

5.0 2008 REASONABLE FURTHER PROGRESS REQUIREMENTS

5.1 Introduction

In June 2004 EPA revoked the 1-hour ozone standard and published implementation guidance for the 8-hour ozone standard. The Metropolitan Washington, DC-MD-VA region was classified as moderate nonattainment of the 8-hour ozone standard under Subpart 2, Section 182, Part b.

EPA's implementation guidance requires that a moderate 8-hour ozone nonattainment area that has an attainment date beyond 5 years after its 8-hour designation and has previously met its 15 percent emission reduction requirements under the 1-hour standard will only be subject to subpart 1 RFP requirements. These requirements will be satisfied with a plan to demonstrate 15 percent emissions reductions (which may be either VOC or NO_x or a combination of both) from 2002 to 2008.¹ The Metropolitan Washington region is currently a moderate 8-hour ozone nonattainment area and has an attainment date (June 15, 2010), which is beyond 5 years after its 8-hour designation (June 15, 2004). The region is also a former 1-hour ozone nonattainment area with an approved 15% VOC reduction plan. Therefore, it is required by EPA to demonstrate reasonable further progress by reducing 15% emissions during the period 2002-2008. This chapter contains the Washington region's reasonable further progress demonstration for the period 2002-2008. The region will need to fulfill this reasonable further progress requirement by January 1, 2009.

In order to demonstrate reasonable further progress, a region must show that its expected emissions, termed controlled inventories, of NO_x and VOC will be less than or equal to the target levels set for the end of the reasonable further progress period, or "milestone year". For the RFP period 2002-2008, the "target inventories" of emissions are the maximum quantity of anthropogenic emissions permissible during the 2008 milestone year.

This section describes the methodology used to establish the regional target inventories and controlled inventories for 2008. Because the expected NO_x and VOC emissions will be less than or equal to the target levels, the Washington region will meet the reasonable further progress requirements for 2008.

5.1.1 Rate of Progress Demonstrated in Previous State Implementation Plans

Since 1990, the Clean Air Act has required ozone nonattainment areas to demonstrate progress towards attaining the ozone standard. This requirement is generically referred to as the reasonable further progress (RFP) requirement, and, was also called rate-of-progress (ROP). But under 40 CFR 51.900, "rate-of-progress" refers to the progress required towards attaining the 1-hour ozone standard, and "reasonable further progress (RFP)" progress required towards attaining the current 8-hour ozone standard. During the period 1990-1996, areas in nonattainment for the 1-hour ozone standard were required to reduce VOC emissions by 15%. After 1996, these areas were required to demonstrate a 9% rate of progress every three years until their attainment date. The percent reductions for these ROP plans were computed relative to 1990 base line emissions.

The Clean Air Act Amendments (CAAA) included restrictions on the use of control measures to meet the 15% requirements. Reductions in ozone precursors resulting from four types of federal and state regulations could not be used to meet rate of progress. These four types of programs are:

- (1) Federal Motor Vehicle Control Program (FMVCP) tailpipe and evaporative standards applicable as of January 1, 1990,
- (2) Federal regulations limiting the Reid Vapor Pressure (RVP) of gasoline in ozone nonattainment areas applicable as of June 15, 1990;
- (3) State regulations correcting deficiencies in reasonably available control technology (RACT) rules
- (4) State regulations establishing or correcting inspection and maintenance (I/M) programs for on-road vehicles.

The basic procedures of developing target levels for the 15% Plan are describe in EPA's guidance on the *Adjusted Base Year Emissions Inventory and the 1996 Target for the 15% Rate of Progress Plans*. For the purposes of the 8-hour RFP requirements this guidance was updated by EPA in November 2005 and August 2006.^{2,6}

In 2003 EPA reclassified the Metropolitan Washington region as severe non-attainment for the 1-hour ozone standard when the region did not meet the attainment deadline for serious non-attainment areas by November 1999. In March 2004 MWAQC approved a State Implementation Plan to meet the requirements for a severe nonattainment area. The "Severe Area SIP" demonstrated rate of progress of 15% from 1999-2002, and 15% from 2002-2005. The states submitted the plan to EPA, and EPA approved the states' SIPs and Rate of Progress plans in 2005.³

5.2 Guidance for Calculating Reasonable Further Progress (RFP) Emission Target Levels

The Clean Air Act Amendments of 1990 provide the primary guidance for calculating the VOC and NO_x target levels used in a region's ROP plans. In November 2005 as part of its final implementation rule for the 8-hour ozone standard, EPA issued guidance to assist the states in their RFP plan development.

As discussed above, the guidance that applies specifically to the Metropolitan Washington region is described in the EPA's 8-hour ozone implementation guidance document.¹ Methodology specific to the Metropolitan Washington region, for calculating emissions target levels for the purpose of demonstrating RFP, is described in details in the EPA document's Appendix A, "Method 2".²

Method 2 of the EPA's guidance document states that the target level of VOC and NO_x emissions in 2008 needed to meet the 2008 RFP requirement is any combination of VOC and NO_x reductions from the adjusted base year 2002 inventories (base year 2002 emissions less non-creditable emissions reduction occurring between 2002 and 2008) that total 15 percent. For example, the target level of VOC emissions in 2008 could be a 10 percent reduction from the adjusted base year 2002 VOC inventory and a 5 percent reduction from the adjusted NO_x

inventory. The actual projected 2008 VOC and NOx inventories for all sources with all control measures in place and including projected 2008 growth in activity must be at or lower than the target levels of VOC and NOx emissions. Washington region has not chosen to substitute NOx for VOC reductions for complying with its reasonable further progress requirements and therefore all its required 15% emissions reductions during the period 2002-2008 come from VOC reductions only.⁴

This section summarizes the requirements and procedures for calculating the target emission levels required for a RFP demonstration. RFP demonstrations build upon each other, starting from the base year of 2002.

5.2.1 2008 VOC and NOx Target Levels

EPA's *Final Rule To Implement the 8-Hour Ozone National Ambient Air Quality Standard – Phase II* mandates that to meet the reasonable further progress requirement, the Washington, DC-MD-VA 8-hour ozone nonattainment area needs to reduce its emissions by 15% between 2002 and 2008 using either reduction in VOC or NOx or any combination of the two. The Washington region is able to demonstrate reasonable further progress for the period 2002-2008 using 15% VOC reduction.

The target levels for 2008 reasonable further progress plans are calculated according to the EPA's final rule mentioned above. The general formula for calculation of 2008 target levels is as follows:

$$\text{Target Level} = (\text{RFP base year emissions} - \text{non-creditable emissions reduction between 2002 and 2008}) * (\text{Reductions required to meet the reasonable further progress requirement}) \quad [\text{Eq. 5-1}]$$

5.2.2 Calculation of 2008 Target Levels

Equation 5-1 gives the general formula for calculating 2008 target levels. Since the region has chosen to demonstrate the 2008 reasonable further progress using 15% VOC reduction, the 2008 VOC target level becomes:

$$\text{2008 VOC Target level} = (\text{2002 RFP Base-Year VOC emissions} - \text{non-creditable emissions reduction between 2002 and 2008}) * (15\% \text{ VOC reduction}) \quad [\text{Eq. 5-2}]$$

Step 1 Develop 2002 Base Year Inventories and 2002 Reasonable Further Progress Base Year Inventories

The 2002 base year inventory is an inventory of actual anthropogenic and biogenic VOC emissions on a typical weekday during peak ozone season. The inventory was calculated as described in Chapter 3 and is presented in Table 3-1. The reasonable further progress base-year inventory includes only anthropogenic emissions generated within the Metropolitan Washington nonattainment area. As the 2002 base-year inventory included no emissions generated outside the Metropolitan Washington area, the only difference between the base year inventory and the reasonable further progress base year inventory is the removal of biogenic emissions. The reasonable further progress base year VOC inventory is presented in Table 5-1.

**Table 5-1
2002 Reasonable Further Progress Base-Year Inventory
(Ozone Season tons per day)**

Source	VOC	NOx
Point	12.91	220.60
Area	195.43	24.25
Non-Road	125.49	85.66
On-Road	116.92	266.66
TOTAL	450.75	597.17

Note: Small discrepancies may result due to rounding

Step 2 Develop 2002 and 2008 Reasonable Further Progress Adjusted Year Inventories

According to the 1990 CAAA, reductions necessary to meet the reasonable further progress requirement must be calculated from an emission baseline that excludes the effects of the non-creditable Federal Motor Vehicle Control Program (FMVCP) and Reid Vapor Pressure (RVP) programs described in Section 5.1.2. Therefore the 2002 baseline must be adjusted by subtracting the VOC and NOx reductions that will result from these two programs during the period 2002-2008. The resulting inventory is referred to as the 2002 Adjusted Base Year Inventory.

In order to calculate the non-creditable emissions reductions, which occur during the period 2002-2008, the following two mobile inventories are needed:

- 1) 2002 Reasonable Further Progress Adjusted-Year Inventory
- 2) 2008 Reasonable Further Progress Adjusted-Year Inventory

Both of these mobile inventories were created using the same inputs (listed below), with the only difference between them being the model year (inventory #1 and #2 were created for model years 2002 and 2008 respectively).

- a) 1990 I/M Program
- b) RVP = 7.8 psi (RVP required according to June 1990 fuel RVP regulations)⁵
- c) No Post-1990 Clean Air Act Measures
- d) 2002 Vehicle Activity Inputs
- e) 2002 Vehicle Miles Traveled (VMT)

The MOBILE6 input files are included in Appendix D. Table 5-2 & 5-3 show RFP adjusted-year inventories for 2002 and 2008 respectively.

Table 5-2
2002 Reasonable Further Progress Adjusted-Year Inventory
(Ozone Season tons per day)

Source	VOC	NOx
Point	12.91	220.60
Area	195.43	24.25
Non-Road	125.49	85.66
On-Road	166.55	308.24
TOTAL	500.38	638.75

Note: Small discrepancies may result due to rounding

Table 5-3
2008 Reasonable Further Progress Adjusted-Year Inventory
(Ozone Season tons per day)

Source	VOC	NOx
Point	12.91	220.60
Area	195.43	24.25
Non-Road	125.49	85.66
On-Road	154.10	276.63
TOTAL	487.93	607.14

Note: Small discrepancies may result due to rounding

Step 3 Non-creditable Emissions Reductions

The non-creditable emissions reductions that occur in absence of any post-1990 CAA measures during a reasonable further progress period can be determined by taking the difference between the RFP adjusted-year inventories for the relevant milestone years. For VOC and NOx, the relevant milestone years are 2002 and 2008.

$$\text{Non-creditable Emissions Reductions} = \text{2002 RFP Adjusted Year Inventory} - \text{2008 RFP Adjusted Year Inventory} \quad [\text{Eq. 5-3}]$$

Table 5-4
Calculation of Non-creditable Emissions Reductions
(Ozone Season tons per day)

Description	VOC	NOx
2002 Adjusted Year Inventory (a)	500.38	638.75
2008 Adjusted Year Inventory (b)	487.93	607.14
Non-creditable Emissions Reduction (a-b)	12.45	31.61

Step 4 Calculation of 2008 Target Levels

Following Equations 5-2 and 5-3, the VOC and NOx target levels for 2008 are calculated in Table 5-4 below:

**Table 5-5
Calculation of VOC Target Level for 2008
(Ozone Season tons per day)**

Description	VOC
2002 RFP Base-Year Inventory (a)	450.75
Non-creditable Emissions Reduction (b)	12.45
2002 Adjusted Base-Year Inventory (c) = (a-b)	438.30
Reduction Required for Reasonable Further Progress (d) = 15% VOC reduction from (c)	65.75
2008 Target Levels for Reasonable Further Progress (e) = (c-d)	372.55

5.3 Compliance with 2008 Reasonable Further Progress Requirements

In order to demonstrate reasonable further progress for the period 2002-2008, the Washington region must show that expected emissions in 2008 are equal to or less than the 2008 target levels presented in Table 5-4.

The 2008 controlled inventories are inventories of all anthropogenic VOC and NOx emissions expected to occur in the Washington nonattainment area during 2008. The inventories were developed as described in Chapter 4 and are displayed in Tables 4-7 and 4-8. As summarized in Table 5-5, the 2008 controlled VOC and NOx inventories are less than the 2008 target inventories. Table 5-5 demonstrates that the Washington region fulfills the 2002-2008 reasonable further progress requirements.

**Table 5-6
Washington Nonattainment Area
Comparison of 2008 Controlled and Target Inventories
Ozone Season Daily Emissions (tons per day)**

Description	VOC
2008 Reasonable Further Progress Target Level	372.55
2008 Controlled Emissions	364.42

*** The controlled area source emissions for the District do not include reductions from the OTC VOC measures. The District's OTC VOC rules on all the applicable area source categories are fully adopted, have been submitted to EPA and they are federally enforceable measures. However, the emission reductions of [xxxx] tpd VOC arising from these measures in the District are not applied to the emissions inventories presented in this RFP demonstration

of the Washington DC-MD-VA regional SIP. The District of Columbia's measures are expected to provide additional enhancements to the air quality improvement in the region.

5.4 Reasonable Further Progress Contingency Emissions Reduction Requirements

This section briefly discusses the procedures for calculating the emission reduction required to meet the RFP contingency requirements, which have been discussed in detail in the chapter 11. A total of 3% reduction using a combination of VOC and NOx reductions are needed to comply with the RFP contingency emissions reduction requirements during the period 2008-2010. Washington region has chosen to use a combination of 0.3% VOC and 2.7% NOx reductions to fulfill the 3% RFP contingency emissions reduction requirements during the period 2008-2010. Therefore, VOC and NOx reductions required during the period 2008-2010:

$$\text{VOC Reduction Required} = (\text{2002 RFP Base-Year VOC emissions} - \text{non-creditable emissions reduction between 2002 and 2008}) * (0.3\% \text{ VOC reduction}) \quad [\text{Eq. 5-4}]$$

$$\text{NOx Reduction Required} = (\text{2002 RFP Base-Year NOx emissions} - \text{non-creditable emissions reduction between 2002 and 2008}) * (2.7\% \text{ NOx reduction}) \quad [\text{Eq. 5-5}]$$

Following Equations 5-4 and 5-5, the VOC and NOx reductions required to meet the RFP contingency in the year 2010 are calculated in Table 5-6 below:

Table 5-7
Calculation of VOC and NOx Reductions for RFP Further Progress Contingency
(Ozone Season tons per day)

Description	VOC	NOx
2002 RFP Base-Year Inventory (a)	450.75	597.17
Non-creditable Emissions Reduction (b)	12.45	31.61
2002 Adjusted Base-Year Inventory (c) = (a-b)	438.30	565.56
0.3% VOC Reduction Required for RFP Contingency (d) = (0.3/100) * (c)	1.31	
2.7% NOx Reduction Required for RFP Contingency (e) = (2.7/100) * (c)		15.27

These emissions reductions must be achieved one year after the failure to meet the RFP is notified in 2009. Therefore these reductions must be achieved during the period 2008-2010.

References

U.S. EPA, "Guidance on the Adjusted Base Year Emissions Inventory and the 1996 Target for the 15% Rate of Progress Plans"

U.S. EPA, "Guidance on the Post-1996 Reasonable Further Progress Plan and the Attainment Demonstration", February 18, 1994.

U.S. EPA, "NOx Substitution Guidance", December 15, 1993.

¹ 40 CFR 51.910(a); *Final Rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard*, *Federal Register*, Vol 70, No. 228, Nov.29, 2005, pp. 71612-71705.

² “Appendix A to Preamble—Methods to Account for Non-Creditable Reductions When Calculating ROP Targets for the 2008 and Later ROP Milestone Years,” in *Final Rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard*, *Federal Register*, Vol 70, No. 228, Nov.29, 2005, pp. 71696.

³ *Approval and Promulgation of Air Quality Implementation Plans; District of Columbia, Maryland, Virginia; 1Hour Ozone Attainment Plans, Rate-of-Progress Plans, Contingency Measures, Transportation Control Measures, VMT Offset, and 1990 Base Year Inventory*, *Federal Register*, vol 70, No. 92, May 13, 2005, pp.25688-25719.

⁴ *If a region chooses to substitute reductions in NOx for reductions in VOC, the substitution must be made in accordance with EPA’s NOx Substitution Guidance. This guidance states the use of NOx emission reductions must be consistent with the photochemical modeling used in the region’s attainment demonstration. As photochemical attainment modeling performed for the Metropolitan Washington region shows that NOx reductions significantly reduce ozone formation, the region can substitute NOx reductions for VOC reductions. Based on this modeling, the Washington region can substitute NOx reductions for some or all (0-15%) of the required VOC reductions for the 2008 reasonable further progress (App. F – Severe SIP).*

⁵ *The 1990 Phase II regulations specify 7.8 psi as the maximum RVP of gasoline being sold in the Washington, DC-MD-VA ozone nonattainment area in 1992.*

⁶ *Memorandum, “8-hour Ozone National Ambient Air Quality Standard (NAAQS) Implementation – Reasonable Further Progress (RFP),” from William T. Harnett, dated August 15, 2006.*