rates and warranties.

**Source Type Affected**

Any person or entity selling, supplying or manufacturing portable fuel containers, except containers with a capacity of less than or equal to one quart, rapid refueling devices with capacities greater than or equal to four gallons, safety cans and portable marine fuel tanks operating with outboard motors, and products resulting in cumulative VOC emissions below those of a representative container or spout.

**Control Strategy**

Maryland adopted phase I of the Ozone Transport Commission (OTC) Model Rule for Portable Fuel Containers in January 2002.

Virginia adopted phase I of the Ozone Transport Commission (OTC) Model Rule for Portable Fuel Containers on November 2003.

The rule became effective in the District of Columbia in February 2004.

The rule applies to all counties in the nonattainment area.

Reductions from this rule increase annually beginning with implementation in the State of Maryland on January 1, 2004.

The District of Columbia and the Commonwealth of Virginia required compliance with this rule as of January 1, 2005.

**Implementation**

Maryland - Air and Radiation Management Administration
Virginia - Department of Environmental Quality
District of Columbia - Department of Environment

## Projected Reductions

| | VOC Emission Reductions (tons per day) | | | |
|---|---|---|---|---|
| | District of Columbia | Maryland | Virginia | Total |
| 2008 VOC Reductions | | | | |
| 2009 VOC Reductions | | | | |

## Emission Benefit Calculations

Projected reductions are based on an emission reduction factor of 75% after full implementation after 10 years. Implementation began in 2005. In 2008, the emission reduction factor is 30%. In 2009, the emission reduction factor is 37.5%.

## References

E.H. Pechan, "Control Measure Development Support Analysis for the Ozone Transport Commission Model Rules", March 31, 2001.

### 6.4.12 Architectural and Industrial Maintenance Coatings Rule

This rule requires manufacturers to reformulate various types of coatings to meet VOC content limits. Affected products include architectural coatings, traffic markings, high-performance maintenance coatings and other special-purpose coatings. It uses more stringent VOC content limits than the existing Federal consumer products rule.

**Source Type Affected**

The measure affects all manufacturers of affected coatings.

**Control Strategy**

Virginia adopted the Ozone Transport Commission (OTC) Model Rule for Architectural and Industrial Maintenance Coatings in November 2003.

Maryland adopted this rule on March 29, 2004.

The rule became effective in the District of Columbia in February 2004.

The rule will apply to all counties in the nonattainment area.

Compliance with this rule was required in all jurisdictions in the region as of January 1, 2004.

The VOC content limits in this rule are based on a Suggested Control Measure (SCM) adopted by the California Air Resources Board (CARB) and a State and Territorial Air Pollution Program Administrators/Association of Local Air Pollution Officials (STAPPA/ALAPCO) model rule or OTC coatings. Manufacturers are expected to comply with this rule using primarily EPA Test Method 24.

**Implementation**

District of Columbia - Department of Environment
Maryland - Air and Radiation Management Administration
Virginia - Department of Environmental Quality

## Projected Reductions

| | VOC Emission Reductions (tons per day) | | | |
|---|---|---|---|---|
| | **District of Columbia** | **Maryland** | **Virginia** | **Total** |
| 2008 VOC Reductions | | | | |
| 2009 VOC Reductions | | | | |

## Emission Benefit Calculations

Projected reductions are based on an emission reduction factor of 31 percent, based on Pechan (2001).

## References

E.H. Pechan, "Control Measure Development Support Analysis for the Ozone Transport Commission Model Rules", March 31, 2001.

### 6.4.13 Consumer Products Rule: Phase I

Phase I of the Consumer Products Rule required reformulation of approximately 80 types of consumer products to reduce their VOC content. It uses more stringent VOC content limits than the existing Federal consumer products rule. The rule also contains requirements for labeling and reporting.

**Source Type Affected**

Manufacturers of various specialty chemicals named in the rule, such as aerosol adhesives, floor wax strippers, dry cleaning fluids and general purpose cleaners.

**Control Strategy**

Phase I of the Ozone Transport Commission (OTC) Model Rule for Reformulated Consumer Products became effective in the District of Columbia in February 2004.

The State of Maryland adopted phase I of the Ozone Transport Commission (OTC) Model Rule for Reformulated Consumer Products on August 18, 2003.

The Commonwealth of Virginia adopted phase I of the Ozone Transport Commission (OTC) Model Rule for Reformulated Consumer Products on March 9, 2005.

Manufacturers are expected to demonstrate compliance with the rule primarily through a California Air Resources Board (CARB) test method. If complying with the VOC contents becomes difficult, flexibility options are provided.

**Implementation**

Maryland - Air and Radiation Management Administration
District of Columbia - Department of Environment
Virginia - Department of Environmental Quality

## Projected Reductions

| | VOC Emission Reductions (tons per day) | | | |
|---|---|---|---|---|
| | District of Columbia | Maryland | Virginia | Total |
| 2008 VOC Reductions | | | | |
| 2009 VOC Reductions | | | | |

## Emission Benefit Calculations

Projected reductions are based on an emission reduction factor of 14.2 percent, based on Pechan (2001).

## References

E.H. Pechan, "Control Measure Development Support Analysis for the Ozone Transport Commission Model Rules", March 31, 2001.

### 6.4.14 Solvent Cleaning Operations Rule

This rule establishes hardware and operating requirements and alternative compliance options for vapor cleaning machines used to clean metal parts. These machines are used in manufacturing operations to clean grease, wax, oil and other contaminants from parts when a high level or cleanliness is necessary. The rule also affects cold cleaners, which are used in automobile and maintenance facilities and industrial maintenance shops.

**Source Type Affected**

Manufacturers and operators of vapor cleaning or cold cleaning machines

**Control Strategy**

Virginia adopted the Ozone Transport Commission (OTC) Model Rule for Solvent Cleaning Operations in November 2003. The rule applies to all counties in the nonattainment area.

The rule became effective in the District of Columbia in February 2004.

The State of Maryland had rules in place by 1996 that contain limits comparable to the OTC model rule. Therefore the OTC model rule will not be implemented in Maryland.

Compliance with this rule in all participating jurisdictions in the region began on January 1, 2004.

Standards for vapor cleaning machines are based on Federal Maximum Available Control Technology (MACT) standards for chlorinated solvent vapor degreasers. Cold cleaner solvent volatility provisions are based on regulatory programs in place in several states, primarily Maryland and Illinois.

**Implementation**

District of Columbia - Department of Environment
Virginia - Department of Environmental Quality

**Projected Reductions**

| | VOC Emission Reductions (tons per day) | | | |
|---|---|---|---|---|
| | **District of Columbia** | **Maryland** | **Virginia** | **Total** |
| 2008 VOC Reductions | | | | |
| 2009 VOC Reductions | | | | |

**Emission Benefit Calculations**

Projected reductions are based on an emission reduction factor of 66 percent, based on Pechan (2001).

**References**

E.H. Pechan, "Control Measure Development Support Analysis for the Ozone Transport Commission Model Rules", March 31, 2001.

### 6.4.14 Industrial Adhesives and Sealants Rule

This rule establishes VOC content limitations for industrial and commercial application of solvent-based adhesives and sealants. Controls will cover adhesives, sealants, adhesive primers, sealer primers, adhesive application to substrates, and aerosol adhesives. VOC content limits are similar to those contained in the CARB Reasonably Available Control Technology (RACT) or Best Available Control Technology (BACT) document for adhesives and sealants (Dec. 1998).

**Source Type Affected**

Manufacturers and distributors of industrial adhesives and sealants.

**Control Strategy**

The District of Columbia adopted the Ozone Transport Commission (OTC) Model Rule for Industrial Adhesives and Sealants on [date to be provided].

The State of Maryland adopted the Ozone Transport Commission (OTC) Model Rule for Industrial Adhesives and Sealants on [date to be provided].

The Commonwealth of Virginia adopted the Ozone Transport Commission (OTC) Model Rule for Industrial Adhesives and Sealants on [date to be provided].

The rule will be effective in all jurisdictions no later than May 1, 2009.

**Implementation**

District of Columbia - Department of Environment
Virginia - Department of Environmental Quality
Maryland - Air and Radiation Management Administration

**Projected Reductions**

| | VOC Emission Reductions (tons per day) | | | |
|---|---|---|---|---|
| | District of Columbia | Maryland | Virginia | Total |
| 2008 VOC Reductions | | | | |
| 2009 VOC Reductions | | | | |

**Emission Benefit Calculations**

Emission reductions are based on a 64 percent reduction in emissions of VOC from the baseline. Further details are available from OTC (2006).

**References**

[OTC 2006. *Identification and Evaluation of Candidate Control Measures: Draft Technical Support Document.* Prepared by MACTEC Federal Programs, Inc., Herndon, Virginia for the Ozone Transport Commission. August 4, 2006]

### 6.4.xx Portable Fuel Containers Rule: Phase II

This measure expands existing performance standards for portable gasoline containers and spouts to kerosene containers. The standards are intended to reduce emissions from storage, transport and refueling activities. The rule also included administrative and labeling requirements. Compliant containers must have: only one opening for both pouring and filling, an automatic shut-off to prevent overfill, an automatic sealing mechanism when not dispensing fuel and specified fuel flow rates, permeation rates and warranties.

**Source Type Affected**

Any person or entity selling, supplying or manufacturing portable fuel containers, except containers with a capacity of less than or equal to one quart, rapid refueling devices with capacities greater than or equal to four gallons, safety cans and portable marine fuel tanks operating with outboard motors, and products resulting in cumulative VOC emissions below those of a representative container or spout.

**Control Strategy**

Maryland adopted phase II of the Ozone Transport Commission (OTC) Model Rule for Portable Fuel Containers on [date].

Virginia adopted phase II of the Ozone Transport Commission (OTC) Model Rule for Portable Fuel Containers on [date].

The District of Columbia adopted phase II of the Ozone Transport Commission (OTC) Model Rule for Portable Fuel Containers on [date].

The rule will be effective in all jurisdictions no later than May 1, 2009.

The rule will apply to all counties in the nonattainment area.

Reductions from this rule will increase annually beginning with implementation on [date]

**Implementation**

Maryland - Air and Radiation Management Administration
Virginia - Department of Environmental Quality
District of Columbia - Department of Environment

## Projected Reductions

| | VOC Emission Reductions (tons per day) | | | |
|---|---|---|---|---|
| | **District of Columbia** | **Maryland** | **Virginia** | **Total** |
| 2008 VOC Reductions | | | | |
| 2009 VOC Reductions | | | | |

## Emission Benefit Calculations

Emission reductions are based on a 4 percent reduction in emissions of VOC from the baseline. Further details are available from OTC (2006).

## References

[OTC 2006. *Identification and Evaluation of Candidate Control Measures: Draft Technical Support Document.* Prepared by MACTEC Federal Programs, Inc., Herndon, Virginia for the Ozone Transport Commission. August 4, 2006]

### 6.4.xxxxx Consumer Products Rule: Phase II

Phase II of the Consumer Products Rule involves adopting the CARB 7/20/05 Amendments which sets new or revises existing limits on 13 consumer product categories. It uses more stringent VOC content limits than the existing federal consumer products rule. The rule also contains requirements for labeling and reporting.

**Source Type Affected**

Manufacturers of various specialty chemicals named in the rule, such as aerosol adhesives, floor wax strippers, dry cleaning fluids and general purpose cleaners.

**Control Strategy**

The District of Columbia adopted phase II of the Ozone Transport Commission (OTC) Model Rule for Reformulated Consumer Products on [dates to be provided].

The State of Maryland adopted phase II of the Ozone Transport Commission (OTC) Model Rule for Reformulated Consumer Products on [dates to be provided].

The Commonwealth of Virginia adopted phase II of the Ozone Transport Commission (OTC) Model Rule for Reformulated Consumer Products on [dates to be provided].

The rule will be effective in all jurisdictions no later than May 1, 2009.

Manufacturers are expected to demonstrate compliance with the rule primarily through a California Air Resources Board (CARB) test method. If complying with the VOC contents becomes difficult, flexibility options are provided.

**Implementation**

Maryland - Air and Radiation Management Administration
District of Columbia - Department of Environment
Virginia - Department of Environmental Quality

## Projected Reductions

| | VOC Emission Reductions (tons per day) | | | |
|---|---|---|---|---|
| | District of Columbia | Maryland | Virginia | Total |
| 2008 VOC Reductions | | | | |
| 2009 VOC Reductions | | | | |

## Emission Benefit Calculations

Emission reductions are based on a 2 percent reduction in emissions of VOC from the baseline. Further details are available from OTC (2006).

## References

[OTC 2006. *Identification and Evaluation of Candidate Control Measures: Draft Technical Support Document.* Prepared by MACTEC Federal Programs, Inc., Herndon, Virginia for the Ozone Transport Commission. August 4, 2006]

## 6.5 Transportation Control Measures (TCMs) and Vehicle Technology, Fuel, and Maintenance-based measures

Section 108(f) of the Clean Air Act Amendments provides examples of Transportation Control Measures (TCMs) that can be implemented to reduce emissions from mobile sources. Most TCMs are designed to reduce vehicle miles traveled or vehicle trips or improve the flow of traffic.

In conjunction with state departments of transportation and local transit authorities, state air agencies have identified a number of projects designed to reduce vehicle travel and mitigate traffic congestion in the Metropolitan Washington nonattainment area. These measures include purchase of alternative-fueled vehicles, improvements to bicycle and pedestrian facilities, and improvements to transit services and access to transit facilities. All responsible agencies have committed to implementing these projects by [January 1, 2005]. [Commitment letters and specific project descriptions are contained in [Appendix] G. -- only needed if there are new commitments]

**Source Type Affected**
Transportation-related activities in the Metropolitan Washington nonattainment area

**Implementation**
District of Columbia – Department of Transportation
Maryland - Department of Transportation
Virginia - Department of Transportation
Washington Metropolitan Area Transit Authority
Northern Virginia Local Governments

## Projected Reductions

[add state-level breakout - see attached TCM benefit table]

| | VOC Emission Reductions (tons per day) | | | |
|---|---|---|---|---|
| | **District of Columbia** | **Maryland** | **Virginia** | **Total*** |
| 2008 VOC Reductions | | | | 0.1954 |
| 2009 VOC Reductions | | | | 0.1849 |

*Emission reduction estimates were supplied by the District of Columbia Department of Transportation, the Maryland Department of Transportation, the Virginia Department of Transportation. See [Appendix] G for details.

| | NOx Emission Reductions (tons per day) | | | |
|---|---|---|---|---|
| | **District of Columbia** | **Maryland** | **Virginia** | **Total*** |
| 2008 NOx Reductions | | | | 0.4854 |
| 2009 NOx Reductions | | | | 0.4535 |

*Emission reduction estimates were supplied by the District of Columbia Department of Transportation, the Maryland Department of Transportation, the Virginia Department of Transportation. See [Appendix] G for details.

## 6.6 Voluntary Bundle

EPA's voluntary measures policy, "Guidance on Incorporating Voluntary Mobile Source Emission Reduction Programs in State Implementation Plans", establishes criteria under which emission reductions from voluntary programs are creditable in a SIP. This policy permits states to develop and implement innovative programs that partner with local jurisdictions, businesses and private citizens to implement emission-reducing behaviors at the local level.

Under EPA's policy, states develop realistic estimates of activity and participation rates for each voluntary program. States assign this credit to a Voluntary Measure in the SIP. States must then implement the voluntary control measure, monitor the measure for effectiveness and report the findings to EPA. If the estimated reductions are not achieved, states commit to take corrective action by either making changes to the existing program or developing a more effective control measure.

The one-hour ozone SIP included a voluntary bundle. All of the measures included in the voluntary bundle approved under the one-hour ozone SIP are included in the eight-hour ozone SIP. Some of the programs have been completed, other commitments remain unchanged, and several programs have been expanded. In addition, there are several new programs being proposed for inclusion in the voluntary bundle.

One of the programs included in the voluntary bundle for the one-hour ozone SIP (Low-VOC Consumer Products in Virginia) has been adopted as a mandatory measure (see Measure 6.4.13) and therefore is no longer included as part of the voluntary bundle. With the exception of this measure, the total emission reduction associated with the voluntary bundle includes both on-the-books voluntary commitments as well as the expanded or new commitments proposed herein. All of the voluntary measures will be implemented after the 2002 SIP base year.

The programs identified in the Voluntary Measures package for Rate of Progress will be fully implemented by May 1, 2008, the beginning of the 2008 ozone season, though most reductions will occur by January 2008, the date on which the region will achieve rate of progress. The measures will reduce emissions daily throughout the region's May-September ozone season. These programs will be implemented largely at the local level by county and state governments and agencies. Implementation will occur in consultation with either the State of Maryland, the District of Columbia, or the Commonwealth of Virginia.

It is expected that this voluntary measures package may be expanded in future SIPs as additional voluntary measures are developed and implemented. Many state agencies and local governments are currently developing programs that could, in the future, qualify as voluntary measures.

This section contains descriptions of the voluntary measure programs included in this package. A detailed estimate of the benefits resulting from each program in this package is contained in [Appendix] J. The information contained below summarizes the reductions for the entire voluntary bundle. Individual measures contained in the bundle are described on succeeding pages.

**Source Type Affected**

This bundle affects, on a voluntary basis, some owners, operators, purchasers or users of the following types of emissions-related items/equipment in the Metropolitan Washington area: commercial power generation, motor vehicles, school and transit buses, portable fuel containers, municipal buildings, urban forest trees, locomotives, and traffic paint.

**Implementation**

Arlington County, Virginia
Calvert County, Maryland
City of Alexandria, Virginia
City of Falls Church, Virginia
City of Greenbelt, Maryland
Fairfax City, Virginia
Fairfax County, Virginia
Loudoun County, Virginia
Maryland Department of Transportation
Maryland National Capital Parks and Planning Commission (Prince George's)
Montgomery County, Maryland
Prince George's County, Maryland
Prince William County, Virginia
Virginia Department of Environmental Quality

**Monitoring and Enforcement**

The District of Columbia, the State of Maryland, and the Commonwealth of Virginia commit to monitoring, evaluation and reporting of the emissions effects of the programs comprising this voluntary measure. All governments and agencies that have committed to implementing voluntary measures have been informed of the monitoring and evaluation requirement and have agreed to provide monitoring information to the state air agencies.

The District of Columbia, Maryland, and Virginia will re-evaluate the emission benefits from this voluntary measures package through a "true-up" analysis to be conducted at least every three calendar years. As agreed in the one-hour ozone SIP, the first true-up is scheduled for March 2007. The next true-up will be completed by June 2010, three years from the submittal of this SIP revision. Should the re-evaluation program determine that the programs listed in this section have not delivered the estimated reductions, the states commit to remedy the resulting deficiency within one year if rulemaking is not required, or within two years if rulemaking is required. If the June 2010 true-up shows emissions benefits lower than expected, the states will remedy the deficiency by June 2011 if the remedy does not require rulemaking, or by June 2012 if rulemaking is required.

**Projected Reductions**

The District of Columbia, the State of Maryland, and the Commonwealth of Virginia have used available methods to create a best estimate of the emission benefits created from this bundle of voluntary measures. These estimates have been agreed upon by the implementing agencies and are conservative in nature. [In some instances, local agencies developed preliminary estimates of benefits that are included in the jurisdiction or agency's commitment letters. However, the most current estimates used for purposes of this section are included] in the "Summary of Voluntary Measure Commitments" section of [Appendix] J. There are several reasons why the states have chosen a conservative "best estimate" methodology in selecting the initial emission credits. These reasons include:

- Many of these projects are innovative and new and have no track record that allows for simple estimation of future success.
- There is a lack of detailed precise models and emission factors for use in estimating emission benefits for any of the bundle's projects/ programs.
- Local jurisdictions have a key role in implementing most projects and have the final word in the success of these projects.
- Private sector investment, which is not assumed in current emission estimates, may increase the emission reduction potential of any individual measure.
- There is a lack of historical reference with regard to EPA's relatively new voluntary measures policies. There is limited experience with including voluntary measures in SIPs.
- There is a historical problem of enforceability for transportation measures in SIPs.
- States are reluctant to overestimate the potential benefits of any of the bundle's programs/ projects.
- Implementation strategies may change over time depending on political decisions that are out of the states' or implementing agencies' control.

| | VOC Emission Reductions (tons per day) | | | |
|---|---|---|---|---|
| | **District of Columbia** | **Maryland** | **Virginia** | **Total** |
| 2008 VOC Reductions | | | | |
| 2009 VOC Reductions | | | | |

| | NOx Emission Reductions (tons per day) | | | |
|---|---|---|---|---|
| | **District of Columbia** | **Maryland** | **Virginia** | **Total** |
| 2008 NOx Reductions | | | | |
| 2009 NOx Reductions | | | | |

## Point Source Strategies

### Regional Wind Power Purchase

Under this measure, local and State government entities in the nonattainment area have committed to purchase a specific number of kilowatt-hours (kWh) of power per ozone season day from wind turbines. The government agencies will purchase the wind energy directly from an electricity supplier or purchase renewable energy certificates (RECs)[2] that assure that such wind energy is placed on the electric grid. This zero-emission wind power will displace emissions from fossil fuel-fired power plants that would normally supply power to the Metropolitan Washington region. The air agencies in Maryland, the District of Columbia, and Virginia will retire NOx allowances in an amount commensurate with the amount of emissions displaced.

### Source Type Affected

The measure affects certain local and State government entities within the Metropolitan Washington nonattainment area. The region is implementing this measure to reduce electric power generation from coal, oil, and/or gas-fired sources, thereby reducing NOx emissions from these sources.

### Control Strategy

This measure is envisioned as a region-wide measure encompassing wind power purchases by state and local government entities within the Metropolitan Washington non-attainment area.

This program was initiated on a pilot basis in the one-hour ozone SIP and is being expanded here. To meet the existing commitments from the one-hour ozone SIP, local governments signed long-term commitments with wind power suppliers to assure that a fixed quantity of wind energy would be placed on the electric grid. These purchases have displaced fossil fuel generated power, thus reducing the NOx emitted from those plants.

Each state plans to include provisions in their NOx Ozone Season emissions trading program that set aside a portion of the state's total NOx allowance budget to support renewable energy and energy efficiency projects. Each state will assure that NOx allowances are retired in an amount commensurate with the size of the wind energy purchase to ensure surplus emission reductions.

The SIP measure will be structured to take into account the differences in the NOx emissions trading regulations of Maryland, the District of Columbia, and Virginia. Maryland's NOx SIP Call regulations authorize the allocation of NOx allowances to support renewable energy purchases but the NOx SIP Call regulations for the District of Columbia and Virginia do not

[2] Renewable energy certificates represent the unique and exclusive proof that 1 Megawatt-hour of energy was generated from a renewable energy source and placed on the electric grid.

provide such authority. Thus, emission reductions from wind purchases will be claimed only for Maryland government entities in 2007 and 2008.

However, in 2009, NOx emissions trading for electric generating units in all three states will be governed by the Clean Air Interstate Rule (CAIR), and all three states plan to include provisions in their CAIR setting aside a portion of allowances to support renewable energy purchases. The Virginia regulation is expected to be adopted in December 2006, and Maryland and District of Columbia plan to adopt their regulations by the end of April 2007. As a result, surplus emission reductions from all three jurisdictions can be claimed for 2009.

**Implementation**

Montgomery County, Maryland
[insert other members of the Montgomery County buying group]
Arlington County, Virginia
Fairfax County, Virginia
[insert other members of the VEPGA buying group]
District of Columbia

In 2004-2006 the Montgomery County buying group purchased more than 28,000,000 kwh wind energy or wind energy RECs. Montgomery County, Maryland has drafted a Request for Proposal (RFP) to be released by [early 2007 - confirm date]. Under this RFP, the County and its buying group (comprised of other Maryland counties, cities and State agencies) will select a supplier of wind energy or wind energy RECs in the amount of [xxxxx] kWh/yr. The following other counties, cities, and state agencies will participate in this buying group: [get final list]. The purchase will cover the period 2007 and 2008.

The Virginia Energy Purchasing Governmental Authority (VEPGA) plans to issue an RFP in [early 2007] to select a supplier of wind energy or wind energy RECs in the amount of at least [xxxxx] kWh/year. The RFP will cover the period [xxxx] [must include 2009]. The following other counties, cities, and state agencies will participate in this buying group: [get final list].

The District of Columbia plans to purchase 16,500 kwh/year from wind energy or wind energy RECs. The purchase will cover the period [xxxx].

All three RFPs will include;

- A requirement that the wind energy purchase be made from wind facilities in the PJM Interconnection grid upwind of the Washington Metropolitan area. Based on ozone transport data contained in the preamble to the EPA's CAIR, purchases from wind plants in Maryland, Virginia, Pennsylvania, West Virginia, or Ohio will qualify for purchase under the RFPs.
- A reporting requirement indicating actual amount of wind energy in kWh purchased during the ozone season and per year.
- A requirement for a retrospective analysis of emissions reductions. [still required?]

**Monitoring and Enforcement**

Each State will provide evidence that it has assured the retirement of the designated amount of NOx allowances from future use under its renewable energy set-aside. In addition, all jurisdictions and agencies participating in the regional wind power purchase program have committed to maintain copies of signed contracts and energy bills to verify the amount of wind energy purchased. They also will purchase wind energy from a certified supplier who can provide independent certification that the wind energy purchased is placed on the electric grid. This evidence will help to validate the emission reduction credit included in the SIP.

[Any variances from the estimated emission reductions will be captured in a retrospective analysis to be conducted during the true-up period. This analysis will examine the emissions in the PJM Interconnection and verify the emission reductions resulting from dispatch of wind power plants. These retrospective analyses will be based on actual power produced and actual emissions reductions measured during the verification period. These records will be provided to the appropriate state air agency on an annual basis and will be used to provide documentation for the region's periodic evaluation reports.]

**Projected Reductions**

Beyond the existing commitments in the one-hour ozone SIP, this program is expected to purchase 10,299 MWh of power annually, reducing 0.0451 tpd NOx during the ozone season. Further information on the projected reductions is included in [Appendix] J.

| Wind Power Purchases | Generation MWh/ year | Ozone Season NOx tons/day | Annual NOx tons/day |
|---|---|---|---|
| Montgomery County MD | 2,143 | 0.0028 | 0.0094 |
| Arlington County VA | 2,340 | 0.0030 | 0.0103 |
| Fairfax County VA | 5,800 | 0.0076 | 0.0254 |
| District of Columbia | 16 | 0.0000 | 0.0001 |
| Total | 10,299 | 0.0134 | 0.0451 |

**Emissions Benefits Calculations**

In recent years, substantial progress has been made in the development of methodologies to quantify emission reduction benefits from energy efficiency and renewable energy (EERE) measures. Several methods have been used to calculate the benefits resulting from displacement of fossil fuel generation in the dispatch order. The methodology outlined below, known as a "power plant dispatch methodology," was originally developed by Resource Systems Group, Inc. (RSG) in cooperation with Environmental Resources Trust (ERT).

The State of Maryland relied on an initial version of the RSG/ERT methodology in its regional

wind purchase submission as part of the bundle of voluntary measures submitted to EPA in its one-hour ozone SIP. This regional wind purchase was subsequently cited with approval by the EPA in its August 2004 "Guidance on State Implementation Plan (SIP) Credits for Emission Reductions from Electric-sector Energy Efficiency and Renewable Energy Measures."[3] EPA also approved the wind purchase as the first-ever renewable energy control measure to receive credit in a State Implementation Plan.[4]

An updated version of the RSG methodology has been subsequently used to estimate the displacement of emissions at fossil fuel fired power plants resulting from EERE projects in New Jersey, Virginia, and Connecticut. Much of this work has been supported by the U.S. Department of Energy.[5] The New Jersey work was conducted in cooperation with the U.S. Environmental Protection Agency and the National Renewable Energy Laboratory.

Under the RSG methodology, the first step is to determine the profile of wind generation for the summer ozone season (by time of day, week, and month). The wind data is based on hourly operating profiles for typical wind turbines in the PJM Interconnection area based on annual records.

The next step is to match the data on the hourly profiles of wind generation against the hourly generation of the variably dispatched fossil-fuel units at plants listed in the Appendix. This matching process is conducted with a database program, and this process identifies which fossil-fuel plants are operating when the wind energy generation is taking place. This comparison forms the basis for matching and identifying the set of generation units which can be displaced in each hour.

Although the hourly generation records for all the fossil-fuel plants are not available, they have been estimated by using the hourly CO2 emissions from the continuous emissions monitors (CEMs) required by EPA. The generation calculation is based on the average CO2 emission rates per MWh reported to the EPA, and the hourly emission rates for NOx are derived from the CEM data reported to EPA. The average NOx avoided emissions are then based on a generation-weighted average of the emissions at units which are operating at each hour. The results are reported for the ozone season (May 1 to September 30). The current analysis is based on electric generation data and continuous emissions monitoring data for CO2 and NOx for the PJM Interconnection area in calendar year 2005.

To ensure a conservative estimate of benefit from this voluntary measure, purchasing jurisdictions have chosen to credit [half] of the emission reductions predicted by the RSG methodology.

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[3] See http://www.epa.gov/cleanenergy/stateandlocal/guidance.htm

[4] 70 Fed. Reg. 24988 (May 12, 2005).

[5] U.S Department of Energy, *Final Report on the Clean Energy/Air Quality Integration Initiative for the Mid-Atlantic Region*, August 2006. See http://www.eere.energy.gov/wip/clean_energy_initiative.html; Resource Systems Group, *Estimation of Avoided Emission Rates for Nitrogen Oxide Resulting from Renewable Electric Power Generation in the New England, New York and PJM Interconnection Power Market Areas, 2006*, Prepared under grant funding from the U.S. Department of Energy and under subcontract to Environmental Resources Trust and Connecticut Smart Power

$$\frac{tons}{day}\text{ NOx credited} = \frac{\frac{tons}{day}\text{ NOx reduced}}{2}$$

A copy of the ERT/RSG report and further documentation of the emissions benefit calculations for this program is included in [Appendix J.]

**Energy Efficiency Programs**

Under this program, the governments in the nonattainment area have undertaken measures to improve the energy performance of government facilities.

**Source Type Affected**

These programs improve the energy efficiency of buildings and building equipment owned and operated by the governments in the Metropolitan Washington area.

**Control Strategy**

This measure is envisioned as a region-wide measure encompassing energy performance contracts and other structured energy savings programs by state and local governments within the Metropolitan Washington non-attainment area. This program is at varying stages of development, and commitments received involve several local jurisdictions in the non-attainment area. Local governments have signed contracts with energy service companies (ESCOs) to retrofit existing facilities to reduce the demand for electricity and have undertaken other energy efficiency measures in their facilities. The reduction in energy demand will displace fossil fuel generated power, thus reducing the NOx emitted from those plants.

Each state in the nonattainment area plans to include provisions in their NOx Ozone Season emissions trading regulations that set aside a percentage of the state's total NOx allowance budget to support energy efficiency and renewable energy (EERE) projects. The state will assure that NOx allowances will be retired in an amount commensurate with the size of the actual emission reductions.

The SIP measure will be structured to take into account the differences in the NOx emissions trading regulations of Maryland, the District of Columbia, and Virginia. Maryland's NOx SIP Call regulations currently authorize the allocation of NOx allowances to support EERE projects but the NOx SIP Call regulations for the District of Columbia and Virginia do not provide such authority. Thus, emission reductions from building energy efficiency retrofits will be claimed only for Maryland government entities in 2007 and 2008.

However, in 2009, NOx emissions trading for electric generating units in all three jurisdictions will be governed by the Clean Air Interstate Rule (CAIR), and all three jurisdictions plan to include provisions in their CAIR setting aside a portion of total allowances to support EERE projects. The Virginia regulation is expected to be adopted in December 2006, and Maryland and District of Columbia plan to adopt their regulations by the end of April 2007. The relevant jurisdictions plan to obtain NOx allowance allocation under their new regulations and to retire such allowances. As a result, surplus emission reductions from all three jurisdictions can be claimed for 2009.

**Implementation**

Arlington County Virginia
Calvert County, Maryland
City of Alexandria, Virginia

City of Falls Church, Virginia
City of Greenbelt, Maryland
Fairfax County, Virginia
Montgomery County, Maryland

*Arlington County, Virginia.* The Arlington County government has committed to improve energy efficiency of operations, including entering into energy performance contracts to improve building efficiency. Arlington has allocated funds for additional efficiency investments that will increase the energy savings between now and 2010.

[additional information pending]

**Monitoring and Enforcement**

All jurisdictions and agencies participating in the energy performance contracting program have committed to maintain copies of signed contracts and energy bills to verify the reduction in energy demand.

Any variances from the estimated emission reductions will be captured in a retrospective analysis to be conducted during the true-up period. This analysis will examine the emissions in the PJM West and/or other appropriate power grids and verify the emission reductions resulting from reduce electricity demand from municipal facilities. These retrospective analyses will be based on actual energy savings and actual emissions reductions measured during the verification period. These records will be provided to the appropriate state air agency on an annual basis and will be used to provide documentation for the region's periodic evaluation reports.

**Projected Reductions and Emissions Benefit Calculations**

The estimates below quantify the reductions in energy consumption resulting from the energy service performance contracts and other measures undertaken by each jurisdiction. The energy reductions were developed by each jurisdiction.

Arlington County has been investing in energy upgrades for its government facilities for some time. Data is available on the impacts of the investments for the period from 2002 to 2005. Initial estimates were developed using energy savings data and cost data for the energy retrofits from the program history. These savings were extrapolated to develop projected energy savings using estimates of available funds for energy efficiency programs and assuming the same yield of energy savings per dollar invested as in the program to date.

**Projected Annual Reductions and Avoided Emissions from Energy Efficiency Programs**

| State or County Program | Annual MWh Reductions | | NOx Emissions Avoided (tpy)* | |
|---|---|---|---|---|
| | 2008 | 2009 | 2008 | 2009 |
| Arlington County, VA | 2,000 | 2,500 | 1.6 | 2 |
| [additional data pending] | | | | |
| | | | | |

*Assumes nominal emission rate of 1.6 lb/MWh

**Emissions Benefits Calculations**

In recent years, substantial progress has been made in the development of methodologies to quantify emission reduction benefits from energy efficiency and renewable energy (EERE) measures. Several methods have been used to calculate the benefits resulting from the displacement of fossil fuel generation resulting from such measures. The methodology outlined below was originally developed by Resource Systems Group, Inc. (RSG) under contract with Environmental Resources Trust (ERT). The State of Maryland relied on an initial version of this methodology in its regional wind purchase submission as part of the bundle of voluntary measures submitted to EPA in its one-hour ozone SIP. This regional wind purchase was subsequently cited with approval by the EPA in its August 2004 "Guidance on State Implementation Plan (SIP) Credits for Emission Reductions from Electric-sector Energy Efficiency and Renewable Energy Energy Measures."[6] EPA also approved the wind purchase as the first-ever renewable energy control measure to receive credit in a State Implementation Plan.[7]

An updated version of the RSG methodology has been subsequently used to estimate the displacement of emissions at fossil fuel fired power plants resulting from EERE projects in New Jersey, Virginia, and Connecticut. Much of this work has been supported by the U.S. Department of Energy.[8] The New Jersey work was conducted in cooperation with the U.S. Environmental Protection Agency and the National Renewable Energy Laboratory.

Under the RSG methodology, the first step is to determine the profile of the timing of energy savings from building efficiency retrofits for the summer ozone season (by time of day, week, and month). This profile is based on typical operating times for signals, and this step is

[6] See http://www.epa.gov/cleanenergy/stateandlocal/guidance.htm

[7] 70 Fed. Reg. 24988 (May 12, 2005).

[8] U.S Department of Energy, *Final Report on the Clean Energy/Air Quality Integration Initiative for the Mid-Atlantic Region*, August 2006. See http://www.eere.energy.gov/wip/clean_energy_initiative.html; Resource Systems Group, *Estimation of Avoided Emission Rates for Nitrogen Oxide Resulting from Renewable Electric Power Generation in the New England, New York and PJM Interconnection Power Market Areas, 2006*, Prepared under grant funding from the U.S. Department of Energy and under subcontract to Environmental Resources Trust and Connecticut Smart Power.

straightforward because energy savings from LED signals is continuous without any seasonal differences.

The next step is to match the electricity savings hourly profile against the hourly generation of the variably dispatched fossil-fuel units at plants in the PJM Interconnection area listed in the Appendix. This matching process is conducted with a database program, and this process identifies which fossil-fuel plants are operating when the energy savings are taking place. This comparison forms the basis for matching and identifying the set of generation units which can be displaced in each hour.

Although the hourly generation records for all the fossil-fuel plants are not available, they have been estimated by using the hourly $CO_2$ emissions from the CEMs. The generation calculation is based on the average $CO_2$ emission rates per MWh reported to the EPA, and the hourly emission rates for NOx are derived from the CEM data reported to EPA. The average NOx avoided emissions are then based on a generation-weighted average of the emissions at units which are operating at each hour. The results are reported for the ozone season (May 1 to September 30). The current analysis is based on electric generation data and continuous emission monitoring data for $CO_2$ and NOx for the PJM Interconnection area in calendar year 2005.

**LED Traffic Signal Retrofit Program**

Under this program, state and local governments in the nonattainment area have committed to replace existing traffic signals with more energy efficient Light Emitting Diode (LED) technology. This will decrease demand for electricity and subsequent power generation from coal, oil, and/or gas-fired sources that would normally supply power to the Metropolitan Washington region, thereby reducing NOx emissions from those sources.

**Source Type Affected**

The measure affects state and local governments within the Metropolitan Washington nonattainment area.

**Control Strategy**

This measure is envisioned as a region-wide measure encompassing LED traffic signal retrofits by state and local governments within the Metropolitan Washington non-attainment area. This program is in the early stages of development, and commitments received at this point affect several state and local jurisdictions in the non-attainment area. Transportation agencies have begun to retrofit existing traffic signals to LED technology to reduce the demand for electricity. The reduction in energy demand will displace fossil fuel generated power, thus reducing the NOx emitted from those plants.

Each state in the nonattainment area are including a provision in their regulatory program that sets aside a portion of the state's total NOx allowance budget for clean air projects. The state will retire NOx set-aside allowances in an amount commensurate with the size of the energy demand reduction to ensure reductions of ozone season emissions allowed under the state regulatory program.

**Implementation**

Maryland Department of Transportation (MDOT)
Virginia Department of Transportation (VDOT)
District Department of Transportation (DDOT)
Montgomery County, Maryland

[details from state input.]

**Monitoring and Enforcement**

All jurisdictions and agencies participating in the LED Traffic Signal Retrofit program have committed to maintain records of the traffic signals being replaced [and energy bills] to verify the reduction in energy demand.

Any variances from the estimated emission reductions will be captured in a retrospective analysis to be conducted during the true-up period. This analysis will examine the emissions in

the PJM West and/or other appropriate power grids and verify the emission reductions resulting from reduce electricity demand from traffic signals. These retrospective analyses will be based on actual energy savings and actual emissions reductions measured during the verification period. These records will be provided to the appropriate state air agency on an annual basis and will be used to provide documentation for the region's periodic evaluation reports.

**Projected Reductions and Emissions Benefit Calculations**

[pending] .

**District of Columbia Renewable Portfolio Standard**

This measure will focus on NOx emission reductions resulting from the displacement of power generation from coal, oil, and/or gas-fired sources by only the zero-emission renewable energy sources. The District of Columbia Department of the Environment will retire NOx allowances in an amount commensurate with the amount of emissions displaced.

**Source Type Affected**

The measure affects the District of Columbia within the Metropolitan Washington nonattainment area. According to the DC RPS Act, a major purpose of the Act is to "ensure that the benefits of electricity from renewable energy sources, including long-term reduced emissions…accrue to the public at large."

**Control Strategy**

Under the DC RPS Act, retail electricity suppliers are required to meet their regulatory requirements by supplying renewable energy that is located: (A) in the PJM Interconnection region or in a state that is adjacent to the PJM Interconnection region; or (B) outside the area described in (A) but in a control area that is adjacent to the PJM Interconnection region, if the electricity is delivered into the PJM Interconnection region.
The increased supply of renewable energy will displace fossil fuel generated power in the PJM Interconnection area, thus reducing the NOx emitted from these upwind plants.

The District of Columbia plans to include provisions in its NOx Ozone Season Trading Program under the Clean Air Interstate Rule setting aside a portion of the District's total NOx allowance budget to support renewable energy and energy efficiency projects. The District will assure that NOx allowances will be retired in an amount commensurate with the NOx emissions reduced as a result of the tier one zero-emission renewable energy purchases. This retirement of allowances will ensure that surplus emission reductions will be provided. Since the CAIR program for electric generating units is not effective until 2009, credit for NOx emission reductions will not be claimed until 2009.

**Implementation**

District of Columbia

Under the Renewable Energy Portfolio Standard (RPS) Act of 2004, retail electricity suppliers serving customers in the District of Columbia are required to provide 2.5% of their supply from tier one renewable energy sources in 2009, including 0.019% from solar energy. This renewable energy percentage increases each year to a level of 11% in 2022 and later. Tier 1 renewable sources are defined to include: (1) zero-emission renewable energy sources, including solar energy, wind energy, geothermal energy, and ocean energy; and (2) low-emission renewable energy, including qualifying biomass, qualified methane from anaerobic decomposition, and fuel cells.

**Monitoring and Enforcement**

The District of Columbia will provide evidence that it has assured the retirement of the designated amount of NOx allowances from future use under its renewable energy set-aside. In addition, the District of Columbia Department of the Environment has committed to obtain information from the DC Public Service Commission confirming that electricity suppliers have made purchases of renewable energy consistent with the commitments incorporated in this control measure.

**Calculation of Emission Reduction Benefits**

The calculation of NOx emission reductions for 2009 involves the following steps:

(1) Estimate total retail sales of electricity in DC for the summer ozone season in 2009;
(2) Estimate the amount of Megawatt-hours supplied from zero-emission Tier 1 renewable resources in the summer ozone season for 2009 (based on the requirements of the DC RPS Act and estimates by the DC Department of the Environment);
(3) Calculate avoided NOx emissions in lbs/MWh during the summer ozone season based on an estimate of actual avoided NOx emissions and the calculation of NOx allowances retired; and
(4) Calculate avoided NOx emissions in tons/day during the summer ozone season.

The most complex aspect of this methodology involves the calculation of avoided NOx emissions. However, in recent years, substantial progress has been made in the development of methodologies to quantify emission reduction benefits from energy efficiency and renewable energy (EERE) measures. Several methods have been used to calculate the benefits resulting from the displacement of fossil fuel generation in the dispatch order. The methodology outlined below, known as a "power plant dispatch methodology," was developed by Resource Systems Group, Inc. (RSG) in cooperation with Environmental Resources Trust (ERT).

The State of Maryland relied on an initial version of the RSG/ERT methodology in its regional wind purchase submission as part of the bundle of voluntary measures submitted to EPA in its one-hour ozone SIP. This SIP control measure was subsequently cited with approval by the EPA in its August 2004 "Guidance on State Implementation Plan (SIP) Credits for Emission Reductions from Electric-sector Energy Efficiency and Renewable Energy Measures."[9] EPA also approved the wind purchase as the first-ever renewable energy measure to receive NOx emissions reduction credit in a State Implementation Plan.[10]

An updated version of the RSG methodology has been subsequently used to estimate the displacement of emissions at fossil fuel fired power plants resulting from EERE projects in New Jersey, Virginia, and Connecticut. Much of this work has been supported by the U.S. Department of Energy.[11] The New Jersey work was conducted in cooperation with the U.S. Environmental Protection Agency and the National Renewable Energy Laboratory.

[9] See http://www.epa.gov/cleanenergy/stateandlocal/guidance.htm
[10] 70 Fed. Reg. 24988 (May 12, 2005).
[11] U.S Department of Energy, *Final Report on the Clean Energy/Air Quality Integration Initiative for the Mid-Atlantic Region*, August 2006. See http://www.eere.energy.gov/wip/clean_energy_initiative.html; Resource

Under the RSG methodology, the wind and photovoltaic (PV) generation data are estimated based on the hourly operating profile for typical wind and PV facilities in the PJM Interconnection area over a one-year period. The wind data is based on performance data from annual records of typical wind turbines in the PJM Interconnection area. The PV data is based on the performance of a standard silicon PV system using solar radiation data for Typical Meteorological Years (TMY2) compiled by the National Renewable Energy Laboratory for representative locations in the PJM Interconnection area.

The next step is to match the renewable electric generation data for each source type (e.g., wind, PV) against the hourly generation of the variably dispatched fossil-fuel units at plants listed in the Appendix. This matching process is conducted with the assistance of a database program, and this process identifies which fossil-fuel plants are operating when the renewable power is being generated. This comparison forms the basis for matching and identifying the set of generation units which can be displaced in each hour.

Although the hourly generation records are not available for all of the fossil-fuel plants, they have been estimated by using the hourly $CO_2$ and NOx emissions data from continuous emission monitors (CEMs). The generation calculation is based on the average $CO_2$ emission rates per MWh reported to the EPA, and the hourly emission rates for NOx are derived from the CEM data reported to EPA. The average NOx avoided emissions are then based on a generation-weighted average of the emissions at units which are operating at each hour. The results are reported for the ozone season (May 1 to September 30). The current analysis is based on electric generation data and continuous emission monitoring data for CO2 and NOx for calendar year 2005 in the PJM Interconnection Area.

**Projected Annual Generation and Avoided Emissions from the DC RPS Tier 1 Sources**

| DC RPS Tier 1 Category | MWh Generation | NOx Emissions Avoided |
|---|---|---|
| Wind | | |
| Solar PV | | |
| | | |
| | | |



Systems Group, *Estimation of Avoided Emission Rates for Nitrogen Oxide Resulting from Renewable Electric Power Generation in the New England, New York and PJM Interconnection Power Market Areas, 2006,* Prepared under grant funding from the U.S. Department of Energy and under subcontract to Environmental Resources Trust and Connecticut Smart Power.

**Green Buildings Programs**

Under this program, local governments in the nonattainment area have committed to reducing energy demand associated with operation of existing and new buildings by implementing Green Building Programs. This will decrease demand for electricity and subsequent power generation from coal, oil, and/or gas-fired sources that would normally supply power to the Metropolitan Washington region, thereby reducing NOx emissions from those sources.

**Source Type Affected**

The measure affects state and local governments within the Metropolitan Washington nonattainment area. Federal government agencies also have Green Building programs and energy use intensity reduction targets set by legislation and executive order. As there are many federal government buildings in this area, particularly of the General Services Administration and the Department of Defense, these facilities with green building energy efficiency and renewable energy improvements may also contribute to power generation emissions reductions.

**Control Strategy**

This measure is envisioned as a region-wide measure encompassing Green Building initiatives by public citizens, private industry, and state and local governments within the Metropolitan Washington non-attainment area. This program is in the early stages of development, and commitments received at this point affect several local jurisdictions in the non-attainment area. Local governments have begun to implement a variety of Green Building programs that may reduce demand for electricity. The reduction in energy demand will displace fossil fuel generated power, thus reducing the NOx emitted from those plants.

Green Building programs can include a number of initiatives, including LEEDs certification, Energy Star Building certification, and Green Building Codes. In order to provide air quality benefits, any program must include as a key component a requirement that retrofitted or new buildings achieve a reduction in energy demand compared to an established baseline.

Each state in the nonattainment area are including a provision in their regulatory program that sets aside a portion of the state's total NOx allowance budget for clean air projects. The state will retire NOx set-aside allowances in an amount commensurate with the size of the energy demand reduction to ensure reductions of ozone season emissions allowed under the state regulatory program.

**Implementation**

District of Columbia
Arlington County, Virginia
Fairfax County, Virginia
Montgomery County, Maryland
City of Alexandria, Virginia
City of Greenbelt, Maryland

City of Falls Church, Virginia
Fairfax County, Virginia

| Jurisdiction | Program Element | 2009 Emission Reduction for 8-hour Ozone SIP |
|---|---|---|
| Fairfax County | LEED goal for recreation center | No Credit |
| Arlington County | LEED scorecard for projects; developer incentives | |
| Montgomery County | Possible Green Building ordinance | |
| District of Columbia | Planning for LEED requirements for all government buildings | |
| City of Alexandria | LEED silver goal for all government buildings | |
| City of Alexandria | Require plan for voluntary LEED for private sector | |
| City of Greenbelt | LEED silver for public works building | |

**Monitoring and Enforcement**
All jurisdictions and agencies participating in the Green Buildings program have committed to maintain records of the projects undertaken to verify the reduction in energy demand. The required factors for recording include the baseline and proposed design or operationally achieved annual energy usage values by fuel type.

**Projected Reductions and Emissions Benefit Calculations**
Annual emissions reductions can be calculated from reporting the LEED Energy Performance, On-Site Renewable Energy, and Green Power certified credits and the baseline and proposed/achieved building energy usage numbers by fuel type. LEED certification energy performance values are reported on an annual basis, although an hourly simulation program is often utilized for building energy modeling. With additional guidance, seasonal or daily numbers could be available from the process. Alternatively, a "summer season allocation" methodology could be applied. Note that for new construction projects, energy and emissions reductions are achieved compared to a theoretical baseline, so additional analysis would be required based on the EPA growth factors for this area.

Co-benefits of Green Building programs include reduction in energy demand and associated emissions from building heating appliance fuels; reduction in VOCs associated with built environment treatments (adhesives and sealants, paints and coatings, carpet, and composite wood); and reduction in transportation emissions (by encouraging the use of mass transit and alternative fuel vehicles).

**Mobile Source Strategies**
**Diesel Retrofit Program**

Under this program, local governments and transit agencies identify high-emitting, high-mileage diesel vehicles, such as older school buses and transit buses for retrofit. These vehicles are retrofitted using any of a variety of technologies certified under EPA's Voluntary Diesel Retrofit Program. Commonly considered technologies include oxidation catalysts and particulate filters.

**Source Type Affected**

The measure affects local governments and transit agencies within the Metropolitan Washington nonattainment area.

**Control Strategy**

This measure is envisioned as a region-wide measure encouraging a variety of school and transit bus operators, trucking companies and construction companies within the Metropolitan Washington non-attainment area to retrofit diesel equipment.

This program was included in the one-hour ozone SIP and is being expanded here. To meet existing and new commitments, local governments are committing to retrofit high-emitting diesel trucks, and school and transit buses using technologies verified under EPA's Voluntary Diesel Retrofit Program. The vehicles operate exclusively in the Washington region.

**Implementation**

Fairfax County, Virginia
Loudoun County, Virginia
Montgomery County, Maryland

In 2004-2005, Fairfax County implemented a comprehensive school bus retrofit program. More than 1,000 vehicles were equipped with diesel oxidation catalysts. Between 2005 and 2007, the county plans to retrofit 113 Class 8 trucks and approximately 90 fire trucks.

Between 2005 and 2008, Loudoun County plans to retrofit 237 school buses with diesel oxidation catalysts.

By 2006, Montgomery County plans to retrofit approximately 253 school buses with diesel oxidation catalysts and chip reflash.

Additional details regarding the types of buses retrofitted are included in [Appendix] J.

**Monitoring and Enforcement**

All jurisdictions and agencies participating in the diesel retrofit program have committed to maintain copies of signed contracts and appropriate work orders or invoices to verify the number and type of retrofits installed. The jurisdictions have also pledged to keep records of the mileage traveled by retrofitted buses. These records will be provided to the appropriate state air agency on an annual basis and will be used to provide documentation for the region's periodic evaluation reports.

**Projected Reductions and Emission Benefit Calculations**

Because of the uncertainty surrounding the amount of creditable reductions available from this program, states are claiming zero credit from this measure. Further information regarding this program is included in [Appendix] J.

**Low-emission Vehicle Purchase Program**

Under this program, local governments and transit agencies purchase low-emission vehicles instead of conventional gasoline powered vehicles.

**Source Type Affected**

The measure affects local governments and transit agencies within the Metropolitan Washington nonattainment area.

**Control Strategy**

This measure is envisioned as a region-wide measure encouraging a variety of fleet owners and operators and private citizens within the Metropolitan Washington non-attainment area to purchase low-emission vehicles instead of conventional gasoline vehicles.

This program was included in the one-hour ozone SIP and is being expanded here. To meet existing and new commitments, local governments are committing to purchase low-emission vehicles to replace conventional higher-emitting vehicles. These vehicles are being purchased both as part of and external to the normal county vehicle replacement cycle. The vehicles operate exclusively in the Washington region.

**Implementation**

Arlington County, Virginia
City of Alexandria, Virginia
City of Greenbelt, Maryland
City of Falls Church, Virginia
Fairfax County, Virginia
Montgomery County, Maryland
Loudoun County, Virginia
Prince George's County, Maryland
Maryland National Capital Parks and Planning Commission (M-NCPPC), Prince George's County

Arlington County has an on-going program to replace conventional gasoline engine vehicles with hybrid electric vehicles. The county plans to replace 58 small general purpose sedans with Toyota Prius hybrid. Arlington will also purchase Ford Escape and Chevrolet Silverado hybrids.

The City of Alexandria has a program to replace conventional gasoline engine vehicles with hybrid electric vehicles. The city plans to purchase 15 Toyota Prius hybrids, 40 flex fuel vehicles, and a Ford Escape hybrid. In addition, the city's General Services will implement a policy requiring Pool Car Attendees to issue all hybrid cars prior to issuing regular gasoline powered vehicles. This will ensure the City receives the maximum fuel savings and environmental benefits associated with the utilization these vehicles.

The City of Greenbelt has an on-going program to replace conventional gasoline engine vehicles with low-emission vehicles. The city operates a number of compressed natural gas (CNG) vehicles, as well as a flex-fuel sedan.

The City of Falls Church has a program to purchase hybrid vehicles. Between 2008 and 2008, the city plans to purchase 3 Ford Escape hybrids, 2 Chevrolet Silverado hybrids, and a Honda Civic hybrid.

Montgomery County has a program to purchase low-emission vehicles. Since 1995, the county has purchased approximately 97 CNG transit buses. The county has also purchased 121 E85 ethanol vehicles. In 2006 and 2007, the county plans to purchase 14 diesel hybrid electric transit buses.

Loudoun County has a program to purchase low-emission vehicles. In 2005 and 2006, the county plans to purchase 25 Ford Escape hybrids.

Prince George's County has a program to purchase low-emission vehicles. Between 2003 and 2007, the county plans to purchase 11 vehicles, including Toyota Prius hybrid, Ford Escape hybrid, and Honda Civic hybrid.

The Maryland National Capital Parks and Planning Commission (M-NCPPC) for Prince George's County has a program to purchase low-emission vehicles. Between 2004 and 2009, the M-NCPPC plans to purchase 27 hybrid vehicles, including the Honda Civic hybrid and the Ford Escape hybrid.

**Monitoring and Enforcement**

All jurisdictions and agencies participating in the low-emission vehicle program have committed to maintain copies of signed contracts and invoices to verify the number and type of vehicles purchased. The jurisdictions have also pledged to keep records of the mileage traveled by the low-emission vehicles. These records will be provided to the appropriate state air agency on an annual basis and will be used to provide documentation for the region's periodic evaluation reports.

**Projected Reductions and Emissions Benefit Calculations**

Because of the uncertainty surrounding the amount of creditable reductions available from this program, states are claiming zero credit from this measure. Further information regarding this program is included in [Appendix] J.

**Auxiliary Power Units on Locomotives**

Diesel locomotives produce large quantities of NOx and particulate matter. Because it is time consuming to start up and shut down locomotives engines, many locomotive operators leave engines running when the locomotives are not in use. This is especially true of locomotives used in switchyards, which must operate frequently at irregular intervals. As a result, operators often tolerate idling so as to have the switcher ready when needed. This program encourages commuter, freight and commercial passenger railroads to install electric-powered APUs on locomotives operating in the Washington nonattainment area. An APU offers a low emission alternative to constantly idling the locomotive engine.

**Source Type Affected**

Locomotives operating within the Metropolitan Washington nonattainment area.

**Control Strategy**

This measure is envisioned as a region-wide measure encouraging a variety of locomotive owners and operators within the Metropolitan Washington non-attainment area to purchase install auxiliary power units to reduce locomotive idling.

This program was included in the one-hour ozone SIP and is not being expanded at this time. Only one commitment has been received. Virginia Railway Express (VRE), a local commuter railroad, has committed to install 13 auxiliary power units (APUs) on locomotives operating within the Metropolitan Washington region. These APUs are used when locomotives would normally idle in the rail yards, reducing fuel usage and locomotive emissions.

There are no new commitments beyond those made in the one-hour ozone SIP.

**Implementation**

Virginia Railway Express

VRE has completed their APU installation program. VRE has already completed installation of these units, and the units are functioning properly. VRE has budgeted funds for the electricity charges and for routine maintenance on the units.

**Monitoring and Enforcement**

VRE has committed to maintain copies of signed contracts and invoices to verify the number and type of APUs purchased. VRE has also pledged to track the average hours the APUs are operated. These records will be provided to the appropriate state air agency on an annual basis and will be used to provide documentation for the region's periodic evaluation report.

**Projected Reductions**

VRE is operating 13 APUs at a projected reduction of 0.1 tpd NOx per year.

**Emissions Benefits Calculations**

Emission benefits are calculated as follows:

$$\frac{\#\text{ of units} \times \frac{hours}{week}\text{ idling avoided} \times \frac{gal}{hour}\text{ avoided fuel consumption} \times \frac{lb}{gal}\text{ emissions avoided}}{2000\frac{lb}{ton} \times 7\frac{days}{week}} = \text{tpd avoided}$$

Further information on emission benefits resulting from this program is included in [Appendix] J.

**Remote Sensing Device Program**

The Commonwealth of Virginia has implemented a remote sensing program throughout the Northern Virginia portion of the Washington nonattainment area. This program reduces the number of high-emitting vehicles in the Virginia portion of the Washington region by requiring vehicles identified as high emitting to undergo out-of-cycle testing.

**Source Type Affected**

The measure affects Virginia motorists driving through the Virginia portion of the Washington nonattainment area.

**Control Strategy**

Under this measure, cars emitting in excess of the state emission limit are identified via a remote sensing program as they drive throughout the region. Owners of high-emitting vehicles are mailed a notice requiring out-of-cycle testing and repair for the vehicle's emission system. High-emitting Virginia vehicles not registered within the I/M program area but driving through the Washington region on a regular basis are also be required to repair their emissions control systems. This will reduce the number of high-emitting vehicles in the Washington nonattainment area.

**Implementation**

Virginia – Department of Environmental Quality

**Monitoring and Enforcement**

VDEQ has developed a rule that will backstop this program and provide clear penalties for noncompliance. Penalties are based on the level of the emissions exceedences and vary from $450 to $225, adjusted from the base year of 1990 by the consumer price index. See 9 VAC 5-91-750. The entire rule may be found at http://www.deq.virginia.gov/air/pdf/airregs/C091.pdf.

**Projected Reductions and Emission Benefit Calculations**

Because of the uncertainty surrounding the amount of creditable reductions available from this program and also due to the problematic nature of relating mobile source concentrations to emission rates, Virginia is claiming zero credit from this measure.

## VOC Reduction Strategies

### Low-VOC Paints Program

Interior and exterior paint is applied to a variety of surfaces, including buildings and roads. Though [Measure 6.2.12], the Architectural and Industrial Maintenance Coatings rule, requires a lower VOC content for many paints, many manufacturers sell no-VOC paint, or paint with VOC content much lower than the AIM rule standard. Use of no- or very low-VOC paint further reduces VOC emissions in the Washington nonattainment area.

### Source Type Affected

The measure affects state and local governments and their contractors involved in some interior and exterior painting and traffic marking activities.

### Control Strategy

This measure is envisioned as a region-wide measure encouraging use of very low or zero-VOC paint by public citizens, private industry and state and local governments within the Metropolitan Washington non-attainment area.

This program was included in the one-hour ozone SIP and is being expanded here. State agencies and local governments have committed to using paint and traffic marking materials with very low or zero VOC content. The lower-VOC paint is to be purchased and applied daily throughout the ozone season, and often year-round. It is hoped that continuing outreach efforts will expand this program to include participation from additional government entities and the private sector.

### Implementation

Arlington County, Virginia
Calvert County, Maryland
City of Alexandria, Virginia
City of Greenbelt, Maryland
Fairfax County, Virginia
Maryland Department of Transportation
Maryland National Capital Parks and Planning Commission (M-NCPPC), Prince George's County
Prince George's County, Maryland

All participating jurisdictions plan to purchase and use paints with VOC content below the allowable levels under the existing regulatory programs for architectural, industrial, and maintenance coatings. See [Appendix J] for more details.

**Monitoring and Enforcement**

All jurisdictions and agencies participating in the low-VOC paint program have committed to maintain records of the number of gallons of paint used and the paint's VOC content. VOC content will be determined either by using the VOC level certification found on the paint can label or through laboratory testing, at the discretion of the participant. These records will be provided to the appropriate state air agency on an annual basis and will be used to provide documentation for the region's periodic evaluation reports.

**Projected Reductions**

This measure affects [xxx gallons of paint per day and is anticipated to reduce xxx] tpd VOC. Further information on commitments and projected reductions is included in [Appendix] J.

**Emissions Benefits Calculations**

Benefits from this program are calculated by determining emissions reduced over and above those required by the OTC AIM rule (Measure 6.4.12). They are calculated as follows:

$$\text{VOC Reduced (tpd)} = \frac{\frac{gallons}{day} \times 3.7854 \frac{liters}{gallon}}{453.39 \frac{g}{lb} \times 2000 \frac{lb}{ton}} * \left( \frac{g}{liter} \text{cap under AIM rule} - \frac{g}{liter} \text{cap in commitments} \right)$$

Further information on emission benefit calculations is included in [Appendix] J.

**Solvent Parts Washer Replacement Program**

Under this program, local governments voluntarily replace solvent-based parts cleaners with zero-emitting technology. This program reduces VOC emissions in the Washington nonattainment area.

**Source Type Affected**

The measure affects local governments within the Metropolitan Washington nonattainment area.

**Control Strategy**

This measure is envisioned as a region-wide measure encouraging replacement of solvent-based parts cleaners with zero-emitting technology private industry and state and local governments within the Metropolitan Washington non-attainment area.

This program is in the early stages of development, and commitments received at this point affects only one local jurisdiction in the non-attainment area. Montgomery County has begun to replace county-owned solvent-based parts cleaners with zero-emitting technology. The program eliminates VOC emissions from those units.

**Implementation**

Montgomery County, Maryland

Montgomery County has a program to replace solvent-based parts washers with microbial/aqueous washers at county-owned vehicle service facilities. The county is also developing a strategy to offer rebates to private automotive shops to purchase microbial/aqueous parts washers. Montgomery County is also working to implement an Environmental Partners Program. The program will certify local auto repair shops as "Environmental Partners" by performing environmental compliance inspections, helping the business achieve compliance and encouraging the use of "green" alternatives such as aqueous/microbial parts washers. The county hopes to expand the program to involve other business sectors such as dry cleaners.

**Monitoring and Enforcement**

All jurisdictions and agencies participating in the Solvent Parts Washer Replacement program have committed to maintain records of the number of units replaced, the annual quantity of solvent use that was displaced, and the VOC content of the displaced solvent. These records will be provided to the appropriate state air agency on an annual basis and will be used to provide documentation for the region's periodic evaluation reports.

**Projected Reductions and Emissions Benefit Calculations**

VOC emission reductions can vary based on the amount of solvent previously used by the facility before the switch to a solvent free system. Based on preliminary estimates provided by staff, replacing a typical unit may reduce VOC emissions by 0.1 to 2 tons/year/unit.

**Sale of Reformulated Consumer Products in Virginia**

The OTC Consumer Products rule (Phase I) requires reformulation of approximately 80 types of consumer products to reduce VOC content. It uses more stringent VOC content limits than the existing Federal consumer products rule. The rule also contains requirements for labeling and reporting. This rule became effective in the Northern Virginia area in March 9th, 2005. See http://www.deq.virginia.gov/air/pdf/airregs/450.pdf.

**Source Type Affected**

Various specialty chemicals named in the rule, such as aerosol adhesives, floor wax strippers, dry cleaning fluids and general-purpose cleaners.

**Control Strategy**

The consumer products regulated by this rule were reformulated or otherwise engineered to meet the limitations on VOC contents as specified in this rule. The basis for this rule was a model rule developed by the Ozone Transport Commission (OTC).

**Implementation**

Virginia Department of Environmental Quality – Effective March 9, 2005

**Monitoring and Enforcement**

This voluntary program has been replaced by a mandatory regulatory program, see Measure 6.4.13.

[Virginia Department of Environmental Quality is consulting with Maryland Department of the Environment, the District of Columbia Department of Health and the Metropolitan Washington Air Quality Committee to develop an effective monitoring and enforcement program for this measure. The program may involve contracting with a consultant to develop a testing program to assess the VOC content of regionally distributed products at regular intervals.]

**Projected Reductions**

This program provided 3.0 tpd VOC reductions in Virginia for 2005.

**Emissions Benefits Calculations**

Emission benefits for this measure were calculated by E.H. Pechan. (See Reference 2, Table IV-6.) Please refer to Measure 6.4.13.

**Gas Can Replacement Program**

Portable gas cans are a significant source of daily VOC emissions. Emissions from gas cans occur from evaporation and due to spillage for overfilling of power equipment fuel tanks. In transporting and storing cans, emissions are also released through secondary vent holes and permeation. By using newer gas cans with features such as shut off valves, harmful gasoline fumes can be reduced by 75%.

**Source Type Affected**

Owners of portable fuel containers, except containers with a capacity of less than or equal to one quart, rapid refueling devices with capacities greater than or equal to four gallons, safety cans and portable marine fuel tanks operating with outboard motors, and products resulting in cumulative VOC emissions below those of a representative container or spout.

**Control Strategy**

This program was adopted as part of the voluntary bundle developed for the one-hour ozone SIP. Commitments included local jurisdictions, state agencies, and their contractors operating in the non-attainment area. Jurisdictions pledged to collect functional cans that were not already scheduled for replacement, and replace those in-use, functional cans with redesigned cans meeting the new Portable Fuel Containers standard. Old cans were destroyed in accordance with requirements for disposal of hazardous waste.

There are no new commitments beyond those made in the one-hour ozone SIP.

**Implementation**

Arlington County, Virginia
Fairfax County, Virginia
City of Fairfax, Virginia
Maryland National Capital Parks & Planning Commission, Prince George's County
Montgomery County, Maryland
Prince George's County, Maryland
Prince William County, Maryland

**Monitoring and Enforcement**

All jurisdictions and agencies participating in the fuel container replacement program committed to maintain records of the number of fuel containers replaced and the method of disposal. These records are provided to the appropriate state air agency on an annual basis and are used to provide documentation for the region's program evaluation report.

**Projected Reductions**

This program was expected to replace 1,478 gas cans, resulting in a benefit of 0.01 tpd VOC. [Further details on commitments and projected reductions are included in [Appendix] J.]

**Emissions Benefits Calculations**

Calculation of emission benefits was based on estimates prepared by EH Pechan for use by the Ozone Transport Commission (Reference 2). In the report, Pechan estimates that 2.28 million gas cans are sold annually in the OTC Region. Table IV-6 in the Pechan document shows that for the 2.5 year period from January 1, 2003 through July 1, 2005, emissions in the OTC region will be reduced by 48 tpd VOC. Over this time period, the expected benefit in the Metropolitan Washington region would be 4.3 tpd, assuming a January 1, 2003 implementation date. [(See calculations for Measure 6.4.11.)] The estimated annual benefit from the measure in the Washington region is 4.3/48=8.96% of the total benefit.

Assuming that emission reductions are linearly related to gas can turnover, the Washington region accounts for 8.96% of the 2.28 million cans sold in the region per year, or 204,000 cans. From [Measure 6.4.11], annual regional reductions from the measure are estimated at 1.88 tpd. Therefore, replacement of one can will, on average, deliver a benefit of 1.88/204,000 = 0.00000922 tpd VOC.

**Urban Heat Island Mitigation/Regional Forest canopy: Conservation, Restoration and Expansion**

[add text from tree canopy workgroup when completed]

## References


1. US EPA, “Guidance on Incorporating Voluntary Mobile Source Emission Reduction Programs in State Implementation Plans,” Memorandum from Richard D. Wilson.

2. EH Pechan, “Control Measure Development Support: Analysis of Ozone Transport Commission Model Rules”, March 31, 2001.

3. State of Maryland, “NOx Reduction and Trading Program: Requirements for New Sources and Set-Aside Pool” COMAR 26.11.29.09.

4. Resource Systems Group, Inc. “Prospective Environmental Report for Clipper Wind Power,” April 2003.

5. US EPA, "New Vehicle Certification Standards", EPA 420-B-00-001, February 2000.

6. US EPA, “2003 EPA Certified Vehicle Test Result Report Data”.

7. [OTC 2006. *Identification and Evaluation of Candidate Control Measures: Draft Technical Support Document.* Prepared by MACTEC Federal Programs, Inc., Herndon, Virginia for the Ozone Transport Commission. August 4, 2006]