
*Washington DC-MD-VA 1997 PM_{2.5} Maintenance
Plan*

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1. Introduction

The District of Columbia, the State of Maryland, and the Commonwealth of Virginia are submitting this maintenance plan for the Washington DC-MD-VA 1997 fine particulate (PM_{2.5}) National Ambient Air Quality Standard (NAAQS) nonattainment area to the United States Environmental Protection Agency (USEPA) in support of the Washington DC-MD-VA redesignation request for that standard. This document demonstrates that PM_{2.5} air quality in the Washington DC-MD-VA area will remain compliant with the 1997 PM_{2.5} NAAQS, as measured by a monitoring network that meets all federal requirements. This plan includes mobile vehicle emissions budgets for the interim year of 2017 and the out year of 2025. It also contains contingency measures that will be implemented in the unlikely event that the area experiences an exceedance of the 1997 PM_{2.5} NAAQS.

2. Background

In July 1997, USEPA established two new PM_{2.5} standards: an annual standard of 15.0 µg/m³ and a 24-hour standard of 65 µg/m³. USEPA designated the Washington DC-MD-VA area as nonattainment for the 1997 PM_{2.5} NAAQS with an effective date of April 5, 2005 (70 FR 944, 1/5/2005). Table 2-1 provides the jurisdictions within the Washington DC-MD-VA 1997 PM_{2.5} nonattainment area, and Figure 2-1 depicts the map of the area.

Since these designations were made, PM_{2.5} air quality in the Washington DC-MD-VA area has improved such that the air quality is significantly better than required by the 1997 PM_{2.5} NAAQS. The Washington DC-MD-VA region's federal reference monitors have demonstrated compliance with the 65 µg/m³ daily standard since the inception of the PM_{2.5} monitoring programs within each state. The federal reference monitors have demonstrated compliance with the 15.0 µg/m³ annual standard since 2005. The most recent design value for the 24-hour standard, based on 2009-2011 data, is 26 µg/m³, and the most recent design value for the annual standard, based on 2009-2011 data, is 10.8 µg/m³.

Table 2-1: Washington DC-MD-VA Nonattainment Area Jurisdiction Listing with FIPS Codes

Maryland Jurisdictions

Charles County (24-017)
Frederick County (24-021)
Montgomery County (24-031)
Prince Georges County (24-033)

Washington D.C. (11-001)

Virginia Jurisdictions

Fairfax County (51-059)
Prince William County (51-153)
Arlington County (51-013)
Loudon County (51-107)
City of Fairfax (51-600)
City of Falls Church (51-610)
City of Manassas (51-683)
City of Manassas Park (51-685)
City of Alexandria (51-510)

Figure 2-1: Washington DC-MD-VA 1997 PM_{2.5} NAAQS Nonattainment Area



These improvements in air quality are due to permanent and enforceable emissions reductions of sulfur dioxide (SO₂) and nitrogen oxides (NO_x), the precursors to PM_{2.5}, and also in reductions of primary PM_{2.5} emissions. This document provides a maintenance plan, as required under § 175A of the federal Clean Air Act (CAA), to ensure that the citizens of the Washington DC-MD-VA area enjoy the benefits of healthy air quality that complies with the 1997 PM_{2.5} NAAQS for a minimum of 10 years, through 2025. This maintenance plan supports the redesignation request that the District of Columbia, the State of Maryland, and the Commonwealth of Virginia have submitted to USEPA concurrently with this document.

3. USEPA Maintenance Plan Requirements

The redesignation process provides that a state may petition USEPA to redesignate a nonattainment area as attainment and that USEPA may approve the redesignation subject to certain criteria being met. Section 107(d)(3)(E) stipulates one of these criteria, that USEPA must fully approve a maintenance plan that meets the requirements of § 175A. A state may submit both the redesignation request and the maintenance plan at the same time, and rulemaking on both may proceed on a parallel track. All applicable nonattainment area requirements must remain in place. The maintenance plan constitutes a SIP revision and must provide for maintenance of the relevant NAAQS in the area for at least 10 years after redesignation, including additional measures to ensure prompt correction of any violation of the NAAQS. The state must also submit a SIP revision 8 years after the original redesignation request is approved to provide for maintenance of the NAAQS for an additional 10 years following the first 10-year period. USEPA provided guidance dated September 4, 1992 on the redesignation request and maintenance plan process in the memorandum from John Calcagni, Director, Air Quality Management Division to Regional Air Directions entitled *Procedures for Processing Requests to Redesignate Areas to Attainment* (redesignation guidance). Other requirements are provided in 40 CFR 51 Subpart Z, entitled *Provisions for Implementation of PM_{2.5} National Ambient Air Quality Standards* (implementation rule). Additional guidance was received in the development of this maintenance plan from USEPA regional staff.

USEPA requires the following provisions to ensure maintenance of the NAAQS:

- States must develop an attainment emissions inventory to identify the level of emissions in the area that is sufficient to attain the NAAQS.
- States may generally demonstrate maintenance by showing that future emissions of a pollutant or its precursors will not exceed the level of the attainment inventory over the 10-year period following redesignation.
- Once an area has been redesignated, states must continue to operate an appropriate air quality monitoring network in order to verify the area's attainment status.
- States must ensure that each has the legal authority to implement and enforce all measures necessary to attain and maintain the NAAQS. States must verify continued attainment by indicating how maintenance plan progress will be tracked.

- Contingency measures must be available to promptly correct any NAAQS violation.

The District of Columbia, the State of Maryland, and the Commonwealth of Virginia have developed a maintenance plan that meets all USEPA requirements and demonstrates that because of permanent and enforceable measures, emissions over the 10 years following redesignation approval will remain below the 2007 attainment year levels while allowing for growth in population and vehicle miles traveled. The period covered by this maintenance plan is 2007 through 2025. Further, the District of Columbia, the State of Maryland, and the Commonwealth of Virginia commit to submitting a second 10-year maintenance plan, if still required for this standard.

The District of Columbia, the State of Maryland, and the Commonwealth of Virginia have developed an emissions inventory in accordance with USEPA guidance that identifies the level of emissions sufficient to achieve the 1997 PM_{2.5} NAAQS. This attainment inventory consists of the actual emissions for a year during the three-year period associated with the monitoring data showing attainment of the 1997 PM_{2.5} NAAQS, that is, 2007. The plan includes a demonstration that emissions will remain beneath the 2007 levels for a 10-year period by keeping in place key elements of the current federal and state regulatory programs and putting in place additional controls.

The District of Columbia, the State of Maryland, and the Commonwealth of Virginia will continue to operate and maintain its air quality monitoring network. The jurisdictions have the legal authority to implement and enforce specified measures necessary to attain and maintain the NAAQS.

In addition to maintaining key elements of regulatory programs, the District of Columbia, the State of Maryland, and the Commonwealth of Virginia will acquire air quality and source emissions data to track attainment and maintenance. The maintenance plan includes contingency measures, as necessary, to promptly correct any NAAQS violation that occurs after redesignation of the area.

The following sections provide detail on each of the above requirements, and the Washington DC-MD-VA area's approach to meeting each requirement.

4. Attainment Inventory

4.1 USEPA Requirements

The District of Columbia, the State of Maryland, and the Commonwealth of Virginia must develop an attainment year emissions inventory to identify the level of emissions sufficient to achieve the NAAQS. This inventory should be consistent with USEPA's most recent guidance on emission inventories for nonattainment areas available at the time. It should also include emissions during the time period associated with the monitoring data showing attainment of the 1997 PM_{2.5} NAAQS. Where a state has made an adequate demonstration that air quality has improved as a result of the SIP, the attainment inventory will generally be the actual inventory during the time period the area attained the standard. The inventory must be based on annual emissions of SO₂, NO_x, and primary PM_{2.5} in units of tons per year (tpy) during the attainment

year. Volatile organic compounds (VOC) and ammonia (NH₃) must also be included if they are determined to be significant contributors to PM_{2.5} air quality issues.

4.2 Washington DC-MD-VA Approach

The District of Columbia, the State of Maryland, and the Commonwealth of Virginia have developed an attainment year emissions inventory that identifies the level of emissions sufficient to achieve the 1997 PM_{2.5} NAAQS. The attainment inventory consists of the actual emissions for the year during the three-year period associated with the monitoring data showing attainment of the ozone standard, that is, 2007. The 2007 inventory is appropriate to use because it represents the typical inventory for the three-year period demonstrating attainment of the standard. The 2007 inventory is consistent with USEPA guidance; is based on annual emissions of SO₂, NO_x, and primary PM_{2.5} during 2007; and contains a list of sources and emissions in tpy. VOC and NH₃ were determined to be insignificant for the PM_{2.5} NAAQS for the Washington, DC-MD-VA PM_{2.5} nonattainment area, and for this reason they are not included in the attainment inventory. This determination was based on USEPA's policy regarding VOC and NH₃ as they relate to fine particle formation in the atmosphere as noted in the implementation rule (72 FR 20591, 4/25/2007). A detailed description of the procedures used to develop the attainment year inventory is contained in the Appendix A1, Appendix B1, and Appendix C1.

Table 4-1: 2007 Attainment Year Inventory

Pollutant	Point	Area	NonRoad	Onroad	Total
District of Columbia, Emissions in tpy					
SO ₂	612	1,241	234	68	2,156
NO _x	789	1,547	3,300	7,512	13,148
PM _{2.5}	53	1,120	246	272	1,691
Maryland, Emissions in tpy					
SO ₂	176,880	1,078	550	319	178,827
NO _x	30,365	3,222	10,406	47,279	91,272
PM _{2.5}	5,048	4,385	899	1,757	12,088
Virginia, Emissions in tpy					
SO ₂	5,956	3,414	867	220	10,457
NO _x	6,701	4,166	13,111	36,848	60,826
PM _{2.5}	446	4,022	1,053	1,422	6,944
Washington DC-MD-VA 1997 PM_{2.5} Nonattainment Area, Emissions in tpy					
SO ₂	183,449	5,733	1,652	607	191,441
NO _x	37,855	8,936	26,817	91,639	165,247
PM _{2.5}	5,547	9,528	2,198	3,452	20,724

5. Maintenance Demonstration

5.1 USEPA Requirements

States may demonstrate maintenance of the NAAQS by showing that future emissions of a pollutant or its precursors will not exceed the level of the attainment inventory. The demonstration should be for a period of 10 years following the redesignation. The projected inventory should consider future growth, including population and industry. It should also be consistent with the attainment inventory, and it should document data inputs and assumptions. All elements of the demonstration should be consistent with current USEPA guidance. Enforceability through regulations must also be demonstrated.

Any assumptions concerning emission rates must reflect permanent, enforceable measures. States generally cannot take credit for reductions unless there are regulations in place requiring those reductions or the reductions are otherwise shown to be permanent. Therefore, states are expected to maintain the implemented control strategy despite redesignation to attainment unless such measures are shown to be unnecessary for maintenance or are replaced with measures that achieve equivalent reductions. Emission reductions from source shutdowns can be considered permanent and enforceable to the extent that those shutdowns have been reflected in the SIP and all applicable permits have been modified accordingly.

5.2 Washington DC-MD-VA Approach

The 2017 and 2025 emissions were developed by projecting the 2007 emissions using the best available growth rates and projections, as noted in Table 5-1. Table 5-2 demonstrates how future projected emissions of SO₂, NO_x, and primary PM_{2.5} will not exceed the levels of the Washington DC-MD-VA attainment inventory for a minimum of 10 years following redesignation.

Table 5-1: Growth Assumptions Used in Emission Inventory Projections

Category	Level of Detail	Source
Stationary/Industrial Source Growth	Source/Unit/Process Specific	AEO State/Federal Requirements
Area and Non-Road Mobile Source Growth	Category Specific	Metropolitan Washington Council of Governments Cooperative Forecasts, AEO, USEPA estimates, etc.
Vehicle Miles Traveled Growth	Jurisdiction-specific	Metropolitan Washington Council of Governments Transportation Planning Board

Table 5-2: Washington DC-MD-VA SO₂, NO_x, and Primary PM_{2.5} Emissions from 2007 to 2025

SO ₂ Emissions in tpy					
Year	Point	Area	Non-Road	Onroad	Total (tpy)
2007	183,449	5,733	1,652	607	191,441
2017	28,183	4,139	433	560	33,315
Δ (2017–2007)	-155,265	-1,594	-1,218	-47	-158,125
2025	28,377	3,862	517	531	33,287
Δ (2025–2007)	-155,071	-1,871	-1,134	-76	-158,153
NO _x Emissions in tpy					
Year	Point	Area	Non-Road	Onroad ¹	Total (tpy)
2007	37,855	8,936	26,817	91,639	165,247
2017	22,481	9,009	17,600	41,709 (Tier 1: 41,709; Tier 2: 50,051)	90,799
Δ (2017–2007)	-15,374	73	-9,217	-49,930	-74,448
2025	23,044	9,342	14,719	27,400 (Tier 1: 27,400; Tier 2: 32,880)	74,504
Δ (2025–2007)	-14,811	406	-12,098	-64,239	-90,743
Primary PM _{2.5} in tpy					
Year	Point	Area	Non-Road	Onroad ¹	Total (tpy)
2007	5,547	9,528	2,198	3,452	20,724
2017	5,656	9,632	1,579	1,787 (Tier 1: 1,787; Tier 2: 2,144)	18,654
Δ (2017–2007)	109	104	-619	-1,665	-2,070
2025	5,693	9,725	1,269	1,322 (Tier 1: 1,350; Tier 2: 1,586)	18,010
Δ (2025–2007)	146	198	-928	-2,129	-2,714

¹Transportation buffers were added to the onroad mobile emissions for NO_x and PM_{2.5} for 2017 and 2025 to develop 2-tier (Tier 1 and Tier 2) mobile budgets for the two years. These mobile budgets are shown in brackets. See Section 5.2.1 for details of the development of mobile budgets.

Mobile source emissions were calculated using USEPA’s MOVES2010a mobile source inventory model. These estimates are based on vehicle-specific registration data obtained from each jurisdiction. Mobile source emission projections included the National Low Emission Vehicle Program (40 CFR 86 Subpart R); the 1994 Tier 1 Rule (40 CFR 86 Subpart A); the 2004 Tier 2 and Low Sulfur Gasoline Rule (40 CFR Part 80 Subpart H, 40 CFR Part 85, and 40 CFR Part 86); and the 2004 and 2007 Heavy-Duty Diesel Vehicle Rules (40 CFR Part 86 Subpart P). All jurisdictions were modeled with Phase II Reformulated Gasoline (RFG) and an enhanced I/M program for all analysis years. More information on the development of these inventories may be found in the Technical Support Document (Appendix C1).

Emissions for non-road vehicles and equipment except for marine, rail, and locomotives were calculated using NMIM2008 (version NMIM20090504), which used NONROAD2008a model (version July 2009). This version of NONROAD2008a is USEPA’s most recently approved emissions estimation tool for the above mentioned nonroad sources. Area, marine, rail, and locomotive emissions were calculated using the most updated practices and inputs. More

information on the development of these inventories may be found in the Appendix A1 and Appendix B1.

5.2.1 Mobile Source Emissions Budgets

Transportation conformity is a way to ensure that federal funding and approval are given to those transportation activities that are consistent with air quality goals. Transportation activities should not worsen air quality or interfere with an area's continued compliance in regards to the 1997 PM_{2.5} NAAQS. The federal transportation conformity rule is codified in 40 CFR Part 93, subpart A, entitled *Determining Conformity of Federal Actions to State or Federal Implementation Plans* (transportation conformity rule). This rule applies to areas designated as nonattainment for one or more NAAQS or that have been redesignated to attainment with federally approved air quality maintenance plans.

The responsible transportation planning entity for the Washington DC-MD-VA 1997 PM_{2.5} nonattainment area is the Metropolitan Washington Council of Governments (MWCOC) Transportation Planning Board (TPB). In the transportation conformity process, overall emissions estimates by analysis year that take into account future traffic activity and projects expected to be completed are compared to a base year, a no build scenario, or emission budgets. Emission budgets are used in this determination only if USEPA has approved or found adequate emissions budgets that have been submitted as a SIP revision. For PM_{2.5}, the pollutant itself and potentially all its various precursors would require analysis. NH₃ and VOC are precursors, however, they are not considered significant overall contributors to PM_{2.5} air quality issues, as noted in the implementation rule at 40 CFR 51.1002(c)(3). For other pollutants and precursors, the highway contribution to those emissions may be insignificant. In that case, the transportation conformity rule allows such pollutants and precursors to be exempt from conformity analysis under certain circumstances:

40 CFR 93.109 (k) *Areas with insignificant motor vehicle emissions.* Notwithstanding the other paragraphs in this section, an area is not required to satisfy a regional emissions analysis for §93.118 and/or §93.119 for a given pollutant/precursor and NAAQS, if EPA finds through the adequacy or approval process that a SIP demonstrates that regional motor vehicle emissions are an insignificant contributor to the air quality problem for that pollutant/precursor and NAAQS. The SIP would have to demonstrate that it would be unreasonable to expect that such an area would experience enough motor vehicle emissions growth in that pollutant/precursor for a NAAQS violation to occur. Such a finding would be based on a number of factors, including the percentage of motor vehicle emissions in the context of the total SIP inventory, the current state of air quality as determined by monitoring data for that NAAQS, the absence of SIP motor vehicle control measures, and historical trends and future projections of the growth of motor vehicle emissions. . .

The District of Columbia, the State of Maryland, and the Commonwealth of Virginia are herein making a finding that regional highway emissions of SO₂ are insignificant contributors to the PM_{2.5} air quality of the Washington DC-MD-VA area. The finding will become final if USEPA concurs and approves this maintenance plan. This finding is due to the fact that the regional highway SO₂ emissions inventory constitutes a very small fraction of the overall emissions inventory in the Washington DC-MD-VA area as shown in Table 5-3.

Table 5-3: Comparison of SO₂ Emissions from On-Road Sources to the Total SO₂ Inventory

Year	Metro DC Total SO₂ Emissions, tpy	On-Road SO₂ Emissions, tpy	Percent On-Road SO₂
2007	191,441	607	0.3
2017	33,315	560	1.7
2025	33,287	531	1.6

Additionally, PM_{2.5} air quality in the region is good and getting better. Figure 5-1 and Figure 5-2 provide the regional trends in PM_{2.5} air quality for the federal reference method monitoring sites. The design value for the Washington DC-MD-VA region is 10.8 µg/m³ for years 2009-2011, 4.2 µg/m³ beneath the standard. As noted in Table 5-3, the contribution of on-road mobile SO₂ emissions is expected to decline in both the 2017 and 2025, as compared to 2007. Therefore, it is highly unlikely that any increase in growth assumptions or activity data, beyond those already included in the on-road SO₂ emissions estimation methodology, could account for an exceedance or violation of the 1997 PM_{2.5} NAAQS annual standard. For these same reasons, the likelihood of on-road emissions of SO₂ contributing to an exceedance of the 1997 PM_{2.5} 24-hour standard is even smaller.

Figure 5-1: Washington DC-MD-VA 24 Hour PM_{2.5} Trends

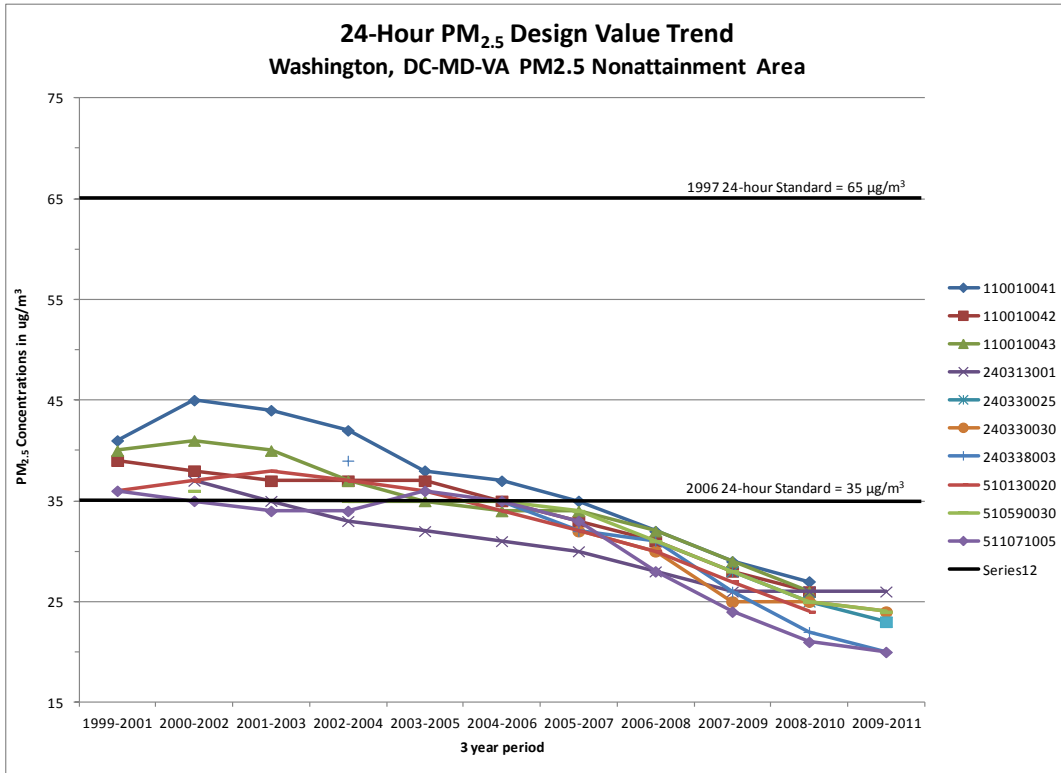
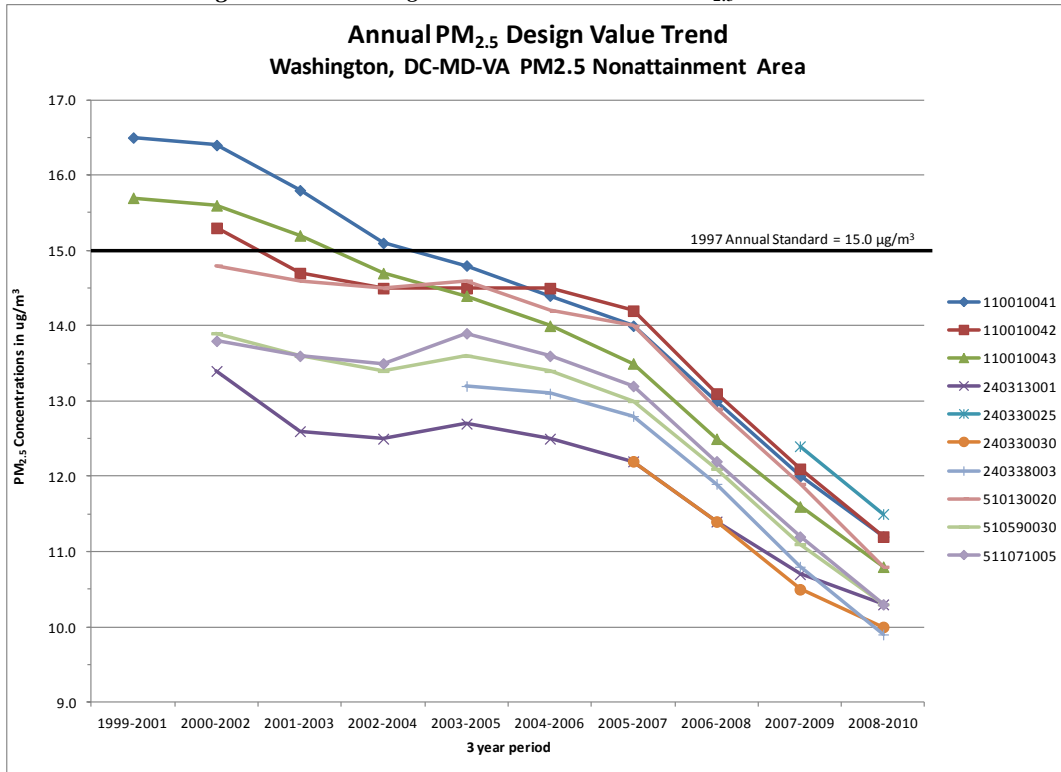


Figure 5-2: Washington DC-MD-VA Annual PM_{2.5} Trend Chart



As required by the transportation conformity rule, this maintenance plan establishes on-road mobile source emissions budgets for NO_x and PM_{2.5}. These budgets represent the level of mobile source emissions that can be emitted in the area while supporting the air quality plan. The mobile source budgets established by this plan are presented in Table 5-4 and Table 5-5.

Table 5-4: Washington DC-MD-VA Maintenance Plan Tier 1 On-Road Mobile Source Emissions Budgets

Year	NO _x On-Road Emissions (tpy)	PM _{2.5} On-Road Emissions (tpy)
2007 Attainment Year	91,639	3,452
2017 Interim Budget	41,709	1,787
2025 Predicted Emissions	27,400	1,322
Transportation Buffer	---	28
2025 Final Budget	27,400	1,350

Table 5-5: Washington DC-MD-VA Maintenance Plan Tier 2 On-Road Mobile Source Emissions Budgets

Year	NO _x On-Road Emissions (tpy)	PM _{2.5} On-Road Emissions (tpy)
2007 Attainment Year	91,639	3,452
2017 Predicted Emissions	41,709	1,787
Transportation Buffer	8,342	357
2017 Interim Budget	50,051	2,144
2025 Predicted Emissions	27,400	1,322
Transportation Buffer	5,480	264
2025 Final Budget	32,880	1,586

This maintenance plan provides a two-tiered approach for the motor vehicle emissions budgets (MVEBs). This approach will be applied in future conformity analyses supporting the 1997 annual PM_{2.5} standard and uses transportation buffers¹ to accommodate future transportation conformity determinations.

The initial Tier 1 MVEBs for PM_{2.5} and the precursor NO_x established for 2017 (interim year) and 2025 (out year) are based on mobile emissions inventory projections for 2017 and 2025. One exception is the PM_{2.5} budget for 2025 which adds a transportation buffer of 28 tons per year (tpy) of PM_{2.5} emissions to the budget to accommodate current inventory projections for 2040. The Tier 1 MVEBs will be in effect once the maintenance plan budgets are determined to be adequate.

¹ Section 93.124(a) of the Code of Federal Regulations (CFR) allows for the use of conformity buffers (or safety margins) in setting motor vehicle emissions budgets.

The Tier 2 MVEBs have been developed by adding a 20 percent transportation buffer to the mobile emissions inventory projections for PM_{2.5} and NO_x in 2017 and 2025. The buffers will add 357 tpy of PM_{2.5} and 8,342 tpy of NO_x to the 2017 emission inventories, and 264 tpy of PM_{2.5} and 5,480 tpy of NO_x to the 2025 emission inventories to develop the Tier 2 MVEBs. The overall emissions inventories even with these buffers remain below the maintenance year caps for both pollutants. In the near term, mobile source emissions are rapidly decreasing due to the implementation of the NLEV, and HDDV rules, even as Vehicle Miles Traveled (VMT) continues to grow. Once these rules have sufficiently penetrated the fleet, growth in VMT begins to push mobile emissions back on an upward trend. The transportation buffers are provided to accommodate technical uncertainties primarily due to model changes and to vehicle fleet turnover that may affect future motor vehicle emissions inventories. Tier 2 MVEBs become effective if it is determined that one or more of these uncertainties lead to motor vehicle emissions estimates above the Tier 1 MVEBs. This determination will be made through the interagency consultation process and will be fully documented in the first conformity analysis that utilizes the Tier 2 budgets. Regulations related to the interagency consultation process adopted by the District of Columbia, the State of Maryland, the Commonwealth of Virginia, and the Transportation Planning Board are identified below.²

District of Columbia: Title 20 Environment, Chapter 20-15 General and Transportation Conformity, Rule Numbers 20-1503, 20-1504, 20-1505, 20-1506, 20-1507

Maryland: Title 26 Department of Environment, Subtitle 11 Air Quality, Chapter 26 Conformity, Regulation Numbers 26.11.26.04, 26.11.26.05, 26.11.26.06, 26.11.26.07, 26.11.26.08

Virginia: 9VAC5 Chapter 151 Regulation for Transportation Conformity Section 70 Consultation (9VAC5-151-70)

Transportation Planning Board: Report titled “*Transportation Planning Board Consultation Procedures with respect to Transportation Conformity Regulations Governing TPB Plans and Programs*”, May 20, 1998

Table 5-4 provides details of the Tier 1 MVEBs for PM_{2.5} and NO_x for 2007, 2017, and 2025. Table 5-5 provides details of the Tier 2 MVEBs for PM_{2.5} and NO_x for 2007, 2017, and 2025. The transportation buffers listed in these two tables use emission reductions achieved but not needed to maintain compliance with the standard after the attainment year.

Calculated as a percentage of total emissions, the transportation buffer for the 2017 Tier 2 PM_{2.5} MVEB is 1.9% of the total PM_{2.5} inventory and for the 2017 Tier 2 NO_x MVEB is 9.2% of the total NO_x inventory. For 2025, the transportation buffer for the Tier 2 PM_{2.5} MVEB is 1.5% of the total PM_{2.5} inventory and for NO_x is 7.4% of the total NO_x inventory.

The Washington DC-MD-VA area commits to evaluating and submitting, as a revision to the 1997 PM_{2.5} NAAQS maintenance plan, updated annual 2017 and 2025 MVEBs for NO_x and PM_{2.5} by the end of 2015.³

² District of Columbia: <http://www.dcregs.dc.gov/Gateway/ChapterHome.aspx?ChapterNumber=20-15>

Maryland: <http://www.dsd.state.md.us/comar/SubtitleSearch.aspx?search=26.11.26>

Virginia: <http://leg1.state.va.us/000/reg/TOC09005.HTM#C0151> (9VAC5-151-70)

Transportation Planning Board: http://www.mwcog.org/store/item.asp?PUBLICATION_ID=233

³ This is being pursued as part of an agreement between the District of Columbia, the State of Maryland, and the Commonwealth of Virginia. See Appendix D for details of the agreement.

5.2.2 Control Measures for Maintenance of Good Air Quality

Point, non-road, and on-road emission projections for 2017 and 2025 include a variety of control strategies that will reduce emissions of PM_{2.5}, NO_x, and SO₂ in the future years. The sections below describe the major control programs in each category. Many of these programs are federal programs that are enforced on a regional or national level. In cases where the programs are delegated programs or state programs, the District of Columbia, the State of Maryland, and the Commonwealth of Virginia commit to the continuation of each program, to include compliance and enforcement mechanisms as appropriate to ensure that reductions assumed in 2017 and 2025 will be achieved.

5.2.2.1 Point Sector Controls

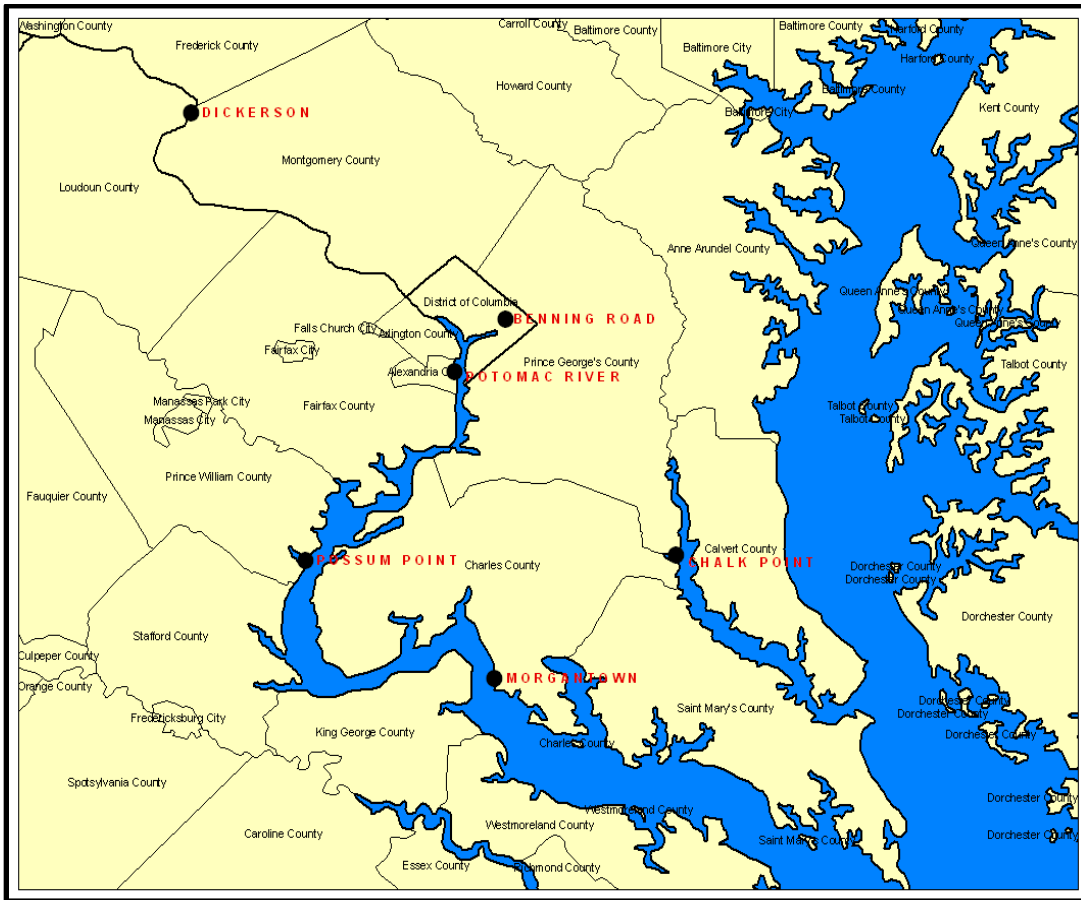
Point source emissions of PM_{2.5}, SO₂, and NO_x are dominated in the Washington DC-MD-VA region by the emissions from electrical generating units (EGU). The EGUs located in the Washington DC-MD-VA nonattainment area are the Possum Point Power Station in Fairfax, Virginia (ORIS⁴ 3804); the Potomac River Power Station in Alexandria, Virginia (ORIS 3788); the Chalk Point Generating Plant, in Prince George's County, Maryland (ORIS 1571); the Dickerson Generating Plant, in Montgomery County, Maryland (ORIS 1572); the Morgantown Generating Plant, in Charles County, Maryland (ORIS 1573); and the Benning Road Generating Station in the District of Columbia (ORIS 603). These facilities are subject to a variety of federal and state-enforceable mechanisms that have reduced emissions at these units since 2007 and will continue to reduce emissions into the future. The emission reduction measures applicable to the point sources are described in the following sections.

5.2.2.1.1 Maryland Healthy Air Act

The Maryland Health Air Act (HAA) regulations became effective on July 16, 2007 (approved into the State of Maryland SIP on 9/4/2008, 73 FR 51599) and required reductions in NO_x, SO₂, and mercury emissions from large coal burning power plants in Maryland. Specifically, this program limits emissions from the Chalk Point Generating Plant, the Dickerson Generating Plant, and the Morgantown Generating Plant, all of which are coal fired power plants located within the Maryland portion of the Washington DC-MD-VA nonattainment area. Emission reductions from the HAA are phased. The first phase required reductions in the 2009/2010 timeframe. Compared against a 2002 emissions baseline, the first phase of the HAA reduced NO_x emissions by almost 70 percent and SO₂ emissions by 80 percent. The second phase of emission controls will occur in the 2012/2013 time frame. At full implementation, the HAA will reduce NO_x emissions by approximately 75 percent from 2002 levels and SO₂ emissions by approximately 85 percent from 2002 levels. The first phase of the HAA was successfully implemented, and the second phase of the program is expected to be implemented in a timely manner.

⁴ EGUs are assigned a 4-digit ORIS (Office of the Regulatory Information System) identifier by the Energy Information Agency (EIA) of the US Department of Energy.

Figure 5-3: Large EGUs in the Washington DC-MD-VA Area



5.2.2.1.2 District of Columbia Source Shutdown

As a condition of the operating permit for the Benning Road Generating Station, Pepco Energy Services, Inc., agreed to permanently cease operation of the facility’s two electric generating units by December 17, 2012. The permit condition became federally enforceable as part of a SIP revision that was approved by USEPA on February 2, 2012 (77 FR 22: 5191). Closure of the two large, uncontrolled oil-fired turbines will result in SO₂ and NO_x reductions.

5.2.2.1.3 Virginia Permitting Requirements.

A federal settlement reduced emissions of NO_x and SO₂ significantly at the Possum Point Power Station, which is located in Fairfax County, Virginia. This consent decree, “United States v. Virginia Electric and Power Co.,” (No. 03-CV-517A, entered October 10, 2003), was signed April 17, 2003. The decree required the Possum Point Power Station to switch two coal-fired boilers to natural gas, thereby removing coal as a fuel at the facility. This requirement was also codified in a federally enforceable permit issued by the Virginia Department of Environmental Quality on October 5, 2001. This permit was issued under Article 8 and Article 9 of 9VAC5 Chapter 80 (Permits for Stationary Sources). Article 8 was most recently approved into Virginia’s SIP on October 22, 2008 (73 FR 62897) and on September 2, 2011 (76 FR 54706). Article 9 was most recently approved into Virginia’s SIP on October 22, 2008 (73 FR 62893).

The fuel switch from coal to natural gas was made in the 2003-2004 timeframe and resulted in large reductions in PM_{2.5}, SO₂, and NO_x from these units.

Two other permitting actions affected the emissions of SO₂ and NO_x from the Potomac River Power Station, a coal-fired EGU located in Alexandria, Virginia. The first was a state operating permit issued on July 31, 2008 by the State Air Pollution Control Board to address modeled exceedances of the National Ambient Air Quality Standards and the Significant Ambient Air Concentrations. This permit limited the facility's primary PM_{2.5} emissions to 207 tpy, the SO₂ emissions to 3,813 tpy, and the NO_x emissions to 3,700 tpy. On July 29, 2010, a second state operating permit was issued, further limiting the facility to 890 tons of NO_x per ozone season (May 1 through September 30). This permit supported the emissions reductions associated with the Washington DC-MD-VA 1997 ozone NAAQS nonattainment area's attainment plan, "Plan to Improve Air Quality in the Washington, DC-MD-VA Region." These permits were issued under Article 5 of 9VAC5 Chapter 80 (Permits for Stationary Sources), which was most recently approved into Virginia's SIP on June 27, 2003 (63 FR 38191).

5.2.2.1.4 Future Point Source Emission Reduction Programs

Three federal regulations may reduce emissions of SO₂ even further than is already estimated by the 2017 and 2025 inventory shown in Table 5-2 for the Washington DC-MD-VA area. These rules were not finalized at the time of the development of this maintenance plan and therefore were not considered in the 2017 and 2025 estimates included in this document. As these regulations are finalized, each should instigate significant further reductions, both within and outside the Washington DC-MD-VA area.

- **Mercury and Air Toxics Rule:** On February 16, 2012 (77 FR 9304), USEPA published the Mercury and Air Toxics Rule to reduce emissions of toxic air pollutants from new and existing coal and oil-fired EGUs. The rule establishes numerical emission limits for hydrogen chloride (HCl) as a surrogate for toxic acid gases or alternative standards for SO₂. USEPA estimates that this rule would affect approximately 1,200 coal-fired units nationwide and would reduce SO₂ emissions from power plants by 55 percent. Existing sources are required to demonstrate compliance with the standards by 2015.
- **2010 SO₂ NAAQS:** On June 22, 2010 (75 FR 35519), USEPA strengthened the primary NAAQS for SO₂ by revising the primary SO₂ standard to 75 ppb averaged over one hour. This short term standard is significantly more stringent than the revoked standards of 140 ppb averaged over 24 hours and 30 ppb averaged annually. Under the new standard's proposed guidance, facilities emitting more than 100 tpy of SO₂, many of which are EGUs, will be required to demonstrate compliance with the standard no later than 2017.
- **Industrial/Commercial/Institutional (ICI) Boiler Maximum Achievable Control Technology (MACT) Standard:** USEPA issued a notice for the final ICI Boiler MACT rule on December 20, 2012. USEPA estimates that implementation of the revised rulemaking will reduce emissions nationwide from major source boilers and process heaters by 16,593 tpy of PM_{2.5}, 570,000 tpy of SO₂, and 2,400 tpy of VOCs.

5.2.2.2 Nonroad Diesel Emission Reduction Programs

Under 40 CFR Part 89, USEPA adopted standards for emissions of NO_x, hydrocarbons, and carbon monoxide (CO) from several groups of nonroad engines, including industrial spark-ignition engines and recreational nonroad vehicles (67 FR 68242). Industrial spark-ignition engines power commercial and industrial applications and include forklifts, electric generators, airport baggage transport vehicles, and a variety of farm and construction applications. Nonroad recreational vehicles include snowmobiles, off-highway motorcycles, and all-terrain vehicles. These rules were initially effective in 2004 and will be fully phased in by 2012.

The nonroad diesel rule set standards that reduced emissions by more than 90 percent from nonroad diesel equipment and, beginning in 2007, the rule reduced fuel sulfur levels by 99 percent from previous levels. The reduction in fuel sulfur levels applied to most nonroad diesel fuel in 2010 and will apply to fuel used in locomotives and marine vessels in 2012 (69 FR 38958).

This program will continue to provide emission reductions of NO_x as new equipment is purchased and older equipment is scrapped. Additionally, SO₂ emissions from the combustion of nonroad diesel fuel and locomotive and marine diesel fuel will continue to be reduced through 2012.⁵

5.2.2.3 On-Road Emission Reduction Programs

In the 2007 heavy-duty highway rule, which is codified in 40 CFR Part 86, Subpart P, USEPA set a PM emission standard for new heavy-duty engines of 0.01 grams per brake horsepower-hour (g/bhp-hr). This standard took full effect for diesel engines in the 2007 model year. This rule included standards for NO_x and non-methane hydrocarbons (NMHC) of 0.20 g/bhp-hr and 0.14 g/bhp-hr, respectively. These diesel engine NO_x and NMHC standards were successfully phased in together between 2007 and 2010. The rule also required that sulfur in diesel fuel be reduced to facilitate the use of modern pollution control technology on these trucks and buses. USEPA required a 97 percent reduction in the sulfur content of highway diesel fuel -- from levels of 500 parts per million (ppm) for low sulfur diesel to 15 ppm for ultra-low sulfur diesel. The reductions in sulfur content engendered similar reductions in SO₂ emissions. These requirements were successfully implemented on the timeline in the regulation.

The Tier 1 federal motor vehicle emission standards were published by USEPA on June 5, 1991 and were phased in beginning with the model year 1994 (40 CFR Part 86 subpart A). The benefits of this program are reflected in the 2002 base year inventory and the 2007 attainment year inventory. This federally implemented program affects light duty vehicles and light duty trucks. The regulations require more stringent exhaust emission standards as well as a uniform level of evaporative emission controls.

The Tier 2 vehicle and gasoline sulfur program, as codified in Subpart H of 40 CFR Part 80, 40 CFR Part 85, and 40 CFR Part 86, became effective in the 2005 model year. This

⁵ Details of Nonroad engine and fuel rules are available at - <http://www.epa.gov/otaq/standards/index.htm>

program for fleet averaging of on-road vehicles is modeled after the California LEV II standards. The Tier 2 program allows manufacturers to produce vehicles with emissions ranging from relatively dirty to very clean, but the mix of vehicles a manufacturer sells each year must have average NO_x emissions below a specified value. Mobile emissions continue to benefit from this program as motorists replace older, more polluting vehicles with cleaner vehicles.⁶

In addition to the federal Tier 2 program and the federal 2007 heavy duty highway rule, enhanced vehicle emissions inspection and maintenance (enhanced I/M) requirements have also been instituted by the District of Columbia (64 FR 31498, 06/11/1999), the State of Maryland (64 FR 58340, 10/29/1999), and the Commonwealth of Virginia (64 FR 47670, 09/01/99). The requirements involve mandating regional vehicle emission I/M programs that are stricter than basic programs, as required under §§ 182 and 202 of the CAA. Before 1994, basic automobile emissions testing checked only tailpipe emissions while idling and sometimes at 2,500 rpm. Enhanced I/M procedures include the use of On Board Diagnostic (OBD) system evaluations, a wider range of vehicles tested, and may include a dynamometer (treadmill) test that checks the car's emissions under driving conditions. The OBD evaluations provide a more complete inspection, checking for excess evaporative emissions and other issues that might affect emissions from the vehicle.

5.2.2.4 Future Control Strategies

The Washington DC-MD-VA area commits to begin planning to identify appropriate strategies to help the area achieve and maintain compliance with a potential bump-up of the region to a moderate classification for the 2008 ozone NAAQS, and with any future ozone NAAQS. This planning process will include, but is not limited to, the development of a preliminary 15% Rate of Progress Plan for the 2008 ozone NAAQS.

The Washington DC-MD-VA area will work with jurisdictions and USEPA to demonstrate the feasibility of (and get SIP credit for) achieving reductions across the entire region from market forces that will result in cleaner products being distributed across the entire region even when the regulations driving the cleaner products have only been adopted in a part of the region.

The State of Maryland and the District of Columbia will work to pursue at least five new regulations to insure that, to the extent the transportation buffers are needed, there is no degradation of environmental protection in the State of Maryland and the District of Columbia portion of the Washington DC-MD-VA 1997 PM_{2.5} NAAQS nonattainment area. These new measures will also begin the process of further reducing ozone and fine particle levels in the region to ensure that public health is protected. The State of Maryland and the District of Columbia agree with the scientific community who believe that more stringent ozone and fine particle standards are needed. The new regulatory programs include low sulfur home heating fuel, enhancements to current controls on consumer products and industrial adhesives, off-road idling, and tougher requirements for smaller diesel generators. The commitments made by The State of Maryland and the District of Columbia will not be construed to infringe upon any prerogative of the Commonwealth of Virginia.

⁶ Details of Onroad engine and fuel rules are available at - <http://www.epa.gov/otaq/standards/index.htm>

Virginia will pursue measures that are necessary to attain and maintain current and future air quality standards as well as measures that may decrease the burden on regulated parties. For instance, Virginia is committed to pursue measures such as the on-road emissions program, which will ensure that up to 30 percent of all eligible registered vehicles in the Northern Virginia area have the option of remotely passing required biennial vehicle emissions inspections by 2015. The increased level of on-road monitoring could also result in the early identification and repair of high emitting vehicles such that this program will maintain environmental protections as well as reduce the time required for station-based tests. Virginia is also committed to supporting voluntary efforts to reduce energy consumption through energy efficiency and renewable energy programs. Organizations, such as the nonprofit Local Energy Alliance Program (LEAP), operate residential and commercial programs in Northern Virginia that seek to reduce energy use by at least 20 percent, thereby saving consumers' money, conserving resources, and decreasing air emissions.

6. Air Quality Monitoring Network

6.1 USEPA Requirements

Once an area has been redesignated, the states must continue to operate an appropriate air quality monitoring network in accordance with 40 CFR Part 58, to verify the area's attainment status. In cases where measured mobile source parameters (for example, vehicle miles traveled) have changed over time, the state may also need to perform a saturation monitoring study to determine the need for and location of additional permanent monitors.

6.2 Washington DC-MD-VA Approach

The District of Columbia, the State of Maryland, and the Commonwealth of Virginia operate a monitoring network that is significantly more robust than required by federal regulation.

Figure 6-1 provides a map showing the locations of the various PM_{2.5} monitoring sites in the current network.

The District of Columbia, the State of Maryland, and the Commonwealth of Virginia commit to operating and maintaining an air quality network for PM_{2.5} monitoring that meets all federal requirements. Should measured mobile source parameters change significantly over time, the states comprising the Washington DC-MD-VA nonattainment area will perform a saturation monitoring study to determine the need for and location of PM_{2.5} monitors.

Figure 6-1: Washington DC-MD-VA PM_{2.5} Monitoring Sites



7. Verify Continued Attainment

7.1 USEPA Requirements

States must ensure that they have the legal authority to implement and enforce all measures necessary to attain and maintain the NAAQS. Sections 110(a)(2)(B) and (F) of the CAA, and regulations promulgated in 40 CFR 51.110(k) suggest that one such measure is the acquisition of air quality and source emission data to demonstrate attainment and maintenance. The submittal must indicate how the states will track the progress of the maintenance plan. This is necessary due to the fact that the emission projections made for the maintenance demonstration depend on assumptions of point, area, and mobile source growth.

One option for tracking the progress of the maintenance demonstration would be for the states to periodically update the emissions inventory. In this case, the maintenance plan should specify the frequency of any planned inventory updates. Such an update could be based, in part, on the annual update of the USEPA Aerometric Information Retrieval System (AIRS) and could indicate new source growth and other changes from the attainment inventory (such as changes in vehicle miles traveled or in traffic patterns). As an alternative to a complete update of the inventory, states may choose to do a comprehensive review of the factors that were used in developing the attainment inventory to show no significant change. If this review does show a significant change, states should then perform an update of the inventory.

7.2 Washington DC-MD-VA Approach

The District of Columbia, the State of Maryland, and the Commonwealth of Virginia have the legal authority to implement and enforce specified measures necessary to attain and maintain the NAAQS. Key regulatory elements that the respective state will keep in place to maintain attainment are as follows:

- Shutdown requirements, permitting requirements, and cap requirements, as described in Section 5.2.2.1.
- I/M program requirements, as described in Section 5.2.2.3.

In addition to maintaining key elements of its regulatory program, each state will acquire ambient and source emission data to track attainment and maintenance. Each state will track the progress of the maintenance demonstration by periodically updating the emissions inventory. This tracking will consist of annual and periodic evaluations. The annual evaluation will consist of checks on key emissions trend indicators such as the annual emissions update of stationary sources, the Highway Performance Monitoring System (HPMS) vehicle miles traveled data reported to the Federal Highway Administration, and other growth indicators. These indicators will be compared to the growth assumptions used in the plan to determine if the predicted versus the observed growth remains relatively constant. Each state will also develop and submit to USEPA comprehensive tracking inventories every three years or as required by federal regulation during the maintenance plan period.

8. Contingency Measures

8.1 USEPA Requirements

The maintenance plan must include contingency measures, as necessary, to promptly correct two future situations. The first situation is an inventory estimate that indicates the Washington DC-MD-VA area had actual emissions of either SO₂, NO_x, or PM_{2.5} in any future year that were greater than that of the attainment year inventories listed in Table 4-1. The second situation is any NAAQS violation that occurs after redesignation of an area. The plan should include measures to be adopted, a schedule and procedures for adoption and implementation, and a specific time limit for action. Specific triggers that would put the plan into motion must be identified. This plan is considered to be an enforceable part of the SIP and should ensure that the contingency measures are adopted expeditiously once they are triggered.

8.2 Washington DC-MD-VA Approach

The ability of the Washington DC-MD-VA nonattainment area to stay in compliance with the 1997 PM_{2.5} NAAQS depends at least partially on the level of NO_x, SO₂, and primary PM_{2.5} emissions in the region. Emissions are projected to stay well below the 2007 attainment year levels, through 2025. However, if emissions increase, the area may experience a PM_{2.5} violation. To address this unlikely situation, the District of Columbia, the State of Maryland, and the Commonwealth of Virginia have developed a contingency plan. The situations described below would trigger the implementation of the contingency measures as described in Section 8.2.1, Section 8.2.2, or Section 8.2.3.

- Annual actual emissions of SO₂, NO_x, or PM_{2.5} exceeding the attainment year inventories in Table 4-1.
- Any annual exceedance (annual average for one year at any federal reference method monitor in the Washington DC-MD-VA maintenance area) of 15.0 µg/m³ or greater.
- Any violation (three year average of the annual average at any federal reference method monitor in the Washington DC-MD-VA maintenance area) of 15.0 µg/m³ or greater.

8.2.1 Exceedance of the Attainment Year Emissions Inventory

Should any future year emissions inventory data indicate that the Washington DC-MD-VA area's total emissions of SO₂, NO_x, or PM_{2.5} exceeded the levels in Table 4-1, the District of Columbia, the State of Maryland, and the Commonwealth of Virginia would first undertake an audit to determine whether inventory refinements were needed. This audit may include, but would not be limited to, a determination that appropriate models, control strategies, monitoring strategies, planning assumptions, industrial throughput, and production data were used in the attainment year and future year estimates. USEPA will be provided with the results of this audit. If this audit does not reconcile the originally estimated emissions exceedances, then the District of Columbia, the State of Maryland, and the Commonwealth of Virginia each commit to implementing one or more of the state-defined programs listed in Table 8-1, which applies to

their individual jurisdictions, so that future total emission estimates for the Washington DC-MD-VA area will not exceed those listed in Table 4-1.

8.2.2 Near Term Contingency Measures for Air Quality Exceedances

If an annual exceedance or violation of $15.0 \mu\text{g}/\text{m}^3$, as described in Section 8.2, occurs prior to January 1, 2013, the Maryland Healthy Air Act's second phase will provide significant emissions reductions of precursors to $\text{PM}_{2.5}$. This regulation, included in COMAR 26.11.27, requires additional SO_2 reductions beginning January 1, 2013, for applicable coal-fired power plants in State of Maryland. These applicable units include coal-fired boilers located at the Morgantown Power Plant, the Dickerson Power Plant, and the Chalk Point Power Plant in the Washington DC-MD-VA nonattainment area. In 2013 the allowable tonnage cap for the units at these facilities will be reduced from 24,209 tpy of SO_2 to 18,541 tpy of SO_2 , a reduction of almost 24 percent. This regulation has the added benefit of already being codified; these reductions will take place in January of 2013 without further action by the State of Maryland.

8.2.3 Long Term Contingency Measures

If an annual exceedance of $15.0 \mu\text{g}/\text{m}^3$, as described in Section 8.2, occurs after January 1, 2013, the District of Columbia, the State of Maryland, and the Commonwealth of Virginia each commit to implementing one of the state-defined programs listed in Table 8-1, which applies to their individual jurisdictions, to garner additional emission reductions for air quality improvement.

If an annual violation, as described in Section 8.2, occurs after January 1, 2013, the District of Columbia, the State of Maryland, and the Commonwealth of Virginia each commit to implementing two or more of the state-defined programs listed in Table 8-1, which apply to their individual jurisdictions, to garner additional emission reductions for air quality improvement.

Table 8-1: Contingency Control Measures

PM _{2.5} Reasonable Available Control Measure (RACM) Determination*
SO ₂ RACM Determination (DC & VA portions of the Washington DC-MD-VA area)*
NO _x RACM Determination*
Non Road Diesel Emission Reduction Strategies
Low Sulfur Home Heating Oil Requirements (DC & MD portions of the Washington DC-MD-VA area)
Alternative Fuel and Diesel Retrofit Programs for Fleet Vehicle Operations
Concrete Manufacturing – Wet Suppression Upgrade Requirements

* If a RACM analysis determines that no controls are economically and technically feasible, then an alternate control measure from Table 8.1 will be implemented.

8.2.4 Contingency Measure Implementation Schedule

The District of Columbia, the State of Maryland, and the Commonwealth of Virginia commit to the implementation of any long term contingency measure on the following schedule:

- Schedule onset: Three months after quality assured data determines that an exceedance or violation occurred within the previous year, or three months after the conclusion of an audit that determines an emissions inventory exceedance of the levels noted in Table 4-1 occurred.
- Applicable regulation or program to be adopted six months after this date.
- Applicable regulation to be implemented six months after adoption.
- Compliance with regulation, or full program implementation, to be achieved within 12 months of adoption.