

***Maintenance Plan  
for the  
Washington DC-MD-VA 2008 Ozone NAAQS  
Nonattainment Area***

**Prepared by:**

**Metropolitan Washington Council of Governments**

**for the**

**District Department of the Environment  
Maryland Department of the Environment  
Virginia Department of Environmental Quality**

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

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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 2008 ozone national ambient air quality standard (NAAQS) marginal nonattainment area to the United States Environmental Protection Agency (USEPA) in support of the redesignation request for that standard. This document demonstrates that ozone air quality in the Washington DC-MD-VA nonattainment area will remain compliant with the 2008 ozone NAAQS as measured by a monitoring network that meets all federal requirements. This plan includes motor vehicle emissions budgets (MVEBs) for the interim year of 2025 and the out year of 2030. It also contains contingency measures that will be implemented in the unlikely event that the area experiences an exceedance of the 2008 ozone NAAQS.

## **2. National Ambient Air Quality Standard for Ozone**

When USEPA establishes a NAAQS, this standard applies to the concentration of a pollutant in ambient outdoor air. If the air quality in a geographic area meets or is cleaner than the national standard, USEPA designates the area as an attainment area. USEPA designates areas that do not meet the national standard or contribute to another area that violates the air quality standard as nonattainment areas.

Ground-level ozone is an extremely reactive gas comprised of three atoms of oxygen. Ozone, the primary constituent of smog, continues to be a pollution problem throughout many areas of the United States. Unlike many other pollutants, ground-level ozone is not directly emitted into the atmosphere from a specific source. Instead, ground-level ozone forms when nitrogen oxides (NO<sub>x</sub>) chemically react with volatile organic compounds (VOCs) through a series of complicated chemical reactions in the presence of strong sunshine.

Because ozone formation is greatest when the sunlight is most intense, the peak ozone levels typically occur during hot, dry, stagnant summertime conditions. Federal regulations, therefore, define the ozone season as April 1 to October 31. Peak ozone concentrations exhibit a clear seasonal cycle, with concentrations rising with the onset of warmer weather in the spring and declining again as the autumn approaches. Changing weather patterns can significantly contribute to yearly differences in ozone concentrations. Years with summertime weather conditions that are hot and dry will generally result in many more days of poor air quality than cool and wet summers.

The formation of ozone is not an instantaneous process, nor is it limited in geographical scope. While many urban areas tend to have high levels of ozone, even rural areas may experience increased ozone levels because wind carries ozone, and the pollutants that form it, hundreds of miles from their original sources. Numerous studies and modeling data show compelling evidence that weather patterns often result in the transport of ozone and the pollutants responsible for ozone formation well beyond the locality that produced the emissions. In many cases, unhealthy days of air pollution experienced in the Washington DC-MD-VA area are exacerbated by pollutants transported into the area from neighboring states.

Ground-level ozone can have significant impacts on human health, particularly people with existing respiratory disease, the elderly, and children. Ozone also impacts the environment and ecosystem health. Scientific evidence suggests that air pollution weakens the immune systems of many types of vegetation and can cause significant crop damage. In addition, rain and snow wash air pollution deposited on vegetation and architectural surfaces into the streams and rivers of the region and finally into the Chesapeake Bay.

### **3. Background**

On March 27, 2008, USEPA published the 2008 ozone NAAQS, setting the primary and secondary standards at 0.075 parts per million (ppm) or 75 parts per billion (ppb) (73 FR 16436). USEPA designated the Washington DC-MD-VA area as a marginal nonattainment for the 2008 ozone NAAQS on May 21, 2012 (77 FR 30088).

Since USEPA published this designation, ozone air quality in the Washington DC-MD-VA nonattainment area has improved such that the air quality is significantly better than required by the 2008 ozone NAAQS. The area's federal reference monitors demonstrated compliance with the 0.075 ppm standard based upon complete, quality-assured, and certified ambient air quality monitoring. USEPA proposed a determination of attainment on April 25, 2017, which stated that the region had monitored attainment of the 2008 ozone NAAQS for the 2013-2015 monitoring period (82 FR 19011). The most recent ozone design value, based on 2014-2016 data, is 0.072 ppm, well under the 0.075 ppm standard.

These improvements in air quality are due to permanent and enforceable emissions reductions of VOC and NO<sub>x</sub>, the precursors to ozone. 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 air quality that complies with the 2008 ozone NAAQS for a minimum of 10 years, through 2030. This maintenance plan supports the redesignation request for the 2008 ozone NAAQS, which the District of Columbia, the State of Maryland, and the Commonwealth of Virginia are submitting concurrently with this document.

#### **3.1 Health Effects from Elevated Concentrations of Ozone**

Ozone is a highly reactive gas that affects living tissues as well as many synthetic substances. Since 90% of inhaled ozone is never exhaled, ozone molecules react with lung tissue to cause several health consequences.<sup>1</sup> Exposure to ozone can result in both long-term and short-term health effects in people who work or exercise outdoors regularly, anyone with respiratory difficulties, and especially to children, asthmatics, and the elderly. Ozone's long-term effects include reduced lung function, scarring of lung tissue, and premature death.<sup>2</sup> Research suggests that repeated exposure to ozone causes damage to lung tissue, thereby reducing lung function.

Children are at greater risk for ozone-related respiratory problems because their lungs are still developing, they breathe more rapidly, and they play outside during the afternoons when ozone

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<sup>1</sup> Sources and Health effects of Ground-Level Ozone, downloaded from [http://www.dnr.state.wi.us/eq/aie/ozone/b\\_effect.htm](http://www.dnr.state.wi.us/eq/aie/ozone/b_effect.htm).

<sup>2</sup> Bell ML, Dominici F, and Samet JM. *A Meta-Analysis of Time-Series Studies of Ozone and Mortality with Comparison to the National Morbidity, Mortality, and Air Pollution Study*. *Epidemiology* 2005; 16:436-445.

is at its highest levels. Children also inhale more air; hence, they receive more pollution per pound of body weight than adults do.

Short-term effects of ozone exposure among healthy populations include impaired lung function and reduced ability to perform physical exercise. For example, healthy young people developed a significant reduction in lung function, additional coughing and breathing pains, and enhanced airway reactivity to irritants when exposed to ozone at concentrations of 80-120 ppb for 6.6 to 7.0 hours while exercising moderately.<sup>3</sup> Among people who are especially sensitive to ozone pollution, short-term effects include increased hospital admissions and emergency room visits for respiratory diseases such as asthma.

In summary, health effects from exposure to ozone can include the following:

- Increased susceptibility to respiratory infection;
- Impaired lung function and reduced ability to perform physical exercise;
- Severe lung swelling and death, due to short-term exposures greater than 300 ppb; and
- Increased hospital admissions and emergency room visits for respiratory diseases.

### 3.2 Geographical Description of the Washington, DC-MD-VA 2008 Ozone Nonattainment Area

USEPA designated the Washington DC-MD-VA area as nonattainment for the 2008 ozone NAAQS on May 21, 2012 (77 FR 30088). Table 2-1 provides the jurisdictions within the Washington DC-MD-VA 2008 ozone NAAQS nonattainment area.

**Table 3-1: Washington DC-MD-VA Nonattainment Area with FIPS Codes**

Washington DC-MD-VA Ozone Nonattainment Jurisdictions	FIPS <sup>1</sup>
District of Columbia	11-001
Calvert County	24-009
Charles County	24-017
Fredrick County	24-031
Montgomery County	24-033
Arlington County	51-013
Fairfax County	51-059
Fairfax City	51-600
Falls Church City	51-610
Loudoun County	51-107
Prince William County	51-153
Manassas City	51-683
Manassas Park City	51-685

<sup>1</sup>Federal Information Processing Standards code

<sup>3</sup> Horstman D, Folinsbee L, Ives P, Abdul-Salaam, Said, and McDonnel W. *Ozone Concentration and Pulmonary Response Relationships for 6.6-Hour Exposures with Five Hours of Moderate Exercise to 0.08, 0.10 and 0.12 ppm*, American Review of Respiratory Disease, February 1990.



## 4. Federal Redesignation and Maintenance Plan Requirements

An area designated as nonattainment for a pollutant can be redesignated to attainment providing that states meet specific conditions. 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).<sup>4</sup> The memorandum provides guidance regarding the processing of redesignation requests for ozone, carbon monoxide (CO), particulate matter, sulfur dioxide, nitrogen dioxide, and lead nonattainment areas. The District of Columbia, the State of Maryland, and the Commonwealth of Virginia followed the redesignation guidance while preparing this maintenance plan and associated redesignation request.

### 4.1 Redesignation Request

The CAA lists five obligations that the USEPA must meet during the redesignation process. Section 107(d)(3)(E) states:

The Administrator may not promulgate a redesignation of a nonattainment area (or portion thereof) to attainment unless –

- (i) the Administrator determines that the area has attained the national ambient air quality standard;
- (ii) the Administrator has fully approved the applicable implementation plan for the area under section 110(k);
- (iii) the Administrator determines that the improvement in air quality is due to permanent and enforceable reductions in emissions resulting from implementation of the applicable implementation plan and applicable Federal air pollutant control regulations and other permanent and enforceable reductions;
- (iv) the Administrator has fully approved a maintenance plan for the area as meeting the requirements of section 175A; and
- (v) the State containing such area has met all requirements applicable to the area under section 110 and part D.

States must meet these five obligations and document this information in an approved redesignation request before USEPA may redesignate the area to attainment status. Section 4.1.1 and Section 4.1.2 describe briefly the air quality improvements and emission reductions discussed within the redesignation request.

#### 4.1.1 Attainment of the Standard

A state requesting redesignation must show that the area is attaining the applicable NAAQS. USEPA must determine that the area complies with the 2008 ozone NAAQS if the design value based on the annual fourth-highest daily maximum concentration, averaged over three years, is less than or equal to 0.075 ppm. In the redesignation request, the District of Columbia, the State

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<sup>4</sup> See <http://www.epa.gov/ttn/oarpg/t5/memoranda/redesignmem090492.pdf>, accessed April 27, 2016.

of Maryland, and the Commonwealth of Virginia present information that demonstrates that the Washington DC-MD-VA nonattainment area has attained the 2008 ozone NAAQS. This demonstration is based on three years of quality-assured monitoring data as specified in 40 CFR Part 58. On April 25, 2017, USEPA published a proposed rule stating that the Washington DC-MD-VA ozone nonattainment area has attained the 2008 ozone NAAQS based on three years (2013-2015) of quality-assured ambient air quality data (82 FR 19011).

#### **4.1.2 Permanent and Enforceable Improvement**

States must show that the improvement in air quality between the year when violations occurred and the attainment year is attributed to permanent and enforceable emission reductions. The emission reductions are not based on temporary shutdowns or adverse economic conditions, but due to permanent and enforceable control measures. The redesignation request showed that between 2011, the base year for the 2008 ozone NAAQS, and 2014, the attainment year for the 2008 ozone NAAQS, NO<sub>x</sub> and VOC emissions within the Washington DC-MD-VA nonattainment area decreased by 33.9% and 13.4% respectively. This maintenance plan includes a commitment to continue to enforce all applicable requirements of past revisions to the state implementation plan (SIP) after the ozone nonattainment area is redesignated to attainment.

#### **4.2 Maintenance Plan**

The redesignation process provides that states 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)(D) states:

(D) The Governor of any State may, on the Governor's own motion, submit to the Administrator a revised designation of any area or portion thereof within the State. Within 18 months of receipt of a complete State redesignation submittal, the Administrator shall approve or deny such redesignation. The submission of a redesignation by a Governor shall not affect the effectiveness or enforceability of the applicable implementation plan for the State.

Section 107(d)(3)(E) stipulates one of these criteria, that USEPA must fully approve a maintenance plan that meets the requirements of § 175A. States 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, and the maintenance plan constitutes a SIP revision. The maintenance plan must contain the following elements:

- A comprehensive "attainment year" emissions inventory of the ozone precursors NO<sub>x</sub>, VOC, and CO.
- A projection of the emissions inventory forward to a year at least 10 years after redesignation and a demonstration that the projected level of emissions is sufficient to maintain compliance with the ozone NAAQS;

- A demonstration of 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;
- A commitment that, once redesignated, the state will continue to operate an appropriate monitoring network to verify maintenance of the attainment status;
- A demonstration of legal authority to implement and enforce all control measures contained in the SIP;
- Provisions for future updates of the inventory to enable tracking of emissions levels, including an annual emissions statement from major sources;
- MVEBs for transportation conformity for the 10 year maintenance period;
- A commitment to submit a revised maintenance plan eight years after redesignation;
- A commitment to enact and implement additional contingency measures expeditiously in the event that future violations of the NAAQS occur; and
- A list of potential contingency measures that would be implemented in such an event.

The District of Columbia, the State of Maryland and the Commonwealth of Virginia have prepared this plan in accordance with the requirements specified in USEPA's guidance document and additional guidance received from USEPA staff. The following subsections of this document describe how the states have met USEPA's requirements for a maintenance plan.

#### **4.3 Commitment to Revise Plan**

Under Section 175A of the Clean Air Act, an area designated as maintenance for a NAAQS is required to submit a second maintenance plan eight years after redesignation of any area as an attainment area under Section 107(d). This second maintenance plan is intended to maintain the NAAQS for 10 years after the expiration of the initial ten year period. The District of Columbia, the State of Maryland, the Commonwealth of Virginia commit to revising the maintenance plan in accordance with federal guidance and regulations at the appropriate time.

#### **4.4 Legal Authority to Implement and Enforce**

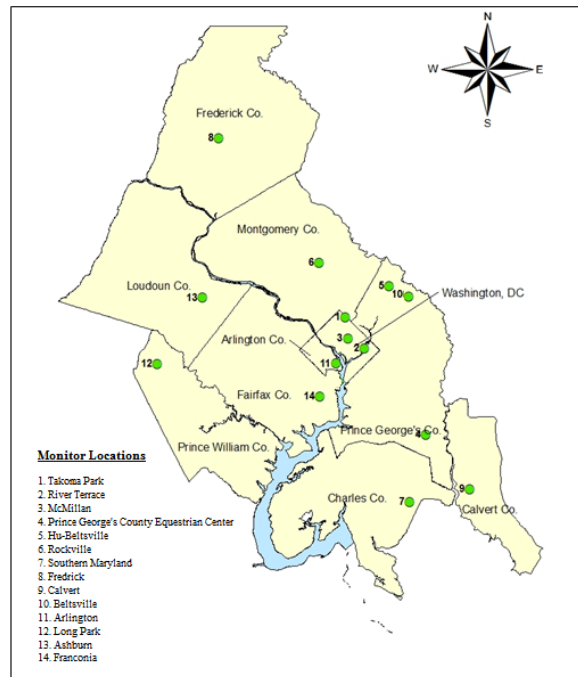
The District Department of Energy and Environment, Maryland Department of the Environment, and the Virginia Department of the Environmental Quality have the legal authorities to develop, implement, and enforce regulations regarding air pollution including the requirements of this SIP submittal.

#### **4.5 Commitment to Operate Air Quality Monitoring Network**

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

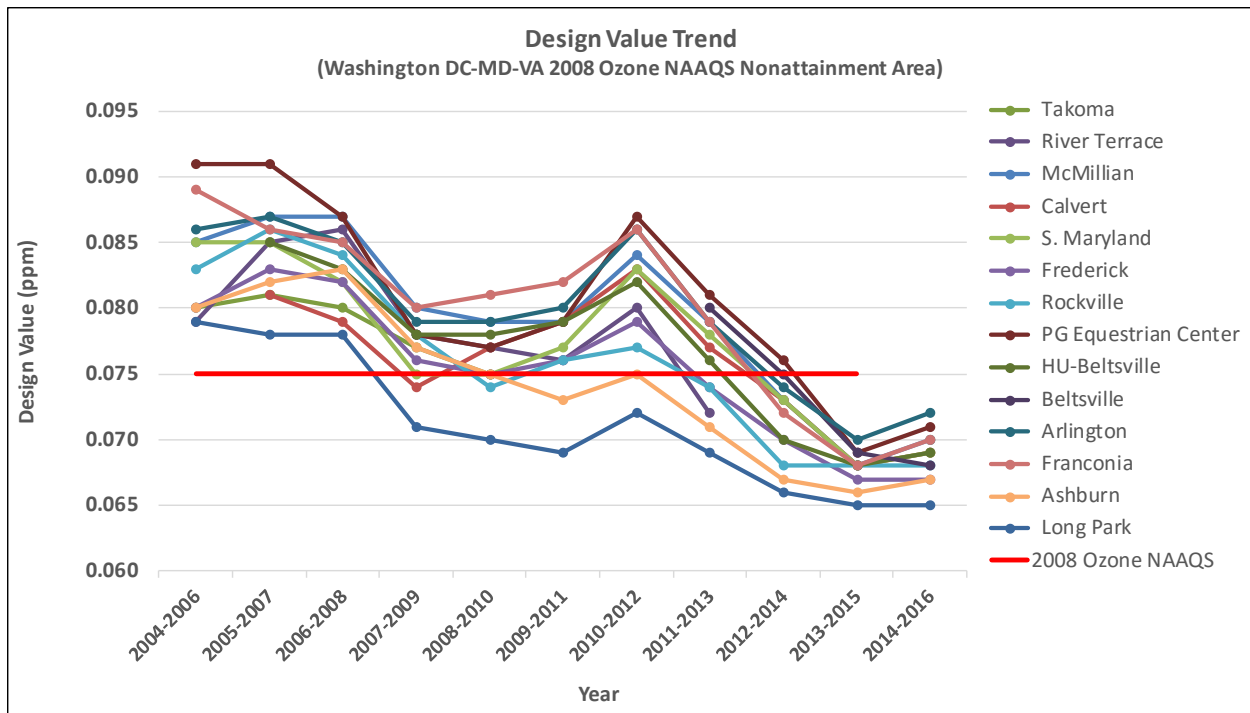
status. In cases where measured parameters (for example, vehicle miles traveled) have changed over time, the state may also need to perform a saturation monitoring study to determine the need for and location of additional permanent monitors.

There are currently 14 sites that monitor ozone in the Washington Region. The ozone monitoring sites are shown in Figure 4-1. The Code of Federal Regulations requires four ozone sites for a metropolitan statistical area of greater than 10 million people for an 2008 ozone NAAQS nonattainment area (40 CFR Part 58 Appendix D). The Washington region operates a robust network of ozone monitoring stations, which has enabled the collection of high resolution ozone data.



**Figure 4-1: Washington DC-MD-VA Nonattainment Area Ozone Monitoring Sites**

Figure 4-2 provides the regional trends in ozone air quality for the federal method monitoring sites. The design value for the 2008 ozone NAAQS for the Washington DC-MD-VA region is 0.072 for years 2014-2016.



**Figure 4-2: Washington DC-MD-VA Area Annual Ozone Data Trend**

#### 4.6 Legal Authority – Verify Continued Attainment

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 National Emissions Inventory (NEI) 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.

The District of Columbia, 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 each state will keep in place to maintain attainment are as follows:

- Shutdown requirements, permitting requirements, and regulatory requirements
- Vehicle inspection and maintenance (I/M) program requirements
- Emission statement requirements

In addition to maintaining key elements of its regulatory program, the state will acquire ambient and source emission data to track attainment and maintenance. The 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. The state will also develop and submit to the USEPA comprehensive tracking inventories every three years or as required by federal regulation during the maintenance plan period.

## **5. Maintenance Demonstration Development**

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 2014 attainment year levels while allowing for growth in population and vehicle miles traveled. The period covered by this maintenance plan is 2014 through 2030.

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 2008 ozone NAAQS. This attainment inventory consists of the actual emissions for a year, during the three-year period associated with the compliant monitoring data, showing attainment of the 2008 ozone NAAQS. The attainment year in this maintenance demonstration is 2014. The plan includes a demonstration that emissions will remain beneath the 2014 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.

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 as required by their respective SIPs.

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 requirements, and the approach of the District of Columbia, State of Maryland, and the Commonwealth of Virginia to meet each requirement.

## 5.1 Attainment Inventory

The District of Columbia, State of Maryland, and the Commonwealth of Virginia developed an attainment year emissions inventory to identify the level of emissions sufficient to achieve the 2008 ozone 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 2008 ozone NAAQS. In this case, the year is 2014. The 2014 inventory is appropriate to use because it represents the typical inventory for the three-year period demonstrating attainment of the standard and because 2014 was a triennial inventory year.

The 2014 inventory is consistent with USEPA guidance; is based on daily emissions of NO<sub>x</sub> and VOCs during 2014; and contains a list of sources and emissions in tons per day (tpd).

A summary of the 2014 attainment year inventory is presented in Table 5-1.

A more detailed accounting of the inventory is contained in Appendix A1, B1, C1, and D1. Detailed emission inventory spreadsheets are presented in Appendix A2, B2, C2, and D2.

**Table 5-1: 2014 Washington DC-MD-VA Nonattainment Area Attainment Year Inventory**

Source Category	NO <sub>x</sub> (tpd)	VOC (tpd)	CO (tpd)
Point	64.85	7.71	23.72
Non-Point (Area)	9.62	139.33	63.56
Marine, Air, Rail	19.51	2.38	19.67
Nonroad Model	51.99	47.48	762.76
On-road Mobile	136.84	61.25	744.08
Quasi-Point	14.37	1.24	4.17
<b>TOTAL</b>	<b>297.18</b>	<b>259.39</b>	<b>1,617.95</b>

## 5.2 Projection Inventory

A maintenance plan must contain a demonstration that the levels of emissions projected for the 10-year period following redesignation are sufficient to maintain the NAAQS. Accordingly, the District of Columbia, the State of Maryland, and the Commonwealth of Virginia have projected NO<sub>x</sub> and VOC emissions for the Washington DC-MD-VA 2008 ozone nonattainment area for 2030, as well as an interim year of 2025. To satisfy federal guidance, emissions for these projection years must be equivalent to or lower than emissions levels in 2014 to ensure that air quality continues to meet the 2008 ozone NAAQS during this period.

The projected inventories are derived by applying the appropriate growth factors to the 2014 attainment year emissions inventory. USEPA guidance describes four typical indicators of growth. In order of priority, these are as follows: (1) product output, (2) value added, (3) earnings, and (4) employment. Surrogate indicators of activity, such as population growth, are

also acceptable methods.

The State of Maryland and the Commonwealth of Virginia based projected emissions for electric generating unit (EGU) point sources on results from the ERTAC EGU tool, using CONUS2.6 reference case information for years 2025 and 2030. Growth factors within the tool rely on AEO2015 future year generation estimates.

States projected emissions for non-EGU unit point sources using state-level employment projections by NAICS code (unless employment growth rate is negative, in which case states made a “no growth” assumption), other state-specific emission projection data, or growth estimates based on the Metropolitan Washington Council of Governments (MWCOG) Cooperative Forecast version 9.0.

The National Capitol Region Transportation Planning Board (TPB) projected emissions for on-road mobile sources using USEPA’s MOVES2014b mobile source inventory model. These estimates use vehicle-specific registration data obtained from each jurisdiction. Mobile source emission projections included the National Low Emission Vehicle Program (NLEV); the 2004 Tier 2 and Low Sulfur Gasoline Rule; the 2004 and 2007 Heavy-Duty Diesel Vehicle (HDDV) Rules; and the 2006 Low Sulfur Diesel Rule. Inputs included Phase II Reformulated Gasoline (RFG) and an enhanced I/M program for all analysis years for all jurisdictions. The model also accounts for the Tier 3 Vehicle Emissions and Fuel Standards Program, beginning in 2017.

Projected emissions for nonroad vehicles and equipment except for marine, air, and railway locomotives were developed using MOVES 2014a nonroad model. This version of MOVES is USEPA’s most recently approved emissions estimation tool for the above-mentioned nonroad sources.

States calculated projected emissions for non-point (area) as well as marine, air, and railway locomotive (MAR) sources using the most updated practices and inputs available, such as the demographic forecasts (population, household, and employment projections) provided in the MWCOG Cooperative Forecast. Table 5-2 provides a summary of growth assumptions.

**Table 5-2: 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 Nonroad Mobile Source Growth	Category Specific	COG Cooperative Forecast
Vehicle Miles Traveled Growth	Jurisdiction-specific	National Capital Region Transportation Planning Board

A more detailed accounting of the 2025 and 2030 projection inventories are contained in Appendix A1, B1, C1, and D1.



### 5.3 Demonstration of Maintenance

Table 5-3 demonstrates how future emissions of NO<sub>x</sub>, CO, and VOCs will not exceed the levels of the Washington DC-MD-VA 2014 attainment year inventory for a minimum of 10 years following redesignation. The projected emissions reflect the expected daily emissions based on the best available growth rates and projections, as noted in Table 5-3.

**Table 5-3: NO<sub>x</sub> and VOC Emissions, 2014 to 2030**

Source Category	NOX (tpd)			VOC (tpd)			CO (tpd)		
	2014	2025	2030	2014	2025	2030	2014	2025	2030
Point	64.85	66.03	68.50	7.71	8.83	9.41	23.72	25.08	26.22
Non-Point (Area)	9.62	9.85	9.96	139.33	153.76	160.37	63.56	64.91	65.47
M-A-R	19.51	21.74	22.71	2.38	2.57	2.66	19.67	20.00	20.75
Nonroad Model	51.99	29.62	27.80	47.48	44.88	47.15	762.76	845.83	898.79
On-road Mobile	136.84	40.68	27.39	61.25	33.18	24.06	744.08	457.08	323.69
Quasi-Point <sup>1</sup>	14.37	14.37	14.37	1.24	1.24	1.24	4.17	4.17	4.17
<b>TOTAL</b>	<b>297.18</b>	<b>182.29</b>	<b>170.73</b>	<b>259.39</b>	<b>244.46</b>	<b>244.89</b>	<b>1617.96</b>	<b>1417.07</b>	<b>1339.09</b>
Δ (2025-2014)	114.89			14.93			200.89		
Δ (2030-2014)	126.45			14.50			278.87		

<sup>1</sup>Quasi-point sources are generally considered part of the area or nonroad emissions sectors but are included in the point source emissions inventory for a particular reason. Such reasons include, but are not limited to, federal guidance (such as in the case of certain airports) or to facilitate future general conformity determinations (such as in the case of military bases, ports, and other similar facilities).

### 5.4 Control Measures for Maintenance of Good Air Quality

Point, nonroad, and on-road emission projections for 2025 and 2030 include a variety of control strategies that will reduce emissions of NO<sub>x</sub> and VOCs in the future years. Additionally, many control strategies are in place that are directionally correct but are not included in the 2025 and 2030 emissions estimates because the reductions from these types of programs are difficult to quantify. The sections below describe notable control programs in each emissions sector. Many of these programs are federal programs that are enforced on a regional or national level while other programs are delegated to states for compliance and enforcement purposes. Some programs are also implemented by individual jurisdictions.

#### 5.4.1 Point Sector Controls

##### COMAR 26.11.38 - Control of NO<sub>x</sub> Emissions from Coal-Fired Electric Generating Units

This action established new NO<sub>x</sub> emission standards and additional monitoring and reporting requirements for coal-fired EGUs in Maryland, resulting in NO<sub>x</sub> emission reductions. This action impacted coal-fired EGUs in Maryland, which account for more than 80% of the State's

power plant NO<sub>x</sub> emissions. Affected EGUs include: Brandon Shores (Units 1 and 2); C.P. Crane (Units 1 and 2), H.A. Wagner (Units 2 and 3) plants; Chalk Point (Units 1 and 2), Morgantown (Units 1 and 2), Dickerson (Units 1, 2 and 3); and AES Warrior Run.

### 2008 Ozone NAAQS Reasonably Available Control Technology Requirements

As part of the Ozone Transport Region, § 184 of the CAA requires the Washington DC-MD-VA 2008 ozone NAAQS nonattainment area to implement Reasonably Available Control Technology (RACT) requirements in support of the 2008 ozone NAAQS. These requirements will provide additional reductions of NO<sub>x</sub> and VOC from major stationary sources within the area.

#### **5.4.2 Nonroad Emission Controls**

##### Nonroad Small Gasoline Engines

This measure requires small gasoline-powered engine equipment, such as lawn and garden equipment, manufactured after August 1, 1996 to meet federal emissions standards. Small gasoline- powered engine equipment includes, for example, lawn mowers, trimmers, generators, and compressors. These measures apply to equipment with engines of less than 25 horsepower. VOC emissions result from combustion and evaporation of gasoline used to power this equipment.

##### Nonroad Diesel Engines Tier 1 and Tier 2

This measure takes credit for NO<sub>x</sub> emissions reductions from emissions standards promulgated by the EPA for nonroad, compression-ignition (i.e., diesel-powered) utility engines. The measure affects diesel-powered (or other compression-ignition) heavy-duty farm, construction equipment, industrial equipment, etc., rated at or above 37 kilowatts (37 kilowatts is approximately equal to 50 horsepower). Heavy-duty farm and construction equipment includes asphalt pavers, rollers, scrapers, rubber-tired dozers, agricultural tractors, combines, balers, and harvesters. This measure applies to all compression-ignition engines except engines used in aircraft, marine vessels, locomotives and underground mining activity.

##### Marine Engine Standards

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

##### Emissions Standards for Large Spark Ignition Engines

This EPA measure controls VOC and NO<sub>x</sub> emissions from several groups of previously unregulated nonroad engines, including large industrial spark-ignition engines, recreational

vehicles, and diesel marine engines. 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. 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. Controls on the other engine categories were required beginning in years after 2005.

#### Reformulated Gasoline Use in Nonroad Motor Vehicles and Equipment

This federally mandated measure requires the use of lower polluting "reformulated" gasoline in the Washington DC-MD-VA area. The measure involves taking credit for emissions reductions resulting from the use of the federally reformulated gasoline in non-road mobile sources. Nonattainment areas classified as severe were required to opt in on the delivery of reformulated gasoline. This measure affects the various non-road mobile sources that burn gasoline, such as small gasoline-powered engine equipment including lawn mowers, trimmers, generators, and compressors. VOC emissions result from combustion and evaporation of gasoline used to power this equipment.

#### Railroad Engine Standards

This measure establishes emission standards for oxides of nitrogen, hydrocarbons, carbon monoxide, particulate matter, and smoke for newly manufactured and remanufactured diesel-powered locomotives and locomotive engines, which were previously unregulated. This regulation took effect in 2000 and affects railroad manufacturers and locomotive remanufacturers. It involves adoption of three separate sets of emission standards with the applicability dependent on the date a locomotive is first manufactured.

### **5.4.3 On-road Emission Controls**

#### Tier 3 Vehicle Emissions and Fuel Standards Program

In 2014 USEPA finalized a rule designed to reduce air pollution from passenger cars and trucks. The Tier 3 program is part of a comprehensive approach to reducing the impacts of motor vehicles on air quality and public health. The program considers the vehicle and its fuel as an integrated system, setting new vehicle emissions standards and lowering the sulfur content of gasoline beginning in 2017. The vehicle standards will reduce both tailpipe and evaporative emissions from passenger cars, light-duty trucks, medium-duty passenger vehicles, and some heavy-duty vehicles. The gasoline sulfur standard will enable more stringent vehicle emissions standards and will make emissions control systems more effective. The vehicle emission standards combined with the reduction of gasoline sulfur content will significantly reduce motor vehicle emissions, including NO<sub>x</sub>, VOC, fine particulate matter (PM<sub>2.5</sub>), CO, and air toxics.

#### Transportation Emission Reduction Measures

The TPD employs many strategies to reduce emissions from mobile sources either by reducing the number of vehicle trips, the vehicle miles traveled, or both. Such strategies include, but are not limited to, ridesharing programs, telecommuting programs, improved transit and bicycling

facilities, and clean fuel vehicle programs. TPB provides a summary of such measures in their transportation conformity analyses.

### Inspection and Maintenance Programs

The District of Columbia, the State of Maryland, and the Commonwealth of Virginia operate enhanced I/M programs to ensure that motorists are driving vehicles that meet federal requirements. Owners of vehicles that do not meet requirements, shown by either tail pipe testing or On-Board Diagnostic (OBD) testing must repair the dirty vehicles or show that repairs have totaled costs more than waiver limitations.

## **5.5 Transportation Conformity and Motor Vehicle Emissions Budgets**

Transportation conformity is required under § 176(c) to ensure that transportation plans, transportation improvement programs (TIPs), and federally supported highway and transit project activities are consistent with (“conform to”) the purpose of the state SIP. These requirements ensure that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the relevant NAAQS or any interim milestones. For the purposes of this document this is specific to attainment and maintenance of the 2008 ozone NAAQS. These requirements are found in § 176(c)(B)(i), (ii), and (iii), which states:

Conformity to an implementation plan means—That such activities will not cause or contribute to any new violation of any standard in any area; increase the frequency or severity of any existing violation of any standard in any area; or delay timely attainment of any standard or any required interim emissions reductions or other milestones in any area.

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 applies to areas that are designated nonattainment and those areas redesignated to attainment after 1990 (i.e., “maintenance areas”) for transportation-related criteria pollutants: carbon monoxide (CO), ozone, nitrogen dioxide (NO<sub>2</sub>) and particulate matter (PM<sub>2.5</sub> and PM<sub>10</sub>).

The responsible metropolitan planning organization addressing transportation planning for the Washington DC-MD-VA 2008 ozone NAAQS nonattainment area is the 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 motor vehicle emissions budgets (MVEBs). MVEBs are used in this determination only if USEPA has approved or found adequate the emission budgets that have been submitted as a SIP revision. Prior to this maintenance plan, the most recent approved ozone season emission budgets originated in the 1997 ozone NAAQS attainment plan and USEPA published an adequacy determination for them on February 7, 2013 (78 FR 9044).

As required by the Transportation Conformity Rule, this maintenance plan addressing the 2008 ozone NAAQS establishes on-road MVEBs for VOC and NO<sub>x</sub>, which are precursors for ozone.

These budgets represent the level of mobile source emissions that can be emitted in the area while supporting the air quality plan. There are two sets of mobile budgets in this plan; each set provides an MVEB for the attainment year (2014), intermediate year (2025), and final year (2030). The first set of MVEBs, presented in Table 5-4, for 2014, 2025, and 2030 are based on the projected emissions for those years as calculated using the most current USEPA MOVES (motor vehicle emissions simulator) model (MOVES2014a) as well as the current regional travel demand forecasting model. The second set of mobile budgets, presented in Table 5-5, add a conformity buffer<sup>5</sup>.

The MVEBs provided in Table 5-5 have been developed by adding a 20 percent transportation buffer to the mobile emissions inventory projections for VOC and NO<sub>x</sub> in 2025 and 2030. The buffers will add 6.6 tpd of VOC and 8.1 tpd of NO<sub>x</sub> to the 2025 emission inventories, and 4.8 tpd of VOC and 5.5 tpd of NO<sub>x</sub> to the 2030 emission inventories.

These two sets of MVEBs (with and without conformity buffer) have been developed for both milestone years. These MVEBs and the overall emission inventories, even with these conformity buffers, remain below the maintenance year caps for both pollutants (See Table 5-6). The MVEBs with conformity buffers (shown in Table 5-5) will be used only as needed in situations where the conformity analysis must be based on different data, models, or planning assumptions, including but not limited to updates to demographic, land use, or project-related assumptions, than were used to create the first set of MVEBs in the maintenance plan. The technical analyses used to demonstrate compliance with the MVEBs and the need, if any, to use conformity buffers will be fully documented in the conformity analysis and follow TPB's interagency consultation procedures.

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

Year	NO <sub>x</sub> On-Road Emissions (tpd)	VOC On-Road Emissions (tpd)
Attainment Year 2014 Emission & Budget	136.8	61.3
Intermediate Year 2025 Emission & Budget	40.7	33.2
Final Year 2030 Emission & Budget	27.4	24.1

<sup>5</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.

**Table 5-5: Washington DC-MD-VA Maintenance Plan On-Road Mobile Source Emissions Budgets with Conformity Buffers<sup>1</sup>**

Year	NO <sub>x</sub> On-Road Emissions (tpd)	VOC On-Road Emissions (tpd)
<b>Attainment Year 2014 Emission &amp; Budget</b>	<b>136.8</b>	<b>61.3</b>
Predicted 2025 Emission	40.7	33.2
Conformity Buffer	8.1	6.6
<b>Intermediate Year 2025 Budget</b>	<b>48.8</b>	<b>39.8</b>
Predicted 2030 Emission	27.4	24.1
Conformity Buffer	5.5	4.8
<b>Final Year 2030 Budget</b>	<b>32.9</b>	<b>28.9</b>
Note: <sup>1</sup> The MVEBs with conformity buffers will be used only as needed in situations where the conformity analysis must be based on different data, models, or planning assumptions, including but not limited to updates to demographic, land use, or project-related assumptions, than were used to create the first set of MVEBs in the maintenance plan.		

**Table 5-6: Washington DC-MD-VA Maintenance Plan NO<sub>x</sub> and VOC Emissions, 2014 to 2030, Including MVEBs with Conformity Buffer**

Source Category	NO <sub>x</sub> (tpd)			VOC (tpd)		
	2014	2025	2030	2014	2025	2030
Point	64.85	66.03	68.50	7.71	8.83	9.41
Non-Point (Area)	9.62	9.85	9.96	139.33	153.76	160.37
M-A-R	19.51	21.74	22.71	2.38	2.57	2.66
Nonroad Model	51.99	29.62	27.80	47.48	44.88	47.15
On-road/MVEBs <sup>1</sup>	136.84	40.68	27.39	61.25	33.18	24.06
Quasi-Point	14.37	14.37	14.37	1.24	1.24	1.24
<b>TOTAL</b>	<b>297.18</b>	<b>182.29</b>	<b>170.73</b>	<b>259.39</b>	<b>244.46</b>	<b>244.89</b>
Δ (2025-2014)	114.89			14.93		
Δ (2030-2014)	126.45			14.50		
Note: <sup>1</sup> The MVEBs with conformity buffers will be used only as needed in situations where the conformity analysis must be based on different data, models, or planning assumptions, including but not limited to updates to demographic, land use, or project-related assumptions, than were used to create the first set of MVEBs in the maintenance plan.						

Regulations governing 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.<sup>6</sup>

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

The MVEBs will be re-evaluated if there is a roll-back of federal emissions control programs and/or changes to EPA’s emissions estimation model which result in significant changes in emissions inventories or to accommodate transportation planning issues when the Constrained Long-Range Plan horizon year is extended beyond 2040.

The conformity analysis shows that the NCR continues to attain and maintain the 2008 ozone standard. MWAQC and TPB are working on the process for addressing the new 2015 ozone standard. MWAQC has strongly endorsed the new 2015 ozone standard. The budgets used in this conformity analysis are based upon the 2008 ozone standard, not the new 2015 ozone.

## **6. Contingency Measures**

Section 175A of the CAA requires that the maintenance plan must include a list of contingency measures to provide additional NO<sub>x</sub> or VOC reductions to help correct any violation of the 2008 ozone NAAQS after redesignation to attainment. While these measures do not need to be fully adopted by the District of Columbia, the State of Maryland, and the Commonwealth of Virginia prior to the occurrence of a NAAQS violation, the contingency measures are expected to be implemented as expeditiously as possible once a triggering event occurs. The maintenance plan must identify the triggers that determine when contingency measures will be adopted, and the measures that the state will consider.

The maintenance plan must include contingency measures to promptly correct two future situations. The first situation is an inventory estimate that indicates the Washington region had actual emissions of either NO<sub>x</sub> or VOC in any future year that were greater than that of the attainment year inventories listed in Table 5-1. The second situation is any NAAQS violation that occurs after redesignation of an area. The plan should include specific triggers for measures to be adopted, a schedule and procedures for adoption and implementation, and a

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<sup>6</sup> 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](http://www.mwcog.org/store/item.asp?PUBLICATION_ID=233)

specific time limit for action. The maintenance plan must ensure that the contingency measures are adopted explicitly once they are triggered.

## **6.1 Exceedance of the Attainment Year Emissions Inventory**

The ability of the Washington DC-MD-VA nonattainment area to stay in compliance with the 2008 ozone NAAQS depends at least partially on the level of NO<sub>x</sub> and VOC emissions in the region. Emissions are projected to stay well below the 2014 attainment year levels, through 2030. However, if emissions increase, the area may experience an ozone violation. Should any future year emissions inventory data indicate that the Washington DC-MD-VA area's total emissions of NO<sub>x</sub> or VOCs exceeded the levels in Table 5-1, 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. 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 commit to implementing one or more of the programs listed in Table 6-1 so that future total emission estimates for the Washington DC-MD-VA area will not exceed those listed in Table 5-1.

## **6.2 Contingency Measures**

If and when any monitor registers a fourth highest daily maximum eight-hour average ozone concentration exceeding 0.075 ppm in any year after approval of the maintenance plan by USEPA, the District of Columbia, the State of Maryland, and the Commonwealth of Virginia commit to implementing one of the programs listed in Table 6-1 to garner additional emission reductions for air quality improvement. If and when any monitor registers a fourth highest daily maximum eight-hour average ozone concentration exceeding 0.075 ppm in two consecutive years following approval of the maintenance plan and subsequent to implementation of the first contingency measure, the District of Columbia, the State of Maryland, and the Commonwealth of Virginia commit to implementing a second program listed in Table 6-1. If and when any monitor registers a violation of the 2008 ozone NAAQS following approval of the maintenance plan by USEPA, the District of Columbia, the State of Maryland, and the Commonwealth of Virginia commit to implementing two programs listed in Table 6-1.

Table 6-1 lists the contingency measures to be adopted by the District of Columbia, the State of Maryland, and the Commonwealth of Virginia in case of exceedances or violations mentioned above. The Maryland NO<sub>x</sub> Rule (Phase I) will provide significant emissions reductions of precursors to ozone. This regulation, COMAR 26.11.38, required additional NO<sub>x</sub> reductions beginning May 1, 2015, for applicable coal-fired power plants in Maryland. This action impacts coal-fired EGUs in Maryland, which account for more than 80% of the state's power plant NO<sub>x</sub> emissions.



**Table 6-1: Contingency Control Measures**

OTC 2009-2014 model rule for VOC for consumer products (VA)
OTC 2009-2014 model rule for VOC for architectural and industrial maintenance coatings (VA)
SNCR controls (or equivalent) for NO <sub>x</sub> on Unit #5 at Possum Point Power Station latest by ozone season, 2021 (VA)
NO <sub>x</sub> Rule - Phase I (MD)
On-road engine idling rule (DC)

### **6.3 Contingency Measure Implementation Schedule**

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

- Schedule onset: notification received from USEPA that a contingency measure must be implemented, or three months after quality assured data determine that an exceedance or violation occurred within the previous year.
- Applicable regulation or program to be adopted six months after this date.
- Applicable regulation or program to be implemented six months after adoption.
- Compliance with regulation, or full program implementation, to be achieved within 12 months of adoption.