

**Commonwealth of Pennsylvania
Department of Environmental Protection**



pennsylvania

DEPARTMENT OF ENVIRONMENTAL PROTECTION

PROPOSED

**State Implementation Plan Revision:
Correction to Reasonable Further Progress Demonstration**

Philadelphia-Wilmington-Atlantic City, PA-NJ-DE

Eight-Hour Ozone Nonattainment Area

(Bucks, Chester, Delaware, Montgomery and Philadelphia Counties)

SEPTEMBER 2009

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Introduction

This revision to the Pennsylvania State Implementation Plan (SIP) is to reflect changes made to the Reasonable Further Progress (RFP) Demonstration included in the SIP revision for the five-county Pennsylvania portion of the Philadelphia-Wilmington-Atlantic City Eight-Hour Ozone Nonattainment Area submitted to the U.S. Environmental Protection Agency (EPA) on August 29, 2007. The sections below will replace Section IV (D) and (E) of the August 2007 submission in its entirety.

The substituted sections will:

- correct the emissions estimated for stationary point sources throughout the RFP calculations. These values were incorrect in the August 29, 2007 submission because name changes were not fully incorporated into the Department's databases, causing some facilities to be included multiple times during the inventory development. Once final, a SIP revision to correct the 2002 base year emission inventory will be submitted to EPA. The change reduces the 2002 inventory by approximately 3 tons per day of volatile organic compounds (VOC) emissions and approximately 24 tons per day of nitrogen oxides (NOx) emissions. The change reduces the 2008 projected inventory by approximately 3 tons per day of VOC emissions and approximately 19 tons per day of NOx emissions.
- correct in Table 4-2 a typographical error for nonroad emissions.
- correct in Table 4-7 the area source values. The values were incorrect due to an error in the calculation formula of column F in Appendix C3, Philadelphia Area Source daily values.
- describe in more detail, with the addition of Table 4-11, the strategies and emission reductions used to meet RFP.
- in Section E, change the number of the table from Table 4-11 to 4-12.

Public Participation

Requirements for a public comment process are set forth in Section 110(a)(2) of the Clean Air Act (CAA) and 40 CFR Section 51.102(d). Public hearings on the proposed SIP revision will be held, if requested, on Thursday, October 29, 2009. Notice of the hearings will be published in the *Pennsylvania Bulletin* and in newspapers in the affected region at least 30 days prior to the date of the hearing. The public comment period will end on Friday, October 30, 2009. A comment/response document will be submitted to EPA with the final SIP revision.

Substitution

D. Reasonable Further Progress (RFP) Requirements

1. Introduction

As a moderate eight-hour ozone nonattainment area, the Commonwealth of Pennsylvania (Commonwealth) is required to demonstrate Reasonable Further Progress (RFP) towards attainment by 2008 for the Philadelphia Nonattainment Area. EPA regulations and guidance define RFP as demonstrating a 15 percent reduction of (VOC and/or NOx) emissions from 2002 to 2008. The Commonwealth is required to demonstrate that the remainder of the emission reductions needed for attainment for the Philadelphia Nonattainment Area will be achieved by the attainment date.

To demonstrate RFP, the Commonwealth must show that its expected emissions of NOx and VOC will be less than or equal to the target levels set for the end of the RFP period in the nonattainment area. For the RFP period 2002-2008, the target levels are the maximum quantity of anthropogenic emissions permissible during the 2008 “milestone year”.

This section describes the methodologies used to establish the target levels, estimate expected emissions and demonstrate that the expected emissions are less than or equal to the target levels in the Pennsylvania portion of the Philadelphia Nonattainment Area.

The Pennsylvania portion (Bucks, Chester, Delaware, Montgomery and Philadelphia counties) of the Philadelphia Nonattainment Area, which was classified as a severe one-hour ozone nonattainment area, has an approved 15 percent VOC plan for the period 1990-1996 as required for moderate and above one-hour nonattainment areas. (62 Fed. Reg. 31,343 (Jun. 9, 1997); 40 CFR 52.2020(e)). The Commonwealth was also required to demonstrate additional reductions after 1996 of 3 percent per year (9 percent every three years) until the Philadelphia Nonattainment Area reaches attainment. The Pennsylvania rate of progress plans demonstrating this were approved in 2001. (66 Fed. Reg. 54,143, October 26, 2001)

2. Calculating RFP Emission Target Levels

a. Procedure

The procedure for developing target levels for an RFP plan is contained in EPA guidance.⁶ Phase 2 of EPA’s eight-hour ozone implementation rule (the Phase 2 Implementation Rule)⁷ and additional guidance⁸ also discuss RFP requirements.

The CAA included restrictions on the ability of states to take emission reduction credit to meet the 15 percent requirements. No credit is allowed from:

⁶ *Adjusted Base Year Emissions Inventory and the 1996 Target for the 15% Rate of Progress Plans*, October 1992.

⁷ 70 Fed. Reg. 71,612, November 29, 2005

⁸ *8-Hour Ozone Implementation Q’s and A’s Concerning RFP*, August 15, 2006

- reductions attributable to from the Federal Motor Vehicle Control Program (FMVCP) standards issued as of January 1, 1990,
- federal regulations limiting the Reid Vapor Pressure (RVP) or evaporability of gasoline issued prior to the passage of the CAA amendments,
- state rules correcting prior deficiencies in reasonably available control technology, and
- certain revisions to vehicle emission inspection/maintenance plans.

Of these restrictions, only that relating to the FMVCP as of January 1, 1990, has a bearing on the Philadelphia Nonattainment Area eight-hour RFP plan. This is because the other restrictions were fully reflected in the 2002 base-year inventory whereas some emissions reductions in highway vehicle emissions after 2002 can be attributable to the FMVCP as of January 1, 1990. Reductions in emissions after 2002 are attributable to the FMVCP as of January 1, 1990, when the oldest vehicles in the fleet that were not required to meet the standards of the FMVCP as of January 1, 1990, were replaced with newer vehicles. The replacement vehicles must meet the most current standards in effect at the time of manufacture.

The RFP plan is allowed to credit only the changes in emissions that result from the difference between the current standard and the standards set by the FMVCP as of January 1, 1990; Appendix A to the Preamble of the Phase 2 Implementation Rule provides step-by-step guidance for how to adjust inventories. Since Pennsylvania's portion of the Philadelphia Nonattainment Area has an approved 15 percent plan under the one-hour ozone standard, the 2002-2008 RFP Demonstration uses Method 2 of Appendix A. While not all portions of the nonattainment area have a one-hour ozone 15 percent plan (Sussex County, Delaware is one portion and Atlantic City, New Jersey is another), the Phase 2 Implementation Rule allows nonattainment areas that are partly covered by a one-hour plan to split the area and demonstrate 15 percent VOC RFP in the part that is not covered, and use 15 percent VOC and NO_x RFP in the part that is covered. Therefore, Pennsylvania's portions can use the 15 percent VOC and NO_x RFP option.

Method 2 states that the target level of VOC and NO_x emission reductions in 2008 is any combination of VOC and NO_x emission reductions from the adjusted base-year 2002 inventories (adjusted to exclude non-creditable emission reductions) that total 15 percent.

The general formula for 2008 target levels is as follows:

$$\text{TARGET LEVEL} = (\text{2002 emissions}) - (\text{non-creditable emissions reductions between 2002 and 2008}) - (\text{reductions required to meet the RFP requirement})$$

b. The Inventories

The 2002 base-year inventory is an inventory of actual anthropogenic emissions on a typical summer day. This is indicated as Step A of Method 2 in Appendix A of the Phase 2 Implementation Rule.

Table 4-3
2002 Anthropogenic Base Year Inventory

	VOC	NOx
Point	22.21	59.63
Area	149.84	14.64
Highway	98.76	184.66
Nonroad	79.06	70.95
TOTAL	349.87	329.88

In Step B of Method 2, the same highway vehicle activity inputs used to calculate the 2002 base-year inventory are used to calculate both 2002 and 2008 highway emissions but without all post-1990 Clean Air Act FMVCP standards. All non-creditable reductions are in the highway inventory. Appendix E-3 shows the inputs to the MOBILE model used to calculate all highway vehicle inventories. Tables 4-4 and 4-5 show the results of these adjustments.

Table 4-4
2002 Adjusted Emissions (tpd)

	VOC	NOx
Point	22.21	59.63
Area	149.84	14.64
Highway	170.33	224.80
Nonroad	79.06	70.95
TOTAL	421.44	370.02

Table 4-5
2008 Adjusted Emissions (tpd)

	VOC	NOx
Point	22.21	59.63
Area	149.84	14.64
Highway	157.61	209.22
Nonroad	79.06	70.95
TOTAL	408.72	354.44

The difference between 2002 and 2008 adjusted inventories represents the amount of non-creditable VOC and NOx emissions. This calculation is described in Step C of Method 2.

$$\text{Non-creditable emissions} = (\text{2002 Adjusted Emissions}) - (\text{2008 Adjusted Emissions})$$

$$\begin{aligned} 12.72 \text{ tpd VOC} &= 421.44 \text{ tpd VOC} - 408.72 \text{ tpd VOC} \\ 15.58 \text{ tpd NOx} &= 370.02 \text{ tpd NOx} - 354.44 \text{ tpd NOx} \end{aligned}$$

Non-creditable emissions are then subtracted from the 2002 anthropogenic base-year inventory (Table 4-3). These adjusted inventories serve as the basis for calculating the 2008 target level of emissions. This calculation is described in Step D of Method 2.

**Table 4-6
Calculation of Basis of Target Levels (tpd)**

	VOC	NO _x
2002 base-year inventory (a): from Table 4-3	349.87	329.88
Non-creditable emission reduction (b)	12.72	15.58
2002 Basis of Target Levels (c) = (a-b)	337.15	314.30

3. Compliance with 2008 RFP Requirements

In order to demonstrate compliance with the 15 percent RFP requirement, Pennsylvania must demonstrate that 2008 expected emissions of any combination of VOC and NO_x have been reduced by 15 percent from 2002 base-year inventory levels. EPA compares the RFP year projected inventories (submitted with the documentation of the 15 RFP percent plan) to the target levels as the primary test of whether any 15 percent RFP plan demonstrates the required reduction.⁹ Expected emissions are those which both project growth in the activities creating the emissions and estimate reductions from the resulting level of emissions through permanent and enforceable control measures. Table 4-7 shows 2008 expected emissions for the Pennsylvania portion of the Philadelphia Nonattainment Area.

**Table 4-7
2008 Expected Emissions (tpd)**

	VOC	NO _x
Point	21.56	57.13
Area	143.23	15.50
Highway	61.09	108.78
Nonroad	62.84	62.67
TOTAL	288.72	244.08

The target level for reduction is any combination of VOC and NO_x reductions that totals 15 percent when comparing the 2002 basis for target level emissions (Table 4-3) to the 2008 expected emissions (Table 4-7). EPA guidance allows for the substitution of NO_x reductions in instances where VOC reductions alone are not equal to or greater than 15 percent. The EPA guidance provides for NO_x substitution on a percentage basis equal to or less than the total percentage reduction estimated in 2008 relative to the 2002 basis for target level emissions. An area can then demonstrate RFP if the actual 2008 VOC percent reductions (relative to the 2002 basis for target level emissions) plus the estimated 2008 NO_x percent reductions are greater than or equal to 15 percent.

⁹ "Rate-of-Progress Plan Guidance on the 15 Percent Calculations," Memorandum from D. Kent Berry, Acting Director Air Quality Management Division (MD-15), October 29, 1993, reissued in Appendix D to "Guidance on the Post '96 Rate-of-Progress Plan (RPP) and Attainment Demonstration" (Corrected version of February 18, 1994).

Table 4-8
Actual 2008 VOC and NOx Reductions Relative to the 2002 Basis for Target Level Emissions

	VOC	NOx
2008 Expected Emissions (tpd) (a); from Table 4-7	288.72	244.08
2002 Basis for Target Level (tpd) (b); from Table 4-6	337.15	314.30
Percent Reduction (c) = $[1 - (a)/(b)] \times 100$	14.36%	22.34%

As there are sufficient NOx percent reductions combined with VOC percent reductions equal to or greater than 15 percent, the Commonwealth can demonstrate RFP for the nonattainment area consistent with EPA NOx substitution guidance. The 2008 target levels for emissions using a combined VOC and NOx reduction of 15 percent are summarized in Table 4-9.

Table 4-9
Calculation of 2008 Target Levels with NOx Substitution

	VOC	NOx
2002 anthropogenic base-year inventory (tpd) (a); from Table 4-3	349.87	329.88
Non-creditable emission reduction (tpd) (b)	12.72	15.58
2002 adjusted base-year inventory (tpd) (c) = (a-b); from Table 4-6	337.15	314.30
Target % Reduction Required for RFP (d)	7.5	7.5
2008 Target Levels (tpd) (e) = $c \cdot (1 - (d/100))$	311.86	290.73

Table 4-10
Comparison of 2008 Target and Expected Emissions (tpd)

	VOC	NOx
2008 Target Levels: from table 4-9	311.86	290.73
2008 Expected Emissions: from table 4-7	288.72	244.08

As shown in Table 4-10, both 2008 estimated VOC and NOx emissions are below the 2008 VOC and NOx target levels, as a result of reductions of VOCs and NOx associated with emissions control programs demonstrating reasonable further progress under the CAA and associated EPA rate-of-progress requirements.

4. RFP Contingency Plan

The SIP for a moderate nonattainment area must include contingency measures to provide for additional reductions for failure to achieve RFP. Early implementation of contingency measures is acceptable. The contingency plan must provide for a three percent reduction (by any combination of VOC and NOx) per year in emissions from the Pennsylvania portion of the area compared to the 2002 adjusted base-year inventory.^{10,11,12,13,14} Furthermore, at least 0.3 percent of the total three percent must be attributable to VOC reductions.

10 "General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990," 57 Fed. Reg. 13,498, April 16, 1992.

11 "Guidance for Growth Factors, Projections, and Control Strategies for the 15 Percent Rate-of-Progress Plans" (EPA-452/R-93-002), March 1993

The contingency plan for potential RFP failures is to include in the SIP an RFP plan that shows an 18 percent reduction in emissions by 2008. This is three percent above the required 15 percent reduction and consists of at least 0.3 percent reductions attributable to VOC. The additional three percent reduction above the requirement can be attributed to Tier 2 vehicle emission standards. Table 4-8 demonstrates that the Commonwealth can demonstrate more than 18 percent combined VOC and NOx reduction by 2008 for the Philadelphia Nonattainment Area and thus meets the RFP contingency plan requirement.

Emission Reductions from Control Measures

The following table identifies the categorical emission reductions due to control measures from 2002-2008. These emission reductions are net of growth from 2002 to 2008 because they are derived from subtracting the 2008 emissions projections with controls from the 2002 anthropogenic base year inventory. The Highway Sources category includes all expected emissions reductions, including those from measures that are not creditable under reasonable further progress. Each control measure is explained in greater detail in Section V. Control Strategies. The negative reductions for NOx from area sources indicate that emissions in this category will increase from 2002 to 2008. This increase occurs because the new control strategies that were implemented in this category affected VOC emissions only.

12 "Early Implementation of Contingency Measures for Ozone and Carbon Monoxide (CO) Nonattainment Areas," Memorandum from G.T. Helms, Chief, Ozone/Carbon Monoxide Programs Branch, August 13, 1993;

13 "Guidance on the Post '96 Rate-of-Progress Plan (RPP) and Attainment Demonstration" (Corrected version of February 18, 1994).

14 Preamble of the Phase 2 Implementation Rule (70 Fed. Reg. 71,696, November 29, 2005)

Table 4-11: Summary of Emission Reductions 2002-2008 from Control Measures

Control Strategies	VOC (tpd)	NOx (tpd)
Stationary Point Sources	0.65	2.50
NOx SIP Call		
Smaller Sources of NOx		
Hazardous Air Pollutant Regulations		
Stationary Area Sources	6.61	-0.86
Portable Fuel Containers		
Consumer Products		
AIM Coatings		
Highway Sources (including non creditable pre-1990 FMVCP reductions)	37.67	75.88
Federal Motor Vehicle Control Programs		
Pennsylvania Clean Vehicles Program		
Heavy-duty Diesel Control Programs		
Inspection/Maintenance Program		
Low Sulfur Gasoline		
Other Motor Vehicle Programs		
Non-road Sources	16.22	8.28
Federal Nonroad Regulations including Fuel Standards		
Total Expected Emission Reductions	61.15	85.80

E. Motor Vehicle Emission Budgets for Transportation Conformity

Section 176 of the CAA provides a mechanism by which federally funded or approved highway and transit plans, programs, and projects are determined not to produce new air quality violations, worsen existing violations, or delay timely attainment of national air quality standards. EPA regulations issued to implement transportation conformity provide that motor vehicle emission “budgets” establish caps of these emissions that cannot be exceeded by the predicted transportation system emissions in the future. Transportation agencies in Pennsylvania are responsible for making timely transportation conformity determinations. The responsible agency in the Pennsylvania portion of the Philadelphia Nonattainment Area is the Delaware Valley Regional Planning Commission, the designated Metropolitan Planning Organization (MPO) under federal transportation planning requirements.

Pennsylvania proposes to establish budgets for highway emissions in order to ensure that transportation emissions do not impede clean air goals in the next decade and beyond. The information in Table 2-3, once EPA approves it for purposes of conformity, will establish transportation conformity budgets for the Pennsylvania portion of the Philadelphia Area.

Table 4-12. Motor Vehicle Emission Budgets

2008	VOC	NOX
Tons/day	61.09	108.78
2009	VOC	NOX
Tons/day	58.71	101.60