

**Commonwealth of Pennsylvania  
Department of Environmental Protection**



**State Implementation Plan (SIP) Revision  
For the Philadelphia Ozone Nonattainment Area**

**Revised Highway Vehicle Emissions Budgets**

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## **What Is Ozone?**

Ozone levels above the health-based standard (National Ambient Air Quality Standards) are a serious human health threat, and also can cause damage to important food crops, forests, and wildlife. Ozone in the troposphere, also called ground-level ozone, should not be confused with stratospheric ozone – located in the upper atmosphere – which protects the earth by blocking out damaging solar radiation.

Ozone is not emitted directly to the atmosphere, but is formed by photochemical reactions between volatile organic compounds (VOCs) and oxides of nitrogen (NO<sub>x</sub>) in the presence of sunlight. The long, hot, humid days of summer are particularly conducive to ozone formation, so ozone levels are of general concern during the months of May through September.

The primary sources of man-made VOCs and NO<sub>x</sub>, the ozone precursors, are the evaporation of fuels and solvents (gasoline and consumer products), combustion of fuels (motor vehicles, power plants, and other industries), and chemical and industrial processes. The Philadelphia Metropolitan area still exceeds the one-hour health-based standard for ozone during the summer.

## **Why Are We Proposing This State Implementation Plan (SIP) Revision?**

Pennsylvania is responsible for developing revisions to the state implementation plan (SIP) for air quality for the five Pennsylvania counties of the Philadelphia interstate ozone nonattainment area -- Bucks, Chester, Delaware, Montgomery and Philadelphia counties. Pennsylvania submitted its required post-1996 rate-of-progress and attainment plans to the U.S. Environmental Protection Agency (EPA) in several documents from 1998 through 2001.

Sections 110 and 181 of the Clean Air Act Amendments (CAAA), 42 U.S.C §§ 7410 and 7511, require Pennsylvania to demonstrate that the area will attain the one-hour National Ambient Air Quality Standard for ozone by 2005. On October 26, 2001, the EPA approved Pennsylvania's One-Hour Ozone Attainment Demonstration for the Philadelphia area [66 FR 54143]. This approval included the EPA's requirement for Pennsylvania to revise the 2005 attainment year motor vehicle emissions budgets using the MOBILE6 vehicle highway emissions model within one year after the release of MOBILE6. If Pennsylvania were to fail to submit the revised budgets, EPA could make a finding of failure to implement the SIP, which could start a sanctions clock under section 179 of the Clean Air Act. 42 U.S.C. § 7509.

On January 29, 2002, EPA published the Notice of Availability of the MOBILE6 motor vehicle emissions factor model in the Federal Register [67 FR 4254]. That notice started the time periods for incorporating MOBILE6 into SIPs and conformity determinations. Pennsylvania has until January 29, 2003 to submit its revised budgets for the Philadelphia area using the MOBILE6 model. This submission serves to fulfill Pennsylvania's requirement to revise its existing motor vehicle emissions budgets using that model.

Section 176 (c) of the CAAA, 42 U.S.C. § 7506(c), 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 under section 176(c) of the CAAA to implement “transportation conformity” provide that motor vehicle emission “budgets” cannot be exceeded by emissions produced by the planned transportation system. The motor vehicle budget represents the highway-generated portion of Pennsylvania’s total emissions for an area from on-road mobile sources. Transportation agencies in Pennsylvania are responsible for making timely transportation conformity determinations. The Delaware Valley Regional Planning Commission holds that responsibility for the Philadelphia area. The Federal Highway Administration approves these determinations after EPA concurs.

A public comment period for this revision began on December 7, 2002 via an announcement in the *Pennsylvania Bulletin* with additional notice given through major newspapers in the Philadelphia region. A public hearing was convened on January 7, 2003 at 1:00 PM in the Hearing Room at the Department’s Southeast Regional Office in Conshohocken, PA. All public comment received by the Department for this revision is addressed in the Comment and Response document. The public comment period was closed at 4:00 PM on January 10, 2003.

### **Motor Vehicle Emission Budgets for Transportation Conformity**

The MOBILE6 model represents the most recent version of the MOBILE series of on-road vehicle highway emissions models. It calculates emissions factors for 28 individual vehicle types and estimates emissions depending on various conditions, such as ambient temperatures, travel speeds, operating modes, fuel volatility, and mileage accrual rates. Each new version of MOBILE reflects the collection and analysis of new test data. It also incorporates changes in vehicle, engine, and emission control system technologies; and improved understanding of in-use emissions levels and the factors that influence them. MOBILE6 incorporates updated information on basic emission rates, more realistic driving patterns, separation of starting and running emissions, improved correction factors, and changing fleet composition. It also includes impacts of new regulations promulgated since the release of the previous version of MOBILE (MOBILE5b).

In addition to the availability of MOBILE6, more recent vehicle fleet information has become available since the submission of Pennsylvania’s original motor vehicle emissions budgets. EPA guidance requires MOBILE model emissions estimates to be based on the latest planning assumptions. For this reason, Pennsylvania is using the following updated data inputs:

- Vehicle mixes based on 1999 PA Department of Transportation (PENNDOT) truck percentages and MOBILE6 defaults for 2005,
- Vehicle age distributions recalculated using MOBILE6 vehicle type definitions,
- Daily minimum/maximum temperatures and humidity,
- Growth rates,

- 1999 traffic data and information, including hourly patterns, seasonal adjustments and VMT (Vehicle Miles Traveled).

Following the initial publication of the proposed revision and the opening of the public comment period, DEP became aware that the modeling contained in the proposal did not account for changes in emissions resulting from Pennsylvania’s adoption of the federal National Low Emissions Vehicle (NLEV) program. The revised modeling and budgets are reflected in this revision and account for only minor changes from the originally proposed budgets.

Table 1 summarizes the 2005 vehicle highway emissions budgets for the Philadelphia Ozone Non-Attainment area:

**TABLE 1 – Proposed 2005 VOC and NOx Budgets with VMT**

<b>POLLUTANT</b>	<b>1990 Baseline (MOBILE5)</b>	<b>1990 Baseline (MOBILE6)</b>	<b>Existing 2005 Budget (MOBILE5)</b>	<b>Revised 2005 Budget (MOBILE6)</b>
VOC				
Kg/summer day	170,459	217,678	54,595	72,293
Tons/summer day	187.90	239.95	60.18	79.69
NOx				
Kg/summer day	143,634	229,453	70,272	131,296
Tons/summer day	158.33	252.93	77.46	144.73
VMT (Vehicle Miles Traveled)	64,602,389	64,608,006*	79,712,326	79,270,129

\* Small differences in the recalculated VMT result from rounding when individual link VMTs are accumulated.

The improvements in the MOBILE6 data, calculation methods, and the use of current fleet and highway network data have led to improved estimates of highway vehicle emissions. The updated MOBILE6 emissions estimates, and the subsequent proposed budgets, are different from the emissions that were estimated for the previous budgets calculated with MOBILE5.

There are a number of reasons why MOBILE5 and MOBILE6 emission estimates differ. Depending on the year modeled, some changes drive the estimates down; others drive the estimates up. There is a tendency for MOBILE6 emission estimates to be higher in early years and lower in later years. Many of these effects are explained in detail in Appendix A, “An Explanation of Methodology”, pages 1 through 3. Minor differences between 2005 VMT estimations are due to the use of the latest growth rate assumptions provided by PENNDOT.

The following information is available in the Appendices to document calculation of the highway vehicle emissions inventories and the transportation conformity budgets:

**Appendix A - Discussion of MOBILE6 and its Effect on Pennsylvania’s Attainment Demonstration for the Philadelphia Ozone Severe Nonattainment Area**

**Appendix B** - An Explanation of Methodology – MOBILE6

**Appendix C** - Summary of VMT, VOC and NOx Inventories and Forecasts by County

**Appendix D** – MOBILE6 Modeling parameters

**Appendix E** - VMT, VOC, CO and NOx Inventory and Forecast; Emissions by County by  
Functional Class

**Appendix F** - VMT, VOC, CO and NOx inventory and forecast; Emissions by County by Vehicle  
Type

**Appendix G** - MOBILE6 Input Files for 1990 Baseline and 2005 Scenario