

***Revision to the Motor Vehicle Emission Budgets  
for the  
Washington DC-MD-VA  
1997 Annual Primary PM<sub>2.5</sub> NAAQS Maintenance Plan***

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**on behalf of the  
Metropolitan Washington Air Quality Committee**

**February, 9, 2016**

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## **1. STATE IMPLEMENTATION PLAN REVISION OVERVIEW**

The District of Columbia, the State of Maryland, and the Commonwealth of Virginia request that the United States Environmental Protection Agency (USEPA) approve revisions to the 1997 annual primary fine particulate (PM<sub>2.5</sub>) maintenance plan (PM<sub>2.5</sub> maintenance plan) for the Washington DC-MD-VA 1997 Annual Primary PM<sub>2.5</sub> National Ambient Air Quality Standards (NAAQS) Maintenance Area (PM<sub>2.5</sub> maintenance area). These revisions include changes to on-road motor vehicle emissions budgets (MVEBs) for PM<sub>2.5</sub> and nitrogen oxides (NO<sub>x</sub>) based on the USEPA approved MOVES2014 model.

The three jurisdictions are revising the MVEBs to meet the commitments in Appendix D of the maintenance plan, which USEPA approved on October 6, 2014 (79 FR 60081). The PM<sub>2.5</sub> maintenance plan relied upon MOVES2010a to generate on-road estimates and projections since MOVES2010a was the most recent, federally-approved tool for such applications at the time of the development of the PM<sub>2.5</sub> maintenance plan. The MOVES2010a estimates were also the basis for the MVEBs contained within the plan. The three jurisdictions within the PM<sub>2.5</sub> maintenance area voluntarily committed to submitting updated PM<sub>2.5</sub> and NO<sub>x</sub> MVEBs developed using MOVES2014 after that tool became approved and available. USEPA officially released MOVES2014 for use in on-road emission inventory development on October 7, 2014. MOVES2014 includes the effects of new federal control measures that MOVES2010a did not consider, such as the Tier 3 Motor Vehicle Emission and Fuel Standards (Tier 3). MOVES2014 also has other technical improvements over previous versions of the on-road model. Due to these updates, emission estimates developed using MOVES2014 differ from those developed using MOVES2010a.

## **2. REVISIONS TO THE MVEBS**

This submittal revises the 2007, 2017, and 2025 MVEBs using MOVES2014 and updated planning assumptions.

Table 2-1 and Table 2-2 provide the previous Tier 1 and Tier 2 MVEBs, which are based on MOVES2010a and were included in the Washington DC-MD-VA maintenance plan approved on October 6, 2014. Table 2-3 and Table 2-4 provide the revised Tier 1 and Tier 2 MVEBs, which are based on MOVES2014 outputs.

The revised Tier 1 MVEBs for PM<sub>2.5</sub> and the precursor NO<sub>x</sub> established for 2017 (interim year) and 2025 (out year) are based on revised mobile emissions inventory projections for 2017 and 2025. These Tier 1 MVEBs will be in effect once the maintenance plan budgets are determined to be adequate.

The revised Tier 2 MVEBs have been developed by adding a 20 percent transportation buffer<sup>1</sup> to the revised mobile emissions inventory projections for PM<sub>2.5</sub> and NO<sub>x</sub> in 2017 and 2025. The buffers will add 304 tpy of PM<sub>2.5</sub> and 6,558 tpy of NO<sub>x</sub> to the 2017 emission inventories, and 185 tpy of PM<sub>2.5</sub> and

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<sup>1</sup> 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.

3,087 tpy of NO<sub>x</sub> 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. The transportation buffers are provided to accommodate technical uncertainties primarily due to model changes, vehicle fleet turnover, and planning assumption updates, e.g., land use and demographic forecasts 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 fully documented in the first conformity analysis that utilizes the Tier 2 budgets.

Based on the on-road mobile emissions trend in this plan revision document and the most recent air quality conformity analysis for the Washington Metropolitan Region, on-road mobile source emissions are rapidly decreasing due to the implementation of the National Low Emission Vehicle Program (NLEV), the Heavy-Duty Engine and Vehicle Standards (HDDV), Tier 3, and Corporate Average Fuel Economy (CAFE) rules. These emission reductions occur even as vehicle miles traveled (VMT) estimates continue to grow. Once these rules have sufficiently penetrated the fleet, growth in VMT may begin to push mobile emissions back on an upward trend. Therefore, the above MVEBs will be re-evaluated to accommodate transportation planning issues when the Constrained Long Range Plan horizon year is extended beyond 2040.

The District of Columbia, the State of Maryland, and the Commonwealth of Virginia developed the previous and revised MVEBs in consultation with the National Capital Region Transportation Planning Board (TPB), which is responsible for transportation planning in the Washington DC-MD-VA PM<sub>2.5</sub> maintenance area.

**Table 2-1: Washington DC-MD-VA Maintenance Plan Tier 1 On-Road Mobile Source Emissions Budgets based on MOVES2010a<sup>(1)</sup>**

<b>Year</b>	<b>NO<sub>x</sub> On-Road Emissions (tpy)</b>	<b>PM<sub>2.5</sub> On-Road Emissions (tpy)</b>
<b>2007 Attainment Year</b>	<b>91,639</b>	<b>3,452</b>
<b>2017 Interim Budget</b>	<b>41,709</b>	<b>1,787</b>
2025 Predicted Emissions	27,400	1,322
Transportation Buffer	---	28
<b>2025 Final Budget</b>	<b>27,400</b>	<b>1,350</b>

<sup>(1)</sup>Information from Table 5-4 in the Washington DC-MD-VA PM<sub>2.5</sub> Maintenance Plan approved by USEPA October 6, 2014 (79 FR 60081)

**Table 2-2: Washington DC-MD-VA Maintenance Plan Tier 2 On-Road Mobile Source Emissions Budgets based on MOVES2010a<sup>(1)</sup>**

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

<sup>(1)</sup>Information from Table 5-5 in the Washington DC-MD-VA PM<sub>2.5</sub> Maintenance Plan approved by USEPA on October 6, 2014 (79 FR 60081)

**Table 2-3: Washington DC-MD-VA Maintenance Plan Tier 1 Revised On-Road Mobile Source Emissions Budgets based on MOVES2014**

Year	NO <sub>x</sub> On-Road Emissions (tpy)	PM <sub>2.5</sub> On-Road Emissions (tpy)
<b>2007 Attainment Year</b>	<b>81,001</b>	<b>3,002</b>
2017 Predicted Emissions	32,790	1,523
Transportation Buffer	---	---
<b>2017 Interim Budget</b>	<b>32,790</b>	<b>1,523</b>
2025 Predicted Emissions	15,434	926
Transportation Buffer	---	---
<b>2025 Final Budget</b>	<b>15,434</b>	<b>926</b>

**Table 2-4: Washington DC-MD-VA Maintenance Plan Tier 2 Revised On-Road Mobile Source Emissions Budgets based on MOVES2014**

Year	NO <sub>x</sub> On-Road Emissions (tpy)	PM <sub>2.5</sub> On-Road Emissions (tpy)
<b>2007 Attainment Year</b>	<b>81,001</b>	<b>3,002</b>
2017 Predicted Emissions	32,790	1,523
Transportation Buffer	6,558	304
<b>2017 Interim Budget</b>	<b>39,348</b>	<b>1,827</b>
2025 Predicted Emissions	15,434	926
Transportation Buffer	3,087	185
<b>2025 Final Budget</b>	<b>18,521</b>	<b>1,111</b>

Appendix A and Appendix B contain information on the development of the 2007, 2017, and 2025 on-road emissions inventories and MVEBs.

### 3. REVISIONS TO THE MAINTENANCE DEMONSTRATION

This submittal revises the maintenance demonstration included in the PM<sub>2.5</sub> maintenance plan and provides updated estimates of PM<sub>2.5</sub>, NO<sub>x</sub>, sulfur dioxide (SO<sub>2</sub>), volatile organic compounds (VOCs), and ammonia (NH<sub>3</sub>) for the 2007 attainment year and for the 2017 and 2025 plan projection years. The maintenance demonstration must show that emissions of PM<sub>2.5</sub> and its precursors do not increase in future years beyond the actual estimated emissions in the attainment year, in this case 2007. The continued downward trend in projected emissions from within the PM<sub>2.5</sub> maintenance area ensures the area will maintain compliance with the 1997 PM<sub>2.5</sub> NAAQS. The following sections describe the revisions to the attainment year, the interim year, and the out year inventories, which reflect changes to the on-road sector.

#### 3.1. Revisions to the 2007 Attainment Year Inventory

Table 3-1 provides the revised 2007 attainment year inventory summary. Other than the on-road emissions estimates, this inventory is identical to the 2007 attainment year inventory summary provided in Table 4-1 of the PM<sub>2.5</sub> maintenance plan, approved by USEPA on October 6, 2014 (79 FR 60081). The on-road data provided in Table 3-1 include on-road estimates created using MOVES2014. The emissions estimates from all other sectors continue to be valid and need no further updating.

**Table 3-1: Revised 2007 Attainment Year Inventory**

Pollutant	Point	Area	Nonroad	On-Road	Total
<b>District of Columbia, Emissions in tpy</b>					
SO <sub>2</sub>	612	1,241	234	43	2,130
NO <sub>x</sub>	789	1,547	3,300	5,724	11,360
PM <sub>2.5</sub>	53	1,120	246	216	1,635
VOC	0	183	3	2,809	2,995
NH <sub>3</sub>	59	5,516	1,357	171	7,103
<b>Maryland, Emissions in tpy</b>					
SO <sub>2</sub>	176,880	1,078	550	317	178,825
NO <sub>x</sub>	30,365	3,222	10,407	42,477	86,471
PM <sub>2.5</sub>	5,048	4,385	899	1,549	11,881
VOC	4	3,079	10	17,493	20,586
NH <sub>3</sub>	719	21,928	9,877	924	33,448
<b>Virginia, Emissions in tpy</b>					
SO <sub>2</sub>	5,956	3,414	867	211	10,448
NO <sub>x</sub>	6,701	4,166	13,111	32,800	56,778
PM <sub>2.5</sub>	446	4,022	1,053	1,237	6,758
VOC	52	962	11	14,138	15,163
NH <sub>3</sub>	596	26,501	10,167	767	38,031
<b>Washington DC-MD-VA PM<sub>2.5</sub> Maintenance Area, Emissions in tpy</b>					
SO <sub>2</sub>	183,449	5,733	1,652	570	191,404
NO <sub>x</sub>	37,855	8,936	26,817	81,001	154,609
PM <sub>2.5</sub>	5,547	9,528	2,198	3,002	20,274
VOC	1,375	53,944	20,275	34,441	110,035
NH <sub>3</sub>	56	4,224	23	1,862	6,165

#### 3.2. Revisions to the 2017 Interim Year and the 2025 Out Year Projection Inventories

Table 3-2 summarizes the 2007, 2017, and 2025 emissions inventories for this revision to the Washington DC-MD-VA PM<sub>2.5</sub> maintenance plan. Revisions to emissions inventories for the attainment year 2007 and projection years 2017 and 2025 include updated on-road emissions estimates based on

MOVES2014. This revision does not contain any updates to the point, area, and nonroad source emissions projections.

Though Maryland has not made any changes to emissions inventories for point sources for projection years 2017 and 2025 for this revision, it has developed and instituted a new regulation addressing emissions from the electric generating industry. The regulation is designed to address the ozone NAAQS(s) and limit NO<sub>x</sub> emissions from coal-fired electric generating units. All of the coal-fired electric generating units in Maryland are equipped with post combustion NO<sub>x</sub> controls such as Selective Catalytic Reduction (SCR), Selective Non-Catalytic Reduction (SNCR) or Selective Auto-Catalytic Reduction (SACR). The regulation limits NO<sub>x</sub> emissions during the ozone season by:

- Establishing system-wide 30-day rolling average NO<sub>x</sub> emission rates for all coal-fired units;
- Mandating the optimization of NO<sub>x</sub> controls for each coal-fire unit; and
- Instituting a system-wide daily NO<sub>x</sub> emission rate cap or system-wide daily tonnage cap.

The intent of the system-wide NO<sub>x</sub> emission rate caps on the coal-fired units is to compel the systems to run the units with the lowest NO<sub>x</sub> rates first and foremost. This allows the system the flexibility to operate the units with higher NO<sub>x</sub> rates on higher demand days or peak days. MDE expects these regulations to drive down peak day NO<sub>x</sub> emissions. Quantifying the effects of an ozone season regulation with both unit-specific requirements and system-wide requirements on an annual basis is extremely difficult especially when combining the regulation with Maryland's Healthy Air Act. As such, Maryland has not included the regulation in projected emission inventories for the PM<sub>2.5</sub> maintenance plan update.

**Table 3-2: Washington DC-MD-VA 1997 Annual Primary PM<sub>2.5</sub> NAAQS Maintenance Area**

SO <sub>2</sub> Emissions in tpy					
Year	Point	Area	Nonroad	On-Road	Total (tpy)
2007	183,449	5,733	1,652	570	191,404
2017	28,183	4,139	433	162	32,917
Δ (2017–2007)	-155,266	-1,594	-1,219	-408	-158,487
2025	28,377	3,862	517	142	32,898
Δ (2025–2007)	-155,072	-1,871	-1,135	-428	-158,506
NO <sub>x</sub> Emissions in tpy					
Year	Point	Area	Nonroad	On-Road <sup>(1)</sup>	Total (tpy)
2007	37,855	8,936	26,817	81,001	154,609
2017	22,481	9,009	17,600	32,790 (Tier 1: 32,790; Tier2: 39,348)	81,880
Δ (2017–2007)	-15,374	73	-9,217	-48,211	-72,729
2025	23,044	9,342	14,719	15,434 (Tier 1: 15,434; Tier2: 18,521)	62,539
Δ (2025–2007)	-14,811	406	-12,098	-65,567	-92,070
Primary PM <sub>2.5</sub> in tpy					
Year	Point	Area	Nonroad	On-Road <sup>(1)</sup>	Total (tpy)
2007	5,547	9,528	2,198	3,002	20,274
2017	5,656	9,632	1,579	1,523 (Tier 1: 1,523; Tier2: 1,827)	18,390
Δ (2017–2007)	109	104	-619	-1,479	-1,884
2025	5,693	9,725	1,269	926 (Tier 1: 926; Tier2: 1,111)	17,613
Δ (2025–2007)	146	197	-929	-2,076	-2,661
VOC in tpy					
Year	Point	Area	Nonroad	On-Road	Total (tpy)
2007	1,375	53,944	20,275	34,441	110,035
2017	1,623	52,333	13,758	16,768	84,482
Δ (2017–2007)	248	-1,611	-6,517	-17,673	-25,553
2025	1,659	54,536	14,592	11,765	82,552
Δ (2025–2007)	284	592	-5,683	-22,676	-27,483
NH <sub>3</sub> in tpy					
Year	Point	Area	Nonroad	On-Road	Total (tpy)
2007	56	4,224	23	1,862	6,165
2017	100	4,255	28	1,229	5,612
Δ (2017–2007)	44	31	5	-633	-553
2025	101	4,285	34	1,181	5,601
Δ (2025–2007)	45	61	11	-681	-564

<sup>(1)</sup> Transportation buffers were added to the on-road mobile emissions for NO<sub>x</sub> and PM<sub>2.5</sub> 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 2 for details of the development of mobile budgets.

### 3.3. Inventory and Emissions Trend Analysis

As described in the sections above, the maintenance planning process relies upon emission trends to ensure good air quality into the future. Emission inventories consider four distinct inventory sectors: area (small, widely distributed sources); nonroad (off road equipment, marine vessels, and airplanes);

on-road (highway motor vehicles); and point (large individual sources such as power plants, manufacturing facilities, etc.). Each has unique methodologies for gathering and estimating both actual emissions and projected emissions.

The point source inventory contains fewer individual entities than do the other sectors. State air agencies have quantitative, quality-assured data for the period 2007 (maintenance plan base) through 2014, obtained from certified emissions reporting for most point sources. Table 3-3 summarizes the point source emissions for each jurisdiction in the region for each pollutant.

**Table 3-3: Maintenance Area Point Source Actual Annual Emissions**

Pollutant/Jurisdiction	Inventory Year - Emissions in TPY		
	2007 <sup>(1)</sup>	2011 <sup>(2)</sup>	2014 <sup>(3)</sup>
<b>PM<sub>2.5</sub></b>			
District of Columbia	53	55	26
Maryland	5,048	1,345	2,380
Virginia	446	269	205
Region Total	5,547	1,670	2,611
<b>NO<sub>x</sub></b>			
District of Columbia	789	703	368
Maryland	30,365	9,187	14,270
Virginia	6,701	4,244	3,663
Region Total	37,855	14,134	18,301
<b>SO<sub>2</sub></b>			
District of Columbia	612	570	49
Maryland	176,880	12,815	15,597
Virginia	5,956	1,009	1,018
Region Total	183,449	14,394	16,664
<b>VOC</b>			
District of Columbia	60	71	38
Maryland	720	472	595
Virginia	596	680	651
Region Total	1,375	1,223	1,284
<b>NH<sub>3</sub></b>			
District of Columbia	0	0	0
Maryland	4	4	5
Virginia	52	49	51
Region Total	56	53	56

<sup>(1)</sup>Source: 1997 PM<sub>2.5</sub> Maintenance Plan approved on October 6, 2014 (79 FR 60081)

<sup>(2)</sup>Source: 2011 Base Year Emissions Inventory approved on May 13, 2015 (80 FR 27276) and July 23, 2015 (80 FR 43625)

<sup>(3)</sup>Source: Emissions databases submitted as part of the National Emissions Inventory 2014 effort by the District, Maryland, and Virginia

Table 3-3 shows that point source emissions generally have a declining trend for PM<sub>2.5</sub> and its precursors within the region. The decreases of SO<sub>2</sub> are particularly important for this region since SO<sub>2</sub> forms sulfates in the atmosphere, a major component of PM<sub>2.5</sub> in this area of the country.

Area sources also contribute a significant portion of the NH<sub>3</sub>, VOC, and PM<sub>2.5</sub> inventories in the Washington DC-MD-VA PM<sub>2.5</sub> maintenance area. Activity levels associated with various area source sub-categories are functions of a number of surrogate parameters that originate with the area's socioeconomic data such as population and employment projections. The Annual Energy Outlook (AEO) fuel consumption forecasts, federal residential wood combustion estimates, VMT, and other state and county estimates also inform the area source projection data. Between the previous PM<sub>2.5</sub> maintenance plan submittal and this submittal, some of these data have not changed. For example, USEPA has not updated the residential wood combustion methodology in this time period. For sectors that show change, many of the changes reflect lower growth, which is typical of such projections. Projections for a greater difference in years are generally more conservative than projections for years not as far into the future. Table 3-4 compares AEO growth factor surrogates for 2007-2017 and 2007-2025 for sectors where the projections change. In nearly all cases, updated projections show smaller growth than predicted during the development of the PM<sub>2.5</sub> maintenance plan.

**Table 3-4: Growth Factors and Projection Data from AEO**

Category	2007-2017 Growth Factor		2007-2025 Growth Factor	
	Initial PM <sub>2.5</sub> Maintenance Plan <sup>(1)</sup>	Updated Growth Factor	Initial PM <sub>2.5</sub> Maintenance Plan <sup>(1)</sup>	Updated Growth Factor
Transportation, Motor Gasoline	0.95	0.92	1.01	0.86
All Sectors, Motor Gasoline	0.95	0.93	1.01	0.87
Industrial; Distillate	0.94	0.86	0.93	0.83
Industrial; LPG	1.09	0.65	1.14	0.78
Comm/Inst; Natural Gas	1.10	1.07	1.19	1.11
Comm/Inst; Kerosene	1.56	0.18	1.67	0.38
Residential; Distillate	0.78	0.47	0.64	0.38
Residential; Natural Gas	1.06	0.99	1.11	1.00
Residential; LPG	0.84	0.66	0.83	0.63

<sup>(1)</sup>The initial PM<sub>2.5</sub> maintenance plan used AEO2010 projections, and the above comparison is to the most recent AEO2015 projections.

For housing and population projection data, the PM<sub>2.5</sub> maintenance plan relied upon information from the COG Cooperative Forecast, Round 7.2a. VMT estimates within recent air quality conformity analyses are the basis for such activity data within the area source calculations. For employment projection data, the PM<sub>2.5</sub> maintenance plan relied upon information from the state department of labor (DOL) projections. Table 3-5 compares the housing and population estimates for 2030 from the PM<sub>2.5</sub> maintenance area jurisdictions based on Round 7.2a with the same data from Round 8.4, which is the most recent update to this forecast. Table 3-5 also compares the VMT estimates for 2030 from the Air Quality Conformity Analyses for 2009 and 2015 and the employment projections from state DOLs for the periods 2006-2016 (2008-2018 in case of the District) and 2012-2022. The more recent forecasts are similar to the forecasts used in the PM<sub>2.5</sub> maintenance plan and show a slightly lower projection for households, VMT, and employment and only slightly higher projection for population.

**Table 3-5: Housing, Employment, Population, and VMT Data Comparison**

Category	Initial PM <sub>2.5</sub> Maintenance Plan		PM <sub>2.5</sub> Maintenance Plan Update	
	2030 Projections	Source	2030 Projections	Source
Households	2,398,843	Round 7.2a Cooperative Forecasting: Population and Household Forecasts to 2040 by Traffic Analysis Zone, Department of Community Planning and Services, Metropolitan Washington Council of Governments, 2009	2,369,668	Round 8.4 Cooperative Forecasting: Population and Household Forecasts to 2040 by Traffic Analysis Zone
Population	6,118,224		6,209,988	
VMT	197,574,487	Air Quality Conformity Analysis of the 2009 Constrained Long-Range Transportation Plan and the FY2010-2015 Transportation Improvement Program for the Washington Metropolitan Region, Page 24, Exhibit 12	193,913,410	Air Quality Conformity Analysis of the 2015 Constrained Long-Range Plan Amendment and the FY2015-2020 Transportation Improvement Program for the Washington Metropolitan Region, Page 13, Exhibit 8
Employment	Annual Growth Rates		Annual Growth Rates	
DC	1.01%	District of Columbia: Industry and Occupational Projections 2008 – 2018, Table 1: District of Columbia Employment by Major Sector, 2008 – 2018	0.74%	District of Columbia Industry Projections, 2012-2022
MD	1.00%	Maryland Industry Projections, 2006-2016	0.64%	Maryland Industry Projections, 2012-2022
VA	1.45%	Virginia Industry Projections, 2006-2016	1.27%	Virginia Industry Projections, 2012-2022

Table 3-4 and Table 3-5 show that reevaluating the area source emissions based upon the most current socioeconomic data would result in emission projections that are less than those included in the approved PM<sub>2.5</sub> maintenance plan. Additionally, marine, rail and aircraft emissions projections as well as nonroad model projections would not change as activity and methodologies have not changed since the development of the PM<sub>2.5</sub> maintenance plan. Therefore, projections for these categories do not require updating in order to ensure that the maintenance demonstration supplied in Table 3-2 is valid. Emissions are below, and will continue to remain below, maintenance levels in the Washington region. What is also clear from this data is that total emissions of PM<sub>2.5</sub> and its precursors are declining and will continue to decline into the future, ensuring further PM<sub>2.5</sub> air quality improvements.

### 3.4. Air Quality

The Washington DC-MD-VA region has been attaining the 1997 PM<sub>2.5</sub> NAAQS since 2005, and PM<sub>2.5</sub> levels have been continually decreasing over the last decade. The trends in the PM<sub>2.5</sub> design values in Figure 3-1 and Figure 3-2 reflect the effect of the declining emissions trends on PM<sub>2.5</sub> levels in the region. The trends in the PM<sub>2.5</sub> speciation data in Figure 3-3 reflect the effect of the declining emissions of SO<sub>2</sub> on sulfate levels over the years on PM<sub>2.5</sub> levels in the region.

Figure 3-1: Annual PM<sub>2.5</sub> Design Value

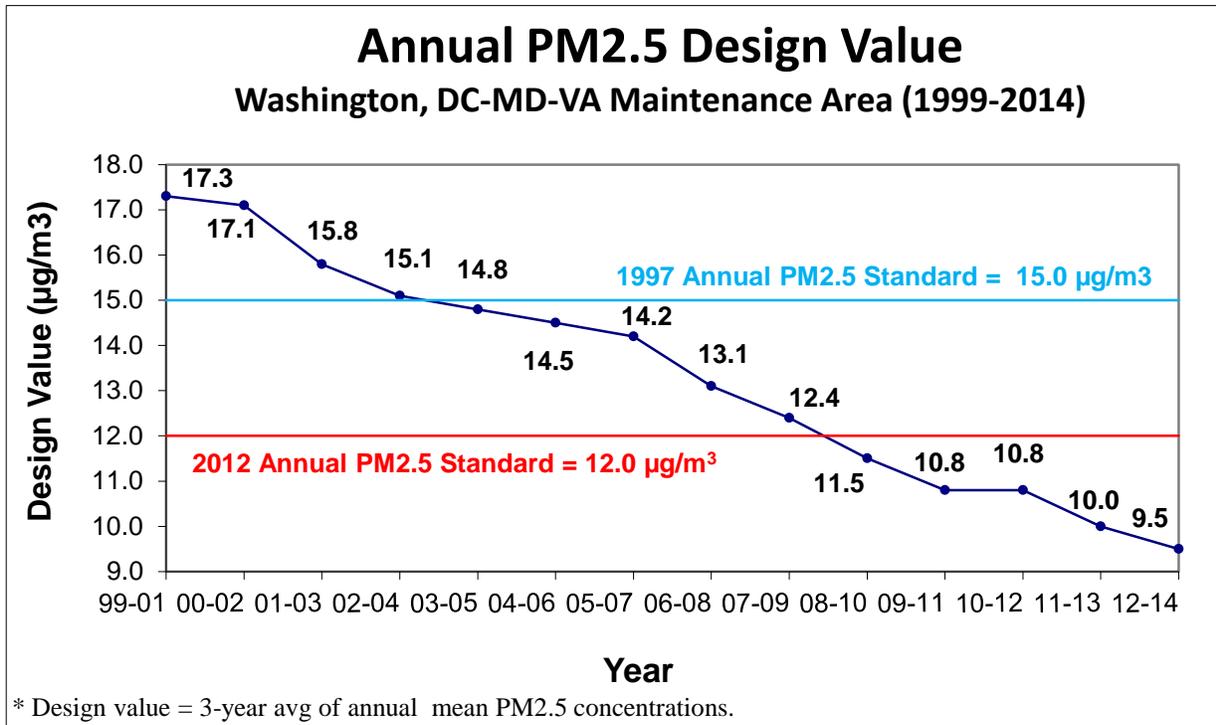


Figure 3-2: 24-Hour PM<sub>2.5</sub> Design Value

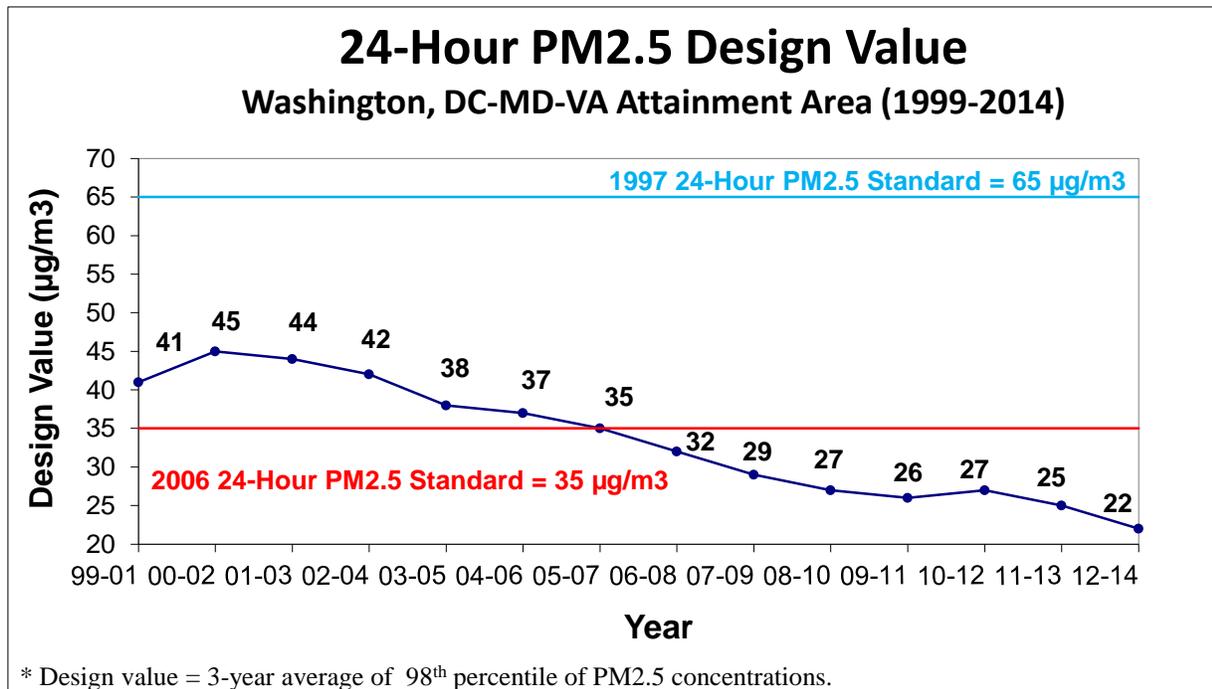
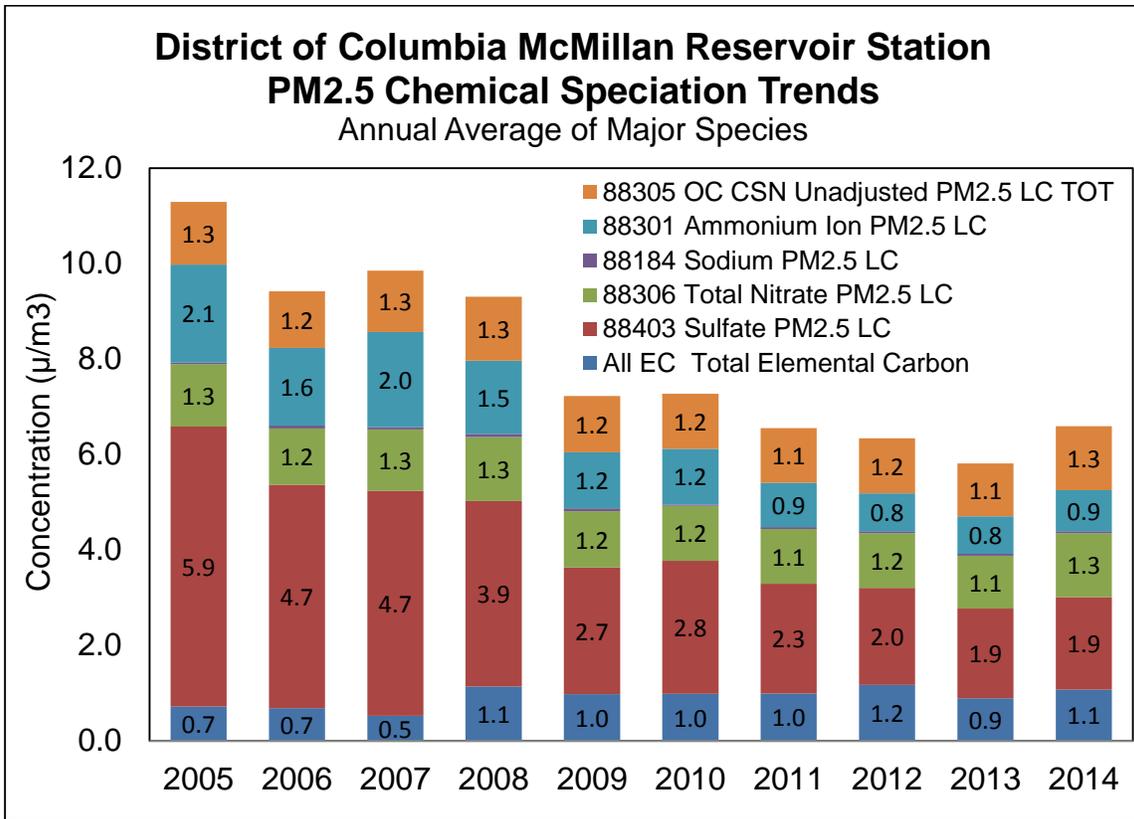


Figure 3-3: PM<sub>2.5</sub> Chemical Speciation (District of Columbia)



#### 4. CONCLUSION

The District of Columbia, the State of Maryland, and the Commonwealth of Virginia request that USEPA approve these revisions to the PM<sub>2.5</sub> maintenance plan for the Washington DC-MD-VA 1997 NAAQS PM<sub>2.5</sub> Maintenance Area. These revisions establish updated MVEBs for highway vehicles using the latest federally approved on-road source emissions estimation model, MOVES2014. The revised MVEBs reflect expected reductions in emissions from newly finalized programs such as the Tier 3 Vehicle Emission and Fuel Standards Program and the Corporate Average Fuel Economy Standards. Future transportation conformity determinations, which already utilize MOVES2014, will apply these revised MVEBs once they are deemed adequate by USEPA.

## **Appendix A**

**Methodology to develop On-Road Mobile Emissions and Motor Vehicle Emissions Budgets**

## **Appendix B**

**Input, RunSpec, and Output Files for On-Road Mobile Emissions by Source Classification Code**

## **Appendix C**

**State Compromise Overview**

