Region III Plan Summary
Maryland Portion of the Philadelphia-Wilmington-Atlantic City
8-Hour Ozone Moderate Nonattainment Area

Title: Rate of Progress (ROP) Plan for the Maryland Portion of the Philadelphia-Wilmington-Atlantic City 1997 8-Hour Ozone Moderate Nonattainment Area

Federal Register Dates: January 7, 2010, 75 FR 953 (Proposed Rule); June 11, 2010, 75 FR 33172 (Final Rule)

EPA Effective date: July 12, 2010

State Submittal Date: June 4, 2007

Affected Areas: Cecil County

Summary of the Plan

On June 4, 2007, the Maryland Department of the Environment (MDE) submitted a SIP revision to address emissions inventory, reasonable further progress (RFP), reasonably available control measures (RACM) analysis, and contingency measure requirements for the Maryland portion of the Philadelphia-Wilmington-Atlantic City moderate nonattainment area (Philadelphia NAA) for the 1997 8-hour ozone national ambient air quality standard (NAAQS). The SIP revision also establishes a motor vehicle emissions budget (MVEB) for 2008 for the Maryland portion of the Philadelphia NAA. This NAA includes Cecil County in Maryland, 5 counties in Pennsylvania, nine counties in New Jersey, and the entire State of Delaware.

Pursuant to Phase 1 of the 8-hour ozone implementation rule, an area was classified under Subpart 2 of the CAA based on its 8-hour design value if that area had a 1-hour design value at or above 0.121 ppm (the lowest 1-hour design value in Table 1 of Subpart 2). Based on this criterion, the Philadelphia NAA was classified under Subpart 2 as moderate nonattainment areas.

Emission Inventories

A summary of the Cecil County 2002 base year VOC and NOx emissions inventory is included in Table 1, below.

Table 1. Cecil County 2002 Base Year VOC & NOx Emissions in Tons per Day (tpd)

Emission Source Category	VOC	NOx
Point	0.28	0.02
Stationary Area	4.93	0.20
Non-Road Mobile	8.37	2.97
On-Road Mobile	4.00	14.22
Biogenics	42.94	0

Emission Source Category	VOC	NOx
Total (excluding Biogenics)	17.58	17.40

Under the Clean Air Act, the emissions benefits resulting from the Federal Motor Vehicle Control Program (FMVCP) and the Reid Vapor Pressure (RVP) regulations are excluded from the base year inventory. The FMVCP and RVP emissions reductions, determined by the state using EPA's on-road mobile source emissions modeling software (MOBILE6), are then removed from the base year inventory by the state, resulting in an adjusted base year inventory. The emission reductions needed to satisfy the RFP requirement are then calculated from the adjusted base year inventory. These reductions are then subtracted from the adjusted base year inventory to establish the emissions target for the RFP milestone year (2008). The RFP SIP revision must provide for a 15 percent emission reduction (either NOx and/or VOC) accounting for any growth that occurs during the 6-year period following the baseline emissions inventory year, that is, 2002-2008.

The Maryland portion of the Philadelphia ozone nonattainment area under the 1-hour ozone standard had the same boundary as the Maryland portion of the Philadelphia NAA under the 1997 8-hour ozone standard. The Philadelphia nonattainment area under the 1-hour ozone standard was classified as severe. On July 12, 1995, Maryland submitted a 15% Plan SIP revision for the Maryland portion of the Philadelphia 1-hour ozone nonattainment area (i.e., Cecil County). On July 29, 1997, EPA approved Maryland's 15% plan for the Philadelphia severe ozone nonattainment area (62 FR 40457). Therefore, according to the Phase 2 Rule, the RFP plan for the Cecil County may use either NOx or VOC emissions reductions (or both) to achieve the 15 percent emission reduction requirement.

The Cecil County 2002 anthropogenic base year inventory is summarized in Table 2, below.

Table 2. Cecil County 2002 Anthropogenic Base Year Inventory (Ozone Season tpd)

Source Category	VOC	NOx
Point	0.28	0.02
Area	4.93	0.20
Non-Road	8.37	2.97
On-Road	4.00	14.22
Total	17.58	17.40

Maryland calculated the non-creditable emission reductions between 2002 and 2008 by modeling its 2002 and 2008 motor vehicle emissions with all post-1990 CAA measures turned off, and calculating the difference. The non-creditable reductions are calculated in Table 3, below.

Table3. Cecil County Non-Creditable Emission Reductions (Ozone Season tpd)

Source Category	VOC	NOx
(i) 2002 On-Road	5.42	16.09

Source Category	VOC	NOx
(ii) 2008 On-Road	4.73	13.90
Non-creditable Reductions (i) – (ii)	0.69	2.19

Maryland's calculations of the Cecil County 2002 VOC and NOx inventories adjusted relative to 2008 and VOC and NOx target levels for 2008 are summarized in Table 4, below.

Table 4. Cecil County 2008 RFP Target Level Calculations (Ozone Season tpd)

Description		Formula	VOC	NOx
A	2002 Rate-Of Progress Base Year Inventory		17.58	17.40
B	FMVCP/RVP Reductions Between 2002 And 2008		0.69	2.19
C	2002 Adjusted Base Year Inventory Relative To 2008	A - B	16.89	15.21
D	RFP Ratio		0.07	0.08
E	Emissions Reductions Required Between 2002 & 2008	C * D	1.18	1.22
F	Target Level for 2008	C - E	15.71	13.99

Projected Inventories and Determination of RFP

Projected controlled 2008 emissions for the Cecil County are summarized in Table 5, below.

Table 5. Cecil County 2008 Projected Controlled VOC & NOx Emissions

Emission Source Category	VOC Emissions (tpd)	NOx Emissions (tpd)
Point	0.39	0.02
Area	4.75	0.23
Non-road	7.23	2.87
Mobile	2.29	7.93
Total	14.65	11.05

To determine if 2008 RFP is met in Cecil County, the total projected controlled emissions must be compared to the target levels calculated in the previous section of this document. As shown below in Table 6, the total VOC and NOx emission projections meet the 2008 emission targets. Therefore, the 2008 RFP in Cecil County is demonstrated.

Table 6. Determination of whether RFP is met in 2008 in Cecil County

Description		VOC Emissions (tpd)	NOx Emissions (tpd)
A	Total 2008 Projected Controlled Emissions	14.65	11.05
B	Target Level for 2008	15.71	13.99

RFP met if A < B	Yes	Yes

Control Measures and Emission Reductions for RFP

To meet the RFP requirement for the Cecil County, Maryland used a combination of (1) on-road mobile, (2) non-road mobile, and (3) area source control measures.

(1) On-Road Mobile Measures

Maryland calculated the emission reductions for 2008 RFP using the MOBILE model for the following measures:

a. Enhanced Vehicle Inspection and Maintenance (Enhanced I/M)
b. Tier I Vehicle Emission Standards and New Federal Evaporative Test Procedures
c. Formulated Gasoline in On-Road Vehicles
d. National Low Emission Vehicle (NLEV) Program
e. Federal Heavy-Duty Diesel Engine (HDDE) Rule

On-road Mobile 2008 Emission Reductions are: 1.75 tpd VOC and 3.78 tpd NOx.

(2a) Non-Road Measures – NONROAD Model

Maryland calculated the emission reductions for 2008 RFP using the EPA NONROAD model for the following measures:

- Non-Road Small Gasoline Engines
- Non-Road Diesel Engines Tier I and Tier II
- Marine Engine Standards
- Emissions Standards for Large Spark Ignition Engines
- Reformulated Gasoline Use in Non-Road Motor Vehicles and Equipment

Non-Road Mobile 2008 Emission Reductions are: 1.18 tpd VOC and 0.28 tpd NOx.

(2b) Other Non-Road Measures

- **Railroad Engine Standards: Tier 2**

This measure establishes emission standards for newly manufactured and remanufactured diesel-powered locomotives and locomotive engines.

Emission Benefit Calculation:

The class I line-haul railroad engine NOx emission reduction factors for 2000, 2005, and 2010 are 0.0100, 0.3200, and 0.4600, respectively.

Interpolation for 2002: 0.0100 + (0.3200 - 0.0100) x 2/5 = 0.134 = CE2002

Interpolation for 2008: 0.3200 + (0.4600 - 0.3200) x 3/5 = 0.404 = CE2008

The class I switch railroad engine NOx emission reduction factors for 2000, 2005, and 2010 are 0.0000, 0.0700, and 0.1700, respectively.

Interpolation for 2002: 0.0000 + (0.0700 - 0.0000) x 2/5 = 0.0280 = CE2002

Interpolation for 2008: 0.0700 + (0.1700 - 0.0700) x 3/5 = 0.1300 = CE2008

To determine the projected uncontrolled 2008 VOC emissions for railroad engines, two source classification codes (SCCs) were identified. See Table 7 for 2008 projected uncontrolled emissions.

Table 7. Rail Road Engine Uncontrolled 2008 VOC Emissions in Cecil County

SCC	Source Subcategory	NOx (tpd)
2285002005	railroad line haul engines (Class I Line-Haul)	0.728399084
2285002010	railroad yard engines (Class I Switch)	0
Total for Cecil County		0.728399084

Emissions benefits for both source categories are calculated by multiplying 2008 uncontrolled emissions by the difference between CE2008 and CE2002, and multiplying by the rule effectiveness (RE) and rule penetration (RP) factors.

$$\text{2008 Controlled Emissions} = \text{2008 Uncontrolled Emissions} \times [CE2008 - CE2002] \times RE \times RP$$

Assuming RE and RP of 1, the 2008 emissions benefits for class I line-haul and class I switch railroad engines are as follows:

Class I Line-Haul: 0.728399084 x (0.4040 – 0.1340) = 0.19666 tpd
Class I Line-Switch: 0 x (0.1300 - 0.0280) = 0 tpd

Railroad Engine Projected 2008 Emission Reductions are: 0.20 + 0 = 0.20 tpd NOx.

(3) Area Source Measures

- **Architectural and Industrial Maintenance (AIM) Coatings**

To determine the projected uncontrolled 2008 VOC emissions for AIM coatings, six SCCs were identified. See Table 8 for 2008 projected uncontrolled emissions.

Table 8. AIM Coating Uncontrolled 2008 VOC Emissions in Cecil County

SCC	Source Subcategory	VOC tpd
2401002000	solvent-based architectural surface coatings	0.241669519
2401003000	water-based architectural surface coatings	0.213326709
2401008000	traffic paints	0.026062156
2401100000	surface coatings for industrial maintenance	0.136167777
2401200000	surface coatings - other categories	0.136167777
2401008999	traffic paint solvents	0.497390156
Total for Cecil County		1.250784094

AIM Coating Projected 2008 Emission Reductions are: 1.250784094 x 31% = 0.39 tpd VOC.

- **Commercial and Consumer Products, Phase I**

Projected reductions are based on an emission reduction factor of 14.2 percent

To determine the projected uncontrolled 2008 VOC emissions for consumer and commercial products, one SCC was identified. See Table 9 for 2008 projected uncontrolled consumer and commercial products emissions.

Table 9. Consumer and Commercial Products Uncontrolled 2008 VOC Emissions in Cecil County

SCC	Source Subcategory	VOC (tpd)
2465000000	Emissions from commercial/consumer solvents	0.95725863

Consumer and Commercial Products Projected 2008 Emission Reductions are: 0.95725863 x 14.2% = 0.14 tpd VOC.

- **<u>Portable Fuel Containers Rule, Phase I</u>**

This measure introduces performance standards for portable fuel containers and spouts, and is intended to reduce emissions from storage, transport and refueling activities. The rule also included administrative and labeling requirements.

Emission Benefit Calculation: Projected reductions are based on an emission reduction factor of 75% after full implementation after 10 years. By the 2008 ozone season, the rule had been implemented for 5.5 years.

Emission reduction factor: $75\% \times \frac{5.5 \text{ years}}{10 \text{ years}} = 41.25\%$

To determine the projected uncontrolled 2008 VOC emissions for portable fuel containers, six SCCs were identified. See Table 10, below.

Table 10. Portable Fuel Container Projected Uncontrolled 2008

VOC Emissions in Cecil County

SCC	Source Subcategory	VOC (tpd)
2501011011	Residential - Permeation Area	0.021914
2501011012	Residential - Diurnal Area	0.191747
2501011016	Residential - Transport Area	0.010957
2501012011	Commercial - Permeation Area	0.002191
2501012012	Commercial - Diurnal Area	0.033967
2501012016	Commercial - Transport Area	0.508404
Total for Cecil County		0.769181

Portable Fuel Containers Projected 2008 Emission Reductions are tpd: 0.769181x 41.25% = 0.32 tpd VOC.

RFP Emission Reduction Summary

For certain control measures, the 2008 projected emission reductions calculated in this document differ from the 2008 projected emission reductions that MDE has taken credit for in the Cecil County 8-hour ozone plan. Table 11 summarizes the emission reductions from each control measure and compares EPA's calculated values with the reductions claimed in the Cecil County 8-hour ozone plan.

Table 11. Control Measures and 2008 Emission Reductions in Cecil County – Comparison of EPA Calculations and Cecil County 8-hour Ozone Plan

	EPA Calculation		Cecil County 8-hour Ozone Plan	
Control Measure	**VOC (tpd)**	**NOx (tpd)**	**VOC (tpd)**	**NOx (tpd)**
On-road Mobile Measures	1.75	3.78	1.75	3.78
Non-road Model	1.18	0.28	1.18	0.28
Railroads (Tier 2)	0.00	0.20	0.00	0.15
OTC - Consumer Products Phase 1	0.14	0.00	0.14	0.00
OTC – AIM Coatings	0.39	0.00	0.39	0.00
OTC – Portable Fuel Containers Phase 1	0.32	0.00	0.26	0.00
Total	**3.78**	**4.26**	**3.71**	**4.21**

Contingency Measures

To meet the requirements for contingency emission reductions, EPA allows states to use NOx emission reductions to substitute for VOC emission reductions in their contingency plans. However, MDE chose to use only VOC reductions to meet the contingency measure requirement

in Cecil County. MDE calculated the contingency VOC reduction for Cecil County as shown in Table 12, below. The RFP contingency requirement may be met by including in the RFP plan a demonstration of 18 percent VOC & NOx RFP. The additional 3 percent reduction above the 15 percent requirement must be attributed to specific measures.

Table 12. Cecil County 2008 RFP Contingency Measure Target Level Calculations

Description		Formula	VOC	NOx
A	2002 Rate-Of Progress Base Year Inventory		17.58	17.40
B	FMVCP/RVP Reductions Between 2002 And 2008		0.69	2.19
C	2002 Adjusted Base Year Inventory Relative To 2008	A - B	16.89	15.21
D	RFP Ratio		0.07	0.08
E	RFP Emissions Reductions Required Between 2002 & 2008	C * D	1.18	1.22
F	Contingency Percentage		3%	0%
G	Contingency Emission Reduction Requirements	C * F	0.51	0
H	Contingency Measure Target Level for 2008	C – E – G	15.20	13.99

To determine if Maryland meets the three percent contingency measure requirement for Cecil County, the total projected controlled emissions must be compared to the contingency measure target levels calculated above. As shown below in Table 13, the total VOC and NOx emission projections meet the 2008 contingency measure targets.

Table 13. Evaluation of the Cecil County 2008 RFP Contingency Measure Requirement

Description		VOC (tpd)	NOx (tpd)
A	Total 2008 Projected Controlled Emissions	14.65	11.05
B	Contingency Measure Target Level for 2008	15.20	13.99
Contingency measure requirement met if A < B		Yes	Yes

RACM Analysis and Determination

The purpose of the RACM analysis is to determine whether or not reasonably available control measures exist that would advance the attainment date for nonattainment areas. Control measures that would advance the attainment date are considered RACM and must be included in the SIP. To meet the RACM requirement, Maryland must demonstrate that it has adopted all RACM necessary to move Cecil County and the Philadelphia NAA toward attainment as expeditiously as practicable and to meet all RFP requirements. Maryland has demonstrated that it has met the RFP requirements for Cecil County.

Maryland evaluated over 200 potential control measures against these criteria. No measures were found to be RACM. However, MDE states in the Cecil County 8-hour ozone plan that many of the measures are worthwhile in that they can reduce emissions. MDE further states that it will consider these potential control measures for future SIP revisions for Cecil County.

Transportation Conformity Budgets

The Cecil County MVEB for the 2008 RFP is based on the projected 2008 mobile source emissions accounting for all mobile control measures. The MVEBs for the 2008 RFP are shown in Table 14, below.

Table 14. Cecil County 2008 RFP MVEBs

VOC (tpd)	NOx (tpd)
2.3	7.9

In a March 27, 2009 Federal Register notice, EPA notified the public that EPA found that the 2008 RFP MVEBs in the Cecil County 8-hour ozone plan are adequate for transportation conformity purposes (74 FR 13433). As a result of EPA's finding, the State of Maryland must use the MVEBs from the June 4, 2007 Cecil County 8-hour ozone plan for future conformity determinations for the 8-hour ozone standard.

EPA Region III Contact: Maria Pino (3AP30), U.S. EPA Region III
1650 Arch Street, Philadelphia, PA 19103-2029
(215) 814-2181; pino.maria@epa.gov