COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF ENVIRONMENTAL PROTECTION

STATE IMPLEMENTATION PLAN REVISION

THE 15 PERCENT RATE OF PROGRESS PLAN FOR THE PHILADELPHIA SEVERE NONATTAINMENT AREA

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1. EXECUTIVE SUMMARY

High ground-level ozone levels pose a significant health threat. Volatile organic compounds (VOCs) react in the atmosphere with sunlight and other photochemically reactive compounds to produce ozone. The sources of VOCs include biogenic (natural) sources, such as trees and crops, and sources from human activities, such as industries, automobiles and lawn mowers.

The Clean Air Act Amendments of 1990 (CAAA)[1] require states to design strategies to reduce ozone and its precursors in order to meet the federal health-based ozone standard. All areas of the country classified as moderate or above for ozone nonattainment must submit to the U.S. Environmental Protection Agency (EPA) a revision to the State Implementation Plan (SIP) demonstrating how emissions of Volatile Organic Compounds (VOCs) will be reduced by 15 percent from 1990 to 1996. Areas that failed to submit or carry out an approvable plan are subject to economic sanctions.

This plan is being submitted to update the 1990 baseline inventory as well as to update emission reduction estimates from control measures, including a decentralized vehicle emission inspection/maintenance program. This SIP amendment focuses on Pennsylvania's plan to reduce VOC emissions in the five county Philadelphia ozone nonattainment area by 15% from 1990 levels as adjusted in compliance with the federal Clean Air Act. This 15% reduction may not include reductions from control measures that were in place, or should have been in place, before November 15, 1990. The plan must also offset emissions growth that occurs between 1990 and 1996. Growth has been projected according to EPA guidance. The plan must also include contingency measures equivalent to an additional 3% reduction. The contingency measures must be implemented if the full 15% reduction is not achieved.

A reduction of 124 tons per summer day (tspd) from projected 1996 emissions is required to meet the 15% reduction requirement and to offset growth. State, local and federal control measures have been adopted or are pending which will lead to VOC emission reductions of 135 tpsd from the following strategies:

- decentralized vehicle emissions test and repair program
- federal reformulated gasoline
- Stage II vapor recovery at gas stations
- turnover in vehicle fleet from more stringent federal new car standards

- federal rules for waste facilities, paints and coatings, consumer products and autobody refinishing
- source and process shutdowns

ESTABLISHING THE BASELINE: 1990 EMISSION LEVELS

A total of 616 tpsd of VOCs were emitted by human-made sources in 1990. The sources from which these emissions come are shown in Figure 1.1. Point sources include the larger industrial and utility sources. Area sources include smaller commercial and consumer emitters. The nonroad category includes farm, recreational and other construction vehicles. The highway vehicle category includes automobiles, trucks and motorcycles. The Act requires adjustment of the 1990 baseline; it is from this adjusted level that the 15% reduction must be calculated.

ESTABLISHING THE TARGET: 1996 REQUIRED LEVEL

The 1996 target level is 15% of the 1990 adjusted level or 494 tons.

Table 1.1 Summary of Target Level Calculation

Category	tpsd
1990 Baseline	615.56
1990 Adjusted Baseline	582.53
Less Required 15% Reduction	87.38
Less RACT fix-ups	0.84
1996 Target Level	494.31

The emission increases projected from economic growth between 1990 and 1996 must also be offset. To project increases in emissions due to growth in the activities that cause those emissions, DEP used growth factors derived from projections developed by the US Department of Commerce Bureau of Economic Analysis (BEA), and, in the case of motor vehicles, from the Pennsylvania Department of Transportation's predictions of Vehicle Miles Traveled (VMT), in accordance with EPA guidance.

Table 1.2 Calculation of 1996 Projected Uncontrolled Inventory

Category	tpsd
1990 Baseline	615.56
Emissions Growth 1990 to 1996	2.39
1996 Projected Uncontrolled Inventory	617.95

Uncontrolled emissions actually increase by about 12% (about 35 tons) by 1996, primarily due to a growth in highway vehicles. However, emissions reductions due to pre-1990 regulations cannot be claimed as a control measure. Therefore, the growth shown above is actually projected growth less the actual reductions from pre-1990 federal rules for motor vehicles and fuels.

A reduction in VOC emissions of 124 tpsd from 1990 levels will be necessary to meet the CAAA requirements. Contingency measures are also required.

Table 1.3 Required Reductions

Category	tpsd
1996 Projected Uncontrolled Inventory	617.95
1996 Target Level	494.31
Total Reduction Needed	123.64
Contingency Measure Reduction Needed	17.48

MEETING THE TARGET: REDUCTIONS ACHIEVED

State, local and federal control measures which have been adopted or are pending will lead to emission reductions of 135 tpsd in 1996. About 61% of these reductions are from highway vehicles, 3% from stationary sources and 36% from area and nonroad sources. Figure 1.2 depicts the reductions by strategy as a percent of the total reductions. Figure 1.3 shows the resulting 1996 inventory by source category.

Contingency measure requirements will be met through additional rule effectiveness for stationary sources and the conversion of highway marking paint to water-based formulation.

Figure 1.1 1990 Baseline VOC Emissions

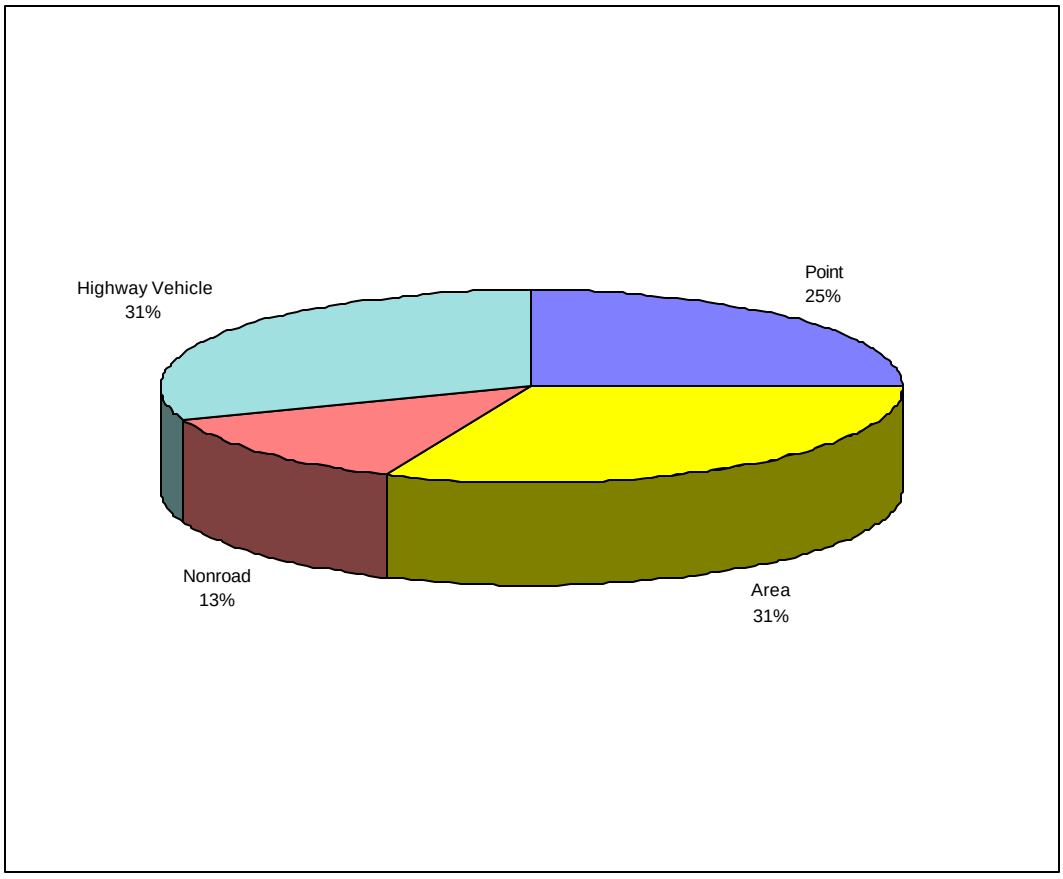


Figure 1.2 Expected Reductions By Control Strategy

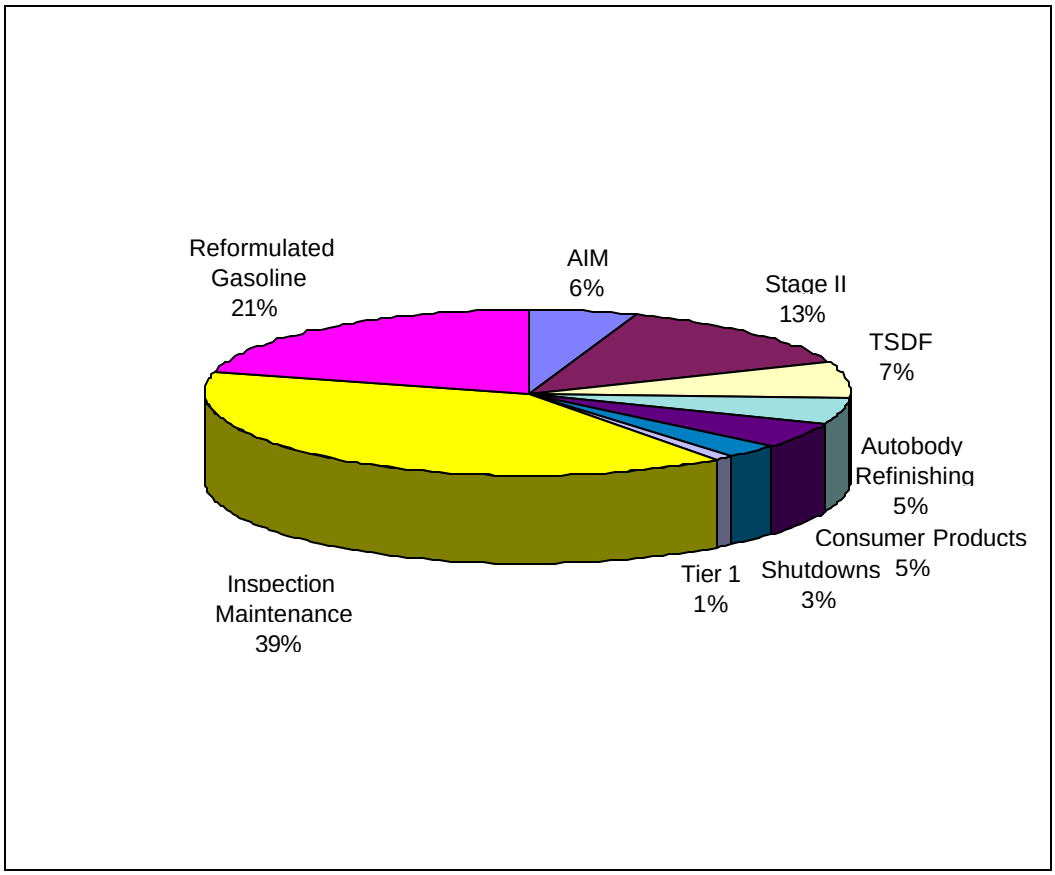
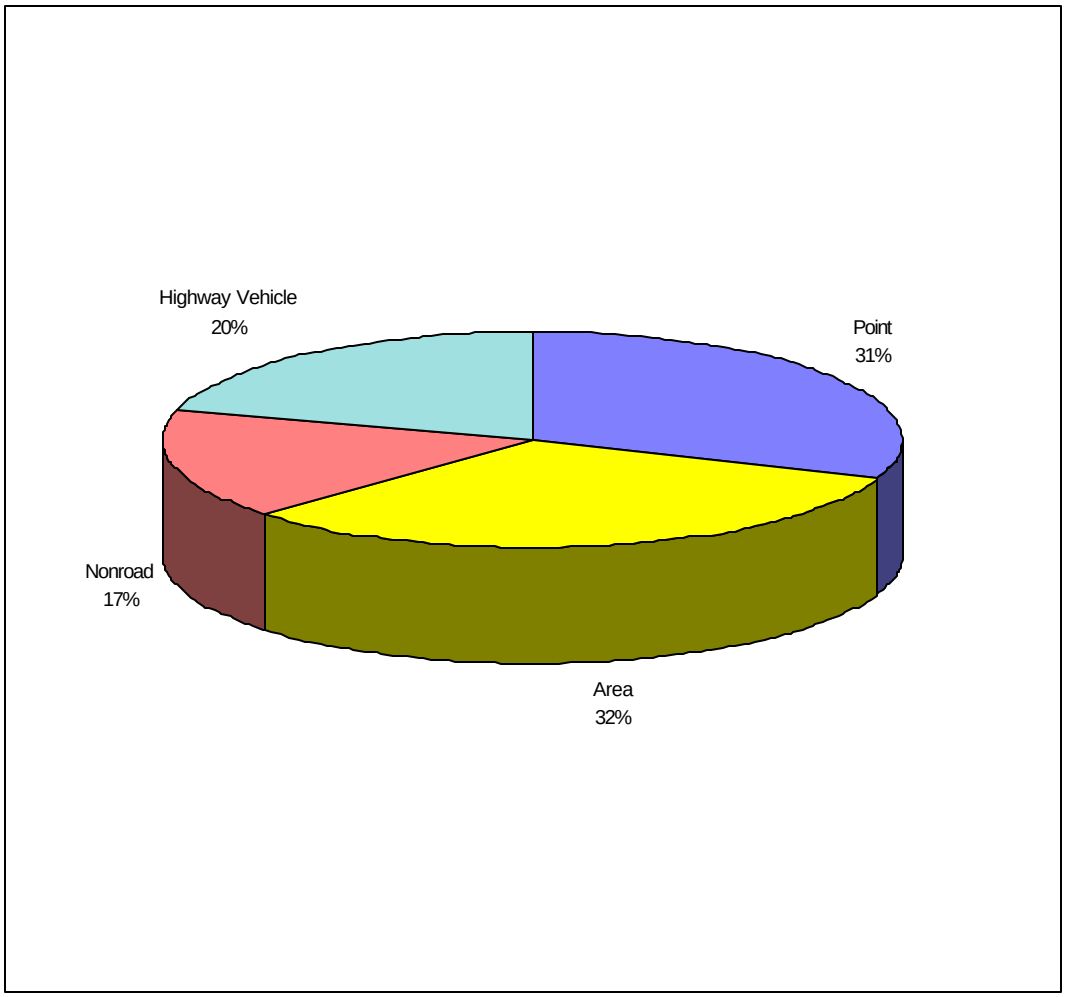


Figure 1.3 1996 Inventory - After Reductions



2. INTRODUCTION

2.1 THE OZONE PROBLEM

The Clean Air Act required the federal Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) for a number of air pollutants including ozone. The CAAA resulted in the classification of areas that had not yet attained the ozone standard, depending on the severity of the pollution (See Table 2.1). More polluted areas have more time to attain standards. However, the more polluted the area, the more measures are specifically mandated in the CAAA for implementation. Currently, the most serious air quality health problem in urban areas is caused by ozone - the principal component of "smog."

Table 2.1 Ozone Classification Chart

Ozone Classifications		
Area Classification	Design Value ppm	Attainment Date
Marginal	0.121 up to 0.138	1993
Moderate	0.138 up to 0.160	1996
Serious	0.160 up to 0.180	1999
Severe	0.180 up to 0.190	2005
	0.190 up to 0.280	2007
Extreme	0.280 and Above	2010

Controlling ozone pollution is difficult because ozone is not emitted directly into the air. It is formed under certain meteorological conditions by a photochemical reaction that involves VOCs, NOx and CO. This plan focuses on reduction of Volatile Organic Compound (VOC) emissions to decrease the amount available for the formation of ozone.

Health problems are associated with “ground level” ozone exceedances. Ozone in the upper atmosphere, which aids in protecting us from harmful solar radiation, is not affected by our efforts to reduce ozone in the air we breathe.

Despite intense efforts on the part of the states and the EPA to control the anthropogenic (human-made) portion of the VOC emissions, many areas remain in violation of the NAAQS for ozone. In fact, extensive efforts for control of ozone have, on three occasions, failed to meet legislative deadlines, first in 1975, then in 1982 and, for some areas, in 1987. In 1988, 101 areas were still in violation. In November 1990, in an effort to solve the ozone problem, Congress mandated changes to our strategies in the form of the Clean Air Act Amendments (CAAA) of 1990.

3. 1990 BASE YEAR INVENTORY

3.1 BACKGROUND

42 U.S.C.A. §7511a(a)(1) requires states containing ozone nonattainment areas to develop a "comprehensive, accurate and current inventory of actual emissions from all sources." The EPA has interpreted "current" to mean an inventory for calendar year 1990. The submittal of a 1990 Base Year Emission Inventory was required in the November 15, 1992, set of SIP revisions. However, in September 1992, the EPA concluded that the 1990 Base Year Emission Inventory must be subject to a public hearing process. Given the late decision, the EPA allowed the states until November 15, 1993, to complete the public hearing process and formally submit the 1990 Base Year Inventory as a SIP revision. The public hearings on the 1990 Base Year Emission Inventory, the 1990 Adjusted Inventory and the 1996 Projected inventory were held August 30, 31, and September 1, 1993. The public hearing for the 15% Rate of Progress (ROP) plan was held on December 22, 1993. The public hearing for this revision to the 15% ROP Plan was held on July 22, 1996.

The inventories consist of emissions that occur during the peak ozone season, i.e., when outdoor air concentrations of ozone tend to be higher than the rest of the year. Pennsylvania's peak ozone season occurs during the months of June, July and August. Unless otherwise specified, any daily emissions given refer to a "typical" summer weekday, and are given in tons per summer day (tpsd).

3.2 GEOGRAPHY

Most of the Commonwealth's major urban areas have been designated as nonattainment areas for ozone. Figure 3.1 shows these areas. The Philadelphia nonattainment area is classified as severe ozone nonattainment. The Pennsylvania portion of the Philadelphia Consolidated Metropolitan Statistical Area (CMSA) includes the counties of Bucks, Chester, Delaware, Montgomery and Philadelphia.

The Philadelphia CMSA is a multi-state area covering parts of New Jersey, Delaware and Maryland. This plan refers only to the five county Pennsylvania portion of the Philadelphia CMSA unless other counties are specified.

Figure 3.1 Nonattainment Area Map

3.3 SOURCE TYPES

The 1990 Base Year Inventory is a compilation of the emissions from sources of anthropogenic (human-made) VOC, biogenic (natural) VOC, sources of anthropogenic oxides of nitrogen (NOx) and carbon monoxide (CO) into the outdoor air. The sources are categorized into five components:

- Point sources
- Area sources
- Nonroad engine sources
- Highway vehicle sources
- Biogenic sources

3.3.1 POINT SOURCES

This section documents the development of the Pennsylvania stationary point source list and characterizes the point source component of the emission inventory by describing data collection, verification and emission estimation techniques. For purposes of this emission inventory, point sources are defined as stationary, commercial or industrial operations that emit more than ten tons per year VOC or 100 or more tons of NOx or CO per year. The point source inventory consists of actual emissions for the base year 1990 for the 5 county Philadelphia Area.

The Pennsylvania Department of Environmental Protection was the agency responsible for compiling the point source inventory. It was responsible for identifying point sources meeting the cutoff criteria, documenting the method used to calculate emissions from each source and summarizing and presenting its findings. Philadelphia Air Management Services compiled the point source inventory for Philadelphia County with the results summarized herein.

The remainder of this point source section details the point source data collection techniques, the emission estimation procedures and provides more detailed tables of emission estimates.

3.3.1.1 COMPILING THE POINT SOURCE LIST

The data for the 1990 VOC, NOx and CO Point Source Emission Inventories was derived from the Pennsylvania Emissions Data System, PEDS. PEDS is the database from which the National Emissions Data System was compiled. PEDS sources are identified and inventoried by Pennsylvania regional air quality offices through permitting operations, and regional / central office field inspections and surveys. The PEDS system is designed to include all point source emissions categories for 10 ton per year emitters of VOC and 100 ton or greater emitters of CO and NOx. Smaller point source emitters are reported in PEDS but to a less inclusive degree. Nonreactive compounds have been excluded from the inventory.

Smaller VOC emitters were discovered using EPA-450/4-91-016 Standard Industrial Classification (SIC) code procedures, the Toxic Release Inventory (TRI) data and through the efforts of field personnel. Potential 10 ton per year or greater emitters were investigated by field personnel and were entered into the PEDS database and are included in the baseline inventory where applicable.

3.3.1.2 *THE EMISSIONS ESTIMATION PROCEDURE*

Emission estimates for each point source on the final list were derived using SCC emission factors in most cases. The automatic features of the PEDS database which duplicate the automatic features of the Airs Facility Subsystem were used where possible. Material balance, AP-42 equations and stack test results were used in addition to SCC emission factor estimates. Rule effectiveness and seasonal adjustments were included in the emission estimates for applicable source categories where company operating schedule data were available to warrant such adjustments or where VOC, a SIP rule and a control device were involved. Operating schedule and seasonal temperature adjustments were used with refinery tank emissions and bulk gasoline storage facility emissions. Adjustments were also made where a company requested that they be done after reviewing the daily emission data in its final draft form. All companies listed as part of the baseline inventory received a copy of the detailed final draft inventory for their review and comment. All company comments were reviewed and requested daily emission changes were made where operating schedule data or seasonal temperature considerations were valid. Requests for seasonal adjustments are documented in the comment/response section of this inventory.

The following equations represent the calculations which were performed on every source that was downloaded from the PEDS database. These equations use only

the potential and actual emissions, the annual throughput and days per year of operation obtained from the PEDS database:

$$LBSpu = \frac{POT \times 2000}{ANNtp}$$

$$RATEpd = \frac{ANNtp}{DPY}$$

$$EFF = \frac{POT - ACT}{POT}$$

$$O_3Day = (RATEpd \times LBSpu) \times (1 - (RE \times EFF))$$

Where:

EFF = Control Efficiency
POT = Potential Emissions (tons)
ACT = Actual Emissions (tons)
LBSpu = Emissions per Unit of Throughput (pounds)
ANNtp = Annual Throughput
RATEpd = Daily Throughput (pounds)
O_3Day = Ozone Season Daily Emissions (pounds)
DPY = Days per Year of Operation
RE = Rule Effectiveness (Applied only when "add-on" controls are used to achieve compliance.)

Sample Calculation:

POT =100tpy VOC
ACT=10tpy VOC
ANNtp=2000
DPY=250
RE=0.80 (*SIP regulation and control device involved, else RE = 1.0*)

$$LBSpu = \frac{100tpy \times 2000 \, lbs/ton}{2000units} = 100 \, lbs/unit$$

$$RATEpd = \frac{2000units}{250dpy} = 8.0 \, units/day$$

$$O_3 Day = (100 \, lbs/unit \times 8.0 \, units/day) \times (1.0 - (.90 \times .80)) = 224.0 \, lbs/day$$

Each company listed in this inventory was mailed a copy of their inventory and calculation results along with instructions to verify or correct the data and notify this office of required changes. The data were mailed in conjunction with public announcements and public hearings in accordance with SIP procedures. The results of the above equations have been altered in response to a company's request for change where the company was able to produce evidence of more appropriate ozone season operating schedule or throughput data.

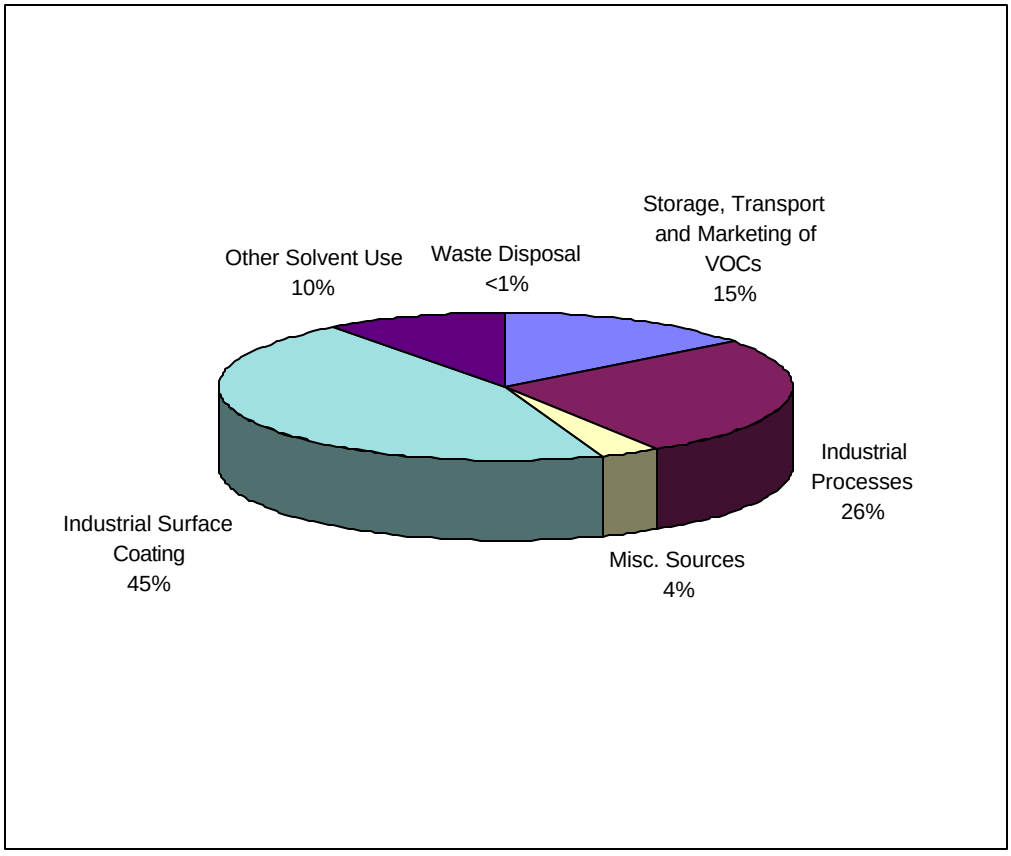
3.3.1.3 *RESULTS*

Figure 3.2 is a summary of point source VOC emissions by major emissions categories. Emissions are depicted as a percent of the total point source inventory and have been adjusted for seasonal variability and rule effectiveness. The six major emissions categories reported are in accordance with EPA reporting requirements. The total point source emissions, by county, are listed in Table 3.1.

Table 3.1 Summary of 1990 Point Source Emissions

Category	Bucks	Chester	Delaware	Montgomery	Philadelphia	Total
Storage, Transport and Marketing	0.02	0.33	14.59	0.67	6.72	22.33
Industrial Processes	1.32	1.26	16.53	3.54	17.72	40.36
Industrial Surface Coating	18.69	6.12	32.95	1.74	9.70	69.20
Other Solvent Use	1.54	7.76	2.99	1.73	1.46	15.49
Waste Disposal	0.00	0.00	0.02	0.00	0.00	0.02
Misc. Sources	0.42	1.01	1.52	0.10	2.29	5.35
TOTAL:	22.00	16.48	68.60	7.78	37.89	152.75

Figure 3.2 - Point Source Pie Chart



3.3.2 AREA SOURCES

The area source inventory enables the Bureau of Air Quality (BAQ) to estimate emissions collectively for those sources that are too small or too numerous to be handled individually in the point source inventory. Considerable attention was given to the area source inventory, as significant quantities of volatile organic compound emissions will generally be associated with the area source categories. Historically, emissions from area sources have been underestimated because of the lack of appropriate inventory procedures or little emphasis on obtaining area source data.

3.3.2.1 *METHODS FOR ESTIMATING AREA SOURCE ACTIVITY LEVELS & EMISSIONS*

Area source emissions are typically estimated by multiplying an emission factor by some known indicator or collective activity for each area source category at the county or equivalent level. Several methodologies were available for estimating area source activity levels and emissions. Estimates were derived by (1) treating area sources as point sources, (2) surveying local activity levels, (3) apportioning national or statewide activity levels to local inventory areas, (4) using per capita emission factors and (5) using emission per employee factors. Each approach has distinct advantages and disadvantages when used in the emission estimates, as discussed below.

Small sources that would normally be treated as area sources may be handled as point for several reasons. First, collective activity levels estimates may not be readily determinable for certain source categories. Bulk plants are an example of this. According to the Control Technique Guideline summary Appendix C, a typical gasoline bulk plant emits only 17 tons of VOC per year. This emission rate would normally be below the BAQ's point source cutoff level. However, because the area source procedures used for determining gasoline sales in an area will probably not yield an estimate of the amount of gasoline transferred through bulk plants, the BAQ needed to elicit this information from each plant by using point source procedures.

In some instances, collective activity level estimates for a given category were available from a local source. For example, the Pennsylvania Department of Transportation (PennDOT) has data on the amount and types of paints used for traffic line painting in the inventoried area. Tax, highway, energy, and other state and local agency records were used to provide collective activity level estimates for other area source categories, such as gasoline sales.

If county wide activity level information was not available locally, state totals were apportioned to compute local estimates. For example, the quantity of highway gasoline used in the Commonwealth was apportioned to the county level on the basis of vehicle miles traveled per county. Residential, commercial, and industrial fuel combustion were other categories that were handled in this manner. The major drawbacks of this approach were that additional data and resources are needed to apportion activity levels to the local level, and accuracy is lost in the process. If state level data were not available, then national data were apportioned to the local inventory area.

Sources in certain area source categories were not only numerous and diffuse, but were too difficult to inventory by any of the above procedures. As an example, solvent evaporation from consumer and commercial products such as waxes, aerosol products and window cleaners cannot be routinely determined by DEP. In addition, it would probably be impossible to develop a survey that would yield such information. The use of per capita emission factors is based on the assumption that, in a given area, emissions can be reasonably associated with population. This assumption is valid over broad areas for certain activities such as architectural surface coating, and selected solvent use categories, such as solvent evaporation from household and commercial products.

Many industrial and commercial sources had emissions estimated by using a per employee factor. This approach is conceptually equivalent to using per capita factors, except that employment was used as a surrogate activity level indicator rather than population. Emissions per employee factors are usually used to estimate emissions for those source categories for which a Standard Industrial Classification Code (SIC) has been assigned and employment data (typically by SIC) at the local level was available.

3.3.2.2 *APPLICATION OF RULE EFFECTIVENESS (RE)*

In previous inventories, it was assumed that regulations would be implemented with full effectiveness, achieving all of the intended emission reductions and maintaining that over time. However, experience has shown that regulatory programs are less than 100 percent effective for most source categories. The concept of applying RE in the inventory has evolved from this observation. In short, RE reflects the ability of a regulatory program to achieve all emission reductions that could be achieved by full compliance with the applicable regulation.

EPA chose an 80 percent factor as a representative estimate of the average effectiveness value for the base year inventory after surveying selected state and local personnel on the perceived effectiveness of their regulatory programs.

The RE factor should be applied to the estimated control efficiency in the calculation of emissions from a source. The formula for this application is given below:

$$Emissions = UCE \times (1 - (CExRE))$$

where:

UCE = Uncontrolled emissions
CE = Control Efficiency
RE = Rule Effectiveness

Note: There is a sample Rule Effectiveness calculation in section 7.1.1

3.3.2.3 APPLICATION OF RULE PENETRATION (RP)

In addition to RE, another important regulatory consideration is to what extent a regulation may affect emissions from a source category. Typically smaller sources in a category may not be covered by a regulation. For example, surface coating regulations do not cover sources less than 15 pounds of volatile organic compounds per day. When estimating emissions using area source methodologies for source categories where a rule or regulation applies, EPA suggests the incorporation of an estimate of RP using the following formula:

$$RP = \frac{UNC}{POT} \times 100$$

where:
UNC = Uncontrolled emissions covered by the regulation
POT = Potential emissions

After controlled emissions and RP are determined, RE should be applied as discussed above. An example of the formula showing how to incorporate both RP and RE in the same source category is given below:

$$EMIS = POT \times (1 - RPxRE \times CE)$$

where:
EMIS = Actual Emissions
POT = Potential Emissions
RP = Rule Penetration
RE = Rule Effectiveness
CE = Control Efficiency

The use of rule effectiveness and rule penetration can substantially increase emission estimates where high control efficiencies are involved.

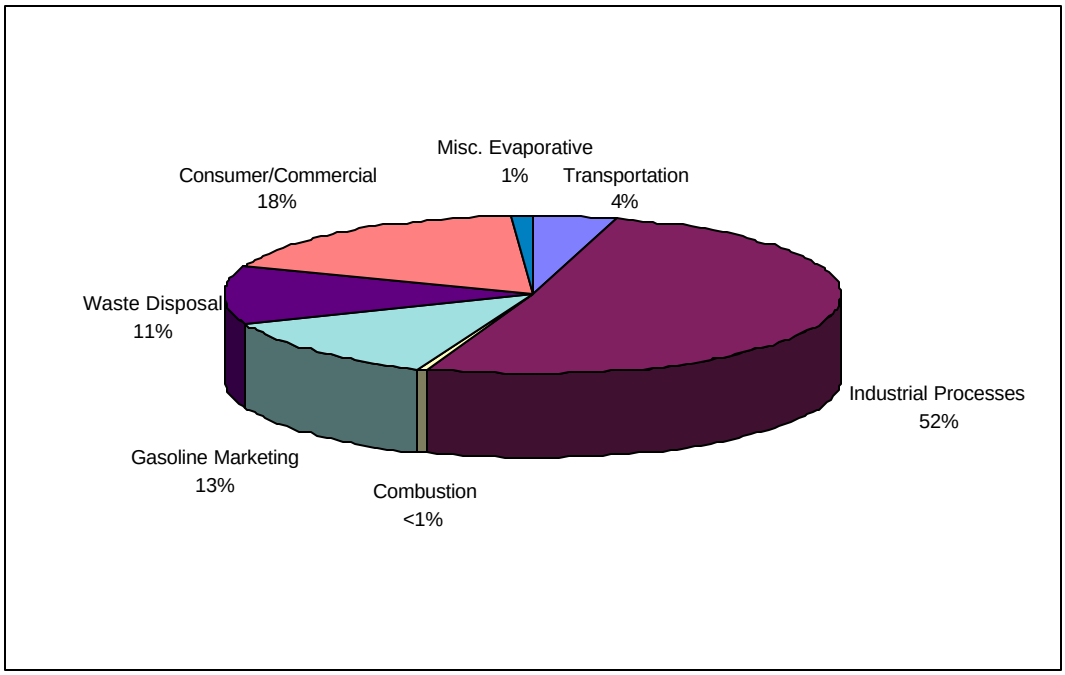
3.3.2.4 *RESULTS*

The EPA approved methodology used to calculate each source category is included in Appendix III. These calculations result in area source emissions of 194 tons per summer day. Figure 3.3 depicts the inventory by category and Table 3.2 summarizes the results.

Table 3.2 Summary of 1990 Area Source Emissions

Category	Bucks	Chester	Delaware	Montgomery	Philadelphia	Total
Transportation	0.23	0.08	5.04	1.38	1.65	8.38
Industrial Processes	16.60	9.35	12.29	26.15	35.27	99.65
Combustion	0.11	0.07	0.14	0.18	0.43	0.93
Gasoline Marketing	5.09	4.03	3.29	6.68	6.54	25.62
Waste Disposal	0.86	1.61	1.05	9.29	9.22	22.02
Consumer/ Commercial	5.31	4.19	5.03	6.43	14.50	35.45
Misc. Evaporative	0.33	0.24	0.34	0.42	0.98	2.31
TOTAL:	28.53	19.56	27.18	50.51	68.58	194.35

Figure 3.3 Area Source Pie Chart



3.3.3 NONROAD ENGINE INVENTORY

3.3.3.1 *INTRODUCTION*

The "Other Non-road Engines and Vehicles" category includes a diverse collection of equipment such as lawn mowers, chain saws, recreational equipment, farm equipment and construction machinery. A study was conducted by the EPA in November 1991 of emissions from non-road engines and vehicles[2]. The study determined whether emissions from such sources cause, or significantly contribute to air pollution that may be anticipated to endanger public health or welfare.

3.3.3.2 *METHODS*

As part of the above study, EPA considered more than 80 different types of equipment. To simplify analysis and reporting, EPA grouped the equipment types into the 10 equipment categories listed below:

- Lawn and Garden Equipment
- Agricultural Equipment
- Logging Equipment
- Light Commercial Equipment
- Industrial Equipment
- Construction Equipment
- Airport Service Equipment
- Recreational Equipment
- Recreational Marine Equipment
- Commercial Marine Vessels.

Two emission inventories were developed for the first nine categories for 24 ozone and CO nonattainment areas across the country.

The EPA then contracted with Energy and Environmental Analysis, Inc., (EEA) to update the non-road equipment and vehicle emission inventories based on the 1991 EPA-designated nonattainment boundaries for CO and ozone exceedance areas. These areas include the original 24 areas from the original non-road study and an additional nine areas. The 33 nonattainment areas all have had an inventory, designated as "Inventory A," prepared for them, based on commercially and publicly available data. Besides Inventory A, the original 24 areas have been provided with two more inventories. The second inventory, designated as "Inventory B," is based on confidential, industry-supplied sales and other data that are not publicly available. The second inventory provided EPA with a cross-check for the first inventory, and the

results agreed reasonably well. Since the DEP was not able to review the confidential data used to generate Inventory B, only Inventory A was used.

The following is a brief description of the procedures that were followed by the EEA in preparing the non-road emissions data that are being used for this inventory.

To construct the EPA non-road inventory, several factors were estimated: (1) equipment populations in the given nonattainment area; (2) annual hours of use of each type of equipment, adjusted for geographic region and for the season of interest for each pollutant studied; (3) average rated horsepower of each type of equipment; (4) typical load factor for each type of equipment; and (5) an emission factor for each of the 79 categories of equipment. In developing emissions inventories for non-road engines and vehicles, the EPA used the following formula to calculate emissions for most of the 79 non-road categories:

$$M_i = N \times HRS \times HP \times LF \times EF_i$$

where:

M_i = mass of emissions of i^{th} pollutant during inventory period
N = source population
HRS = annual hours of use
HP = average rated horsepower
LF = typical load factor
EF_i = average emissions of i^{th} pollutant per unit of use (e.g., emission factor grams per horsepower-hour)

The product of the annual hours of use, the average rated horsepower, and the load factor is referred to as the per-source usage rate. The product of the equipment population and the per-source usage rate is called the activity level and is estimated in units of horsepower-hours. By multiplying the seasonally adjusted activity levels by the appropriate emission factor, emission estimates for an ozone season day were developed for each category of non-road equipment and vehicles in the EPA-prepared inventories.

As outlined in an April 27, 1992, memorandum[3] from EPA to all EPA Regional Offices, the first option for States developing non-road engine and vehicle emission inventories is to simply use the inventory prepared by EPA for the particular nonattainment area for which an inventory is being developed. This option was selected for the counties in the Philadelphia CMSA. The ozone precursor emission estimates for

the ozone season for the Philadelphia CMSA ozone nonattainment counties were taken directly from the EPA-supplied Inventory A for the Philadelphia CMSA.

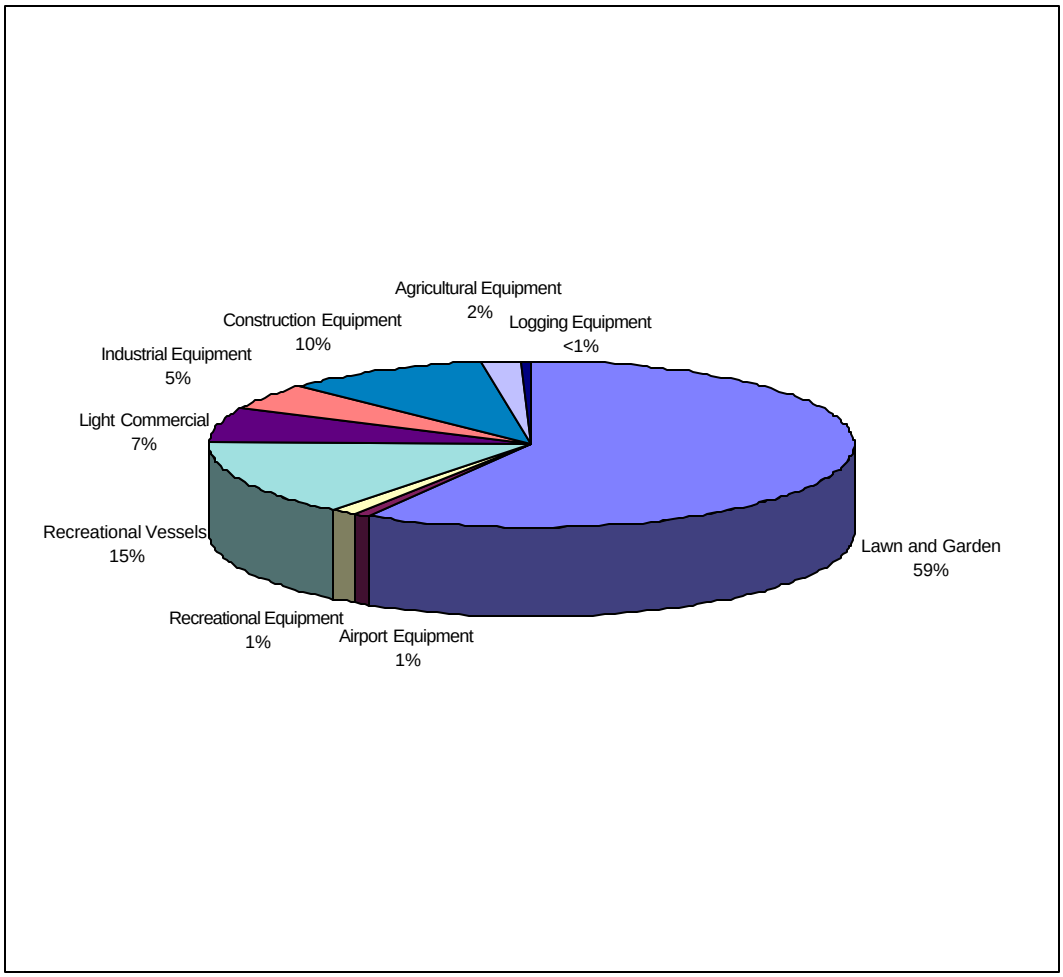
3.3.3.3 *RESULTS*

The Philadelphia ozone nonattainment modeling domain emission estimate of 81 tons per day was drawn from the spreadsheets, prepared by the EPA's Office of Mobile Sources, for the Philadelphia CMSA. Figure 3.4 depicts the emissions calculated by engine type. Table 3.3 presents a breakdown by county and the total emissions.

Table 3.3 Summary of 1990 Nonroad Engine Source Emissions

Category	Bucks	Chester	Delaware	Montgomery	Philadelphia	Total
Lawn and Garden	8.14	6.44	6.57	11.65	14.10	46.90
Airport Equipment	0.00	0.00	0.00	0.00	0.85	0.85
Recreational Equipment	0.43	0.54	0.00	0.00	0.00	0.97
Recreational Vessels	3.09	3.97	1.11	2.36	1.39	11.91
Light Commercial Equipment	0.90	0.71	0.69	1.65	1.62	5.57
Industrial Equipment	0.65	0.43	0.50	1.23	1.24	4.05
Construction Equipment	1.38	1.04	1.21	2.49	2.26	8.38
Agricultural Equipment	0.50	0.74	0.02	0.32	0.00	1.58
Logging Equipment	0.09	0.11	0.03	0.11	0.01	0.35
TOTAL:	15.18	13.98	10.13	19.81	21.47	80.56

Figure 3.4 1990 Nonroad Engine Source Emissions by Engine Type



3.3.4 HIGHWAY VEHICLE SOURCES

3.3.4.1 *INTRODUCTION*

Highway vehicle emissions contribute a significant portion to Pennsylvania's emission inventory. This impact is due to both tailpipe and evaporative emissions from the traffic volumes experienced in both urban and surrounding areas. The Department of Environmental Protection has coordinated with the Pennsylvania Department of Transportation (PennDOT) to develop the necessary data to produce highway vehicle emission estimates.

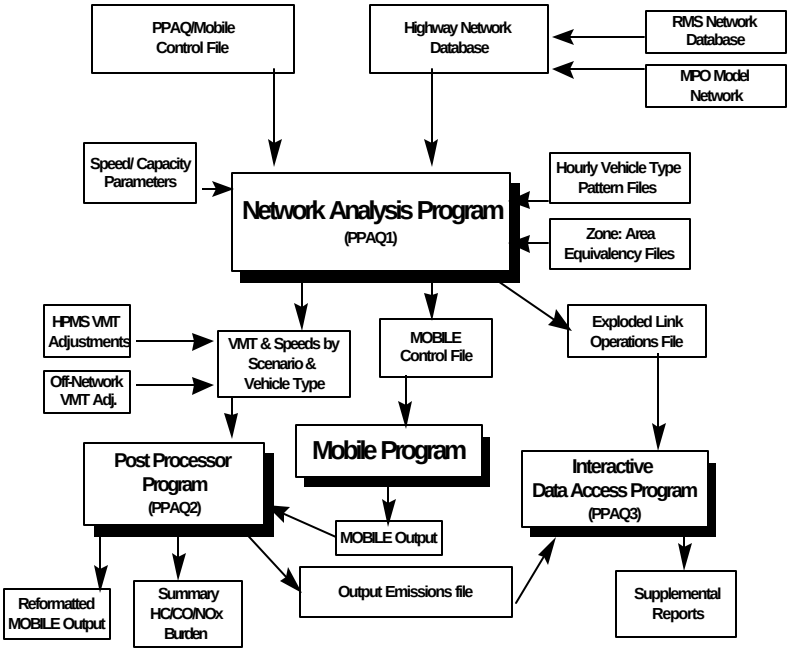
Pennsylvania's emission inventory includes the following vehicle classifications:

1. LDGV - Light-Duty Gasoline Vehicles
2. LDGT1 - Light-Duty Gasoline Trucks (<6,500 lbs)
3. LDGT2 - Light-Duty Gasoline Trucks (<8,500 lbs)
4. HDGV - Heavy-Duty Gasoline Vehicles (>8,500 lbs)
5. LDDV - Light-Duty Diesel Vehicles
6. LDDT - Light-Duty Diesel Trucks (<8,500 lbs)
7. HDDV - Heavy-Duty Diesel Vehicles (>8,500 lbs)
8. MC - Motorcycles

The inventory illustrates the individual county's emissions for each of the three pollutants. The data and methods presented in the inventory represent the Commonwealth's approach based on US EPA guidance[4].

The Mobile 5a version H Model was used for calculating emissions factors. It was supported by the Post Processor for Air Quality (PPAQ). PPAQ is a set of programs which analyzes network operating conditions, calculates highway segment speeds, compiles vehicle miles of travel (VMT) and vehicle type mix data, prepares mobile runs and calculates emissions quantities from the emission rates and VMT. The PPAQ Mobile System Layout is provided in Figure 3.5. PPAQ/Mobile System functions and input parameters are detailed in Appendix III.

Figure 3.5 The PPAQ/Mobile5a System Layout



3.3.5 VMT ESTIMATION PROCEDURE

The Vehicle Miles Traveled (VMT) and speed data supplied by PENNDOT was compiled from the Highway Performance Monitoring System (HPMS). The data are classified into the following areas:

1. Urbanized
2. Small Urban
3. Rural

Each area is defined into functional road classifications:

1. Interstate
2. Other Freeways & Expressways (Urban & Small Urban)
3. Principle Arterials
4. Minor Arterials
5. Major Collectors
6. Minor Collectors
7. Local Roads

3.3.5.1 *SOURCE OF VMT*

The Roadway Management System (RMS) is maintained by PennDOT's Bureau of Transportation System Performance (BTPS). It contains each state highway segment including the Pennsylvania Turnpike, current traffic counts, truck percentages, and a variety of physical attributes of the segment. These data were extracted from RMS and compiled into a database for emissions calculation purposes.

Factors were calculated which adjust the 1990 RMS VMT to be consistent with HPMS totals, by county, area (Urban, Small-urban or Rural (USR)), and functional class. Adjustments for the "higher" functional classes were very close to 1.00, since HPMS VMT is derived from RMS. "Lower" classes (i.e. local roads) required greater adjustment, since a large part of the local system is not under state jurisdiction and is not in the RMS database. The state highway system does, however, contain a significant amount of local mileage; it was assumed that these local streets are

representative of the local streets in their area with respect to volume and speed, so that a roadway mileage adjustment was appropriate.

Seasonal and daily adjustment factors have been developed by BTSP for traffic pattern regions and functional classes. These were applied to the 1990 average annual daily traffic (AADT) volumes to produce July 1990, average weekday traffic (AWDT) volumes on each segment. This adjusted volume then was the basis for the inventory and forecast runs.

3.3.5.2 *AGGREGATION SCHEME*

While highway volumes, vehicle mixes, and speeds are calculated on the basis of individual highway segment and hour, these data are far too disaggregate to apply directly to Mobile 5a version H. Instead, VMT and Vehicle Hours of Travel (VHT) are accumulated by larger geographic areas, highway functional class and time period. Geographic aggregation was performed by USR areas of each county. Functional class aggregation was according to PennDOT's 18 standard functional classes, respecting urban, small urban, and rural definitions. Time period aggregation was according to AM peak (6-9 am), PM peak (4-7 pm), midday (9 am-4 pm), and night (7 pm-6 am). For an individual county this creates a potential for 72 possible combinations, each of which becomes a Mobile scenario. This allows each Mobile scenario to represent the actual VMT mix, speed and cold/hot start fraction for that geographic/highway/time combination.

3.3.5.3 *VEHICLE TYPE MIX*

The RMS database contains daily truck percentages on each highway segment, estimated from traffic counts. Additional pattern data assembled by BTSP was applied to generate the hourly distribution of trucks for different functional classes, plus the Mobile default type distribution was used to split the generic "trucks" category to the Mobile sub-vehicle types. For each link, then PPAQ calculates an hourly vehicle mix as a percentage of the hourly volume.

The truck percentage is used to adjust highway capacity for speed estimation, as discussed below.

As VMT is accumulated to the geographic area / functional class / time period table, it is actually stratified by vehicle type. After all highway segments have been processed, then total and vehicle type VMT have been accumulated for each of the Mobile scenarios. Simple division then calculates the vehicle mix that is input to Mobile as part of each scenario's specification.

3.3.5.4 COLD vs. HOT START FRACTIONS

Mobile 5a version H default cold and hot start fractions of 20.6 and 27.3 percent respectively are used in all scenarios.

3.3.5.5 SPEED ESTIMATION

Physical attributes of each highway segment are contained in the database. These include functional class, number of lanes, and USR area type. Using this information the zero-volume speed and capacity of the segment are estimated. Truck percentage adjustments are then applied to produce an hourly capacity.

For functional classes which do not have control devices (i.e. freeways, expressways, and rural highways), a modified Bureau of Public Roads (BPR) formula with adjusted coefficients is used to calculate the speeds that will occur for each hour on the segment. This speed reflects the traffic volume, vehicle mix, and physical segment characteristics.

For functional classes which do have control devices (i.e. urban arterials), an intersection approach model is used to simulate the effect of traffic signals on speed. For each type of facility (differentiated by functional class, number of lanes, and area type), key parameters such as average signal spacing, cycle length, green time, additional approach lanes, and progression factor are extracted from a lookup table. Using 1985 Highway Capacity Manual delay equations, the effect of traffic volume on traffic-signal delay is calculated and added to the link travel time calculated above.

The result of this process is, for each highway segment, an estimated average travel time and speed for each hour of the day. The average time is multiplied by volume to produce vehicle hours of travel (VHT). VHT is then accumulated for each of the above Mobile scenarios, and when complete an average speed for the scenario is calculated by dividing VMT by VHT. This, then, is the speed which is input to Mobile 5a version H.

3.3.5.6 TIME OF DAY AND DIURNAL EMISSIONS

The highway system VMT and speeds are aggregated according to four time periods. Because diurnal emissions are calculated by Mobile 5a version H on the basis of 24-hour minimum-to-maximum temperatures, special processing is needed to accurately estimate this emissions component by allocating daily diurnal emissions to the various time periods. In order to use this method, minimum and maximum temperatures are required for each of the four time periods, in addition to the minimum and maximum daily temperatures. Mobile 5a version H is then run at all five temperature ranges.

3.3.5.7 EMISSION FACTOR ESTIMATION PROCEDURE

The Mobile 5a version H model was the emission factor model used to generate the on-road inventory. A summary of the input data are included in Appendix III. Key assumptions and data to be used as input to the model are as follows:

Speed - Input based on speed estimation (section B.5)

Vehicle Mix - One mix for each scenario was applied based on the aggregation scheme (section B.2)

Temperature - Reflects time of day variations upon actual weather station hourly data where the specific day was chosen according to EPA procedure.

I/M - Program start year of 1984 for current I/M counties, 1995 for others.

Pollutants - Emission factors for VOC's, CO, and NOx are produced for all the model runs.

RVP - RVPs are set to be consistent with observed data in the Philadelphia region for the 1990 actual run. A value of 8.4 was used for the entire Philadelphia region. This values was then reset to 9.0 region-wide for the 1990 adjusted and 1996 projected baseline, and 8.7 for the 1996 proposed strategy. These are the default values required by EPA where actual 1990 measured RVP data are not available.

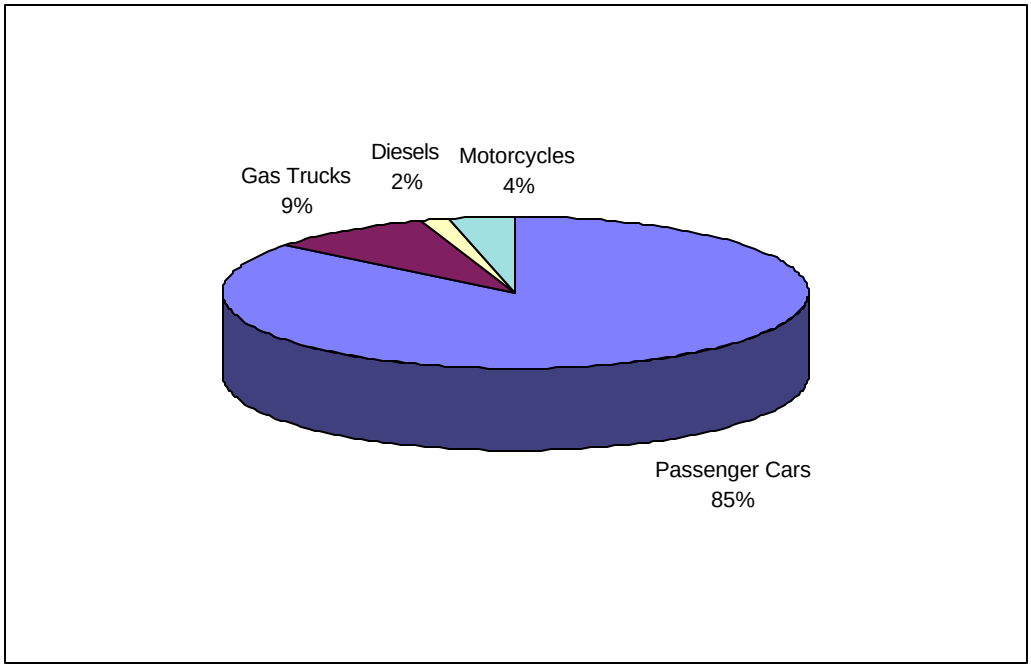
3.3.5.8 RESULTS

The Results from the highway vehicle emissions modeling are summarized in Figure 3.6 and detailed in Table 3.4 and in Appendix IV. A detailed description of the reductions shown by the modeling can be found in Section 5.4 of this document.

Table 3.4 Summary of 1990 Highway Vehicle Inventory Emissions

Category	Bucks	Chester	Delaware	Montgomery	Philadelphia	Total
LDGV	30.51	18.67	19.98	35.78	56.03	160.97
LDGT1	1.54	1.19	0.93	1.96	2.72	8.33
LDGT2	1.24	0.96	0.70	1.51	2.00	6.42
HDGV	0.47	0.35	0.29	0.57	0.77	2.44
LDDV	0.27	0.18	0.20	0.35	0.44	1.44
LDDT	0.03	0.02	0.02	0.04	0.05	0.16
HDDT	0.27	0.21	0.18	0.36	0.41	1.43
MC	1.32	1.00	0.87	1.73	1.78	6.69
TOTAL:	35.65	22.57	23.16	42.31	64.21	187.89

Figure 3.6 Highway Vehicle Inventory By Vehicle Type



3.3.6 BIOGENIC SOURCES

3.3.6.1 INTRODUCTION

This section describes the procedure used to develop the biogenic portion of the emissions inventory. The PC-based model, PC-Biogenic Emissions Inventory System (PC-BEIS) was used to estimate biogenic non-methane hydrocarbon emissions from biogenic sources. The model estimates area-wide emissions on an hourly basis for one typical ozone day.

***3.3.6.2** MODEL INPUT*

The PC-BEIS model requires input for each county, defining the location (Federal Information Procedures System (FIPS) code, latitude, and longitude), time (day-month-year for a typical ozone day), and meteorology (temperature, wind speed, relative humidity, and cloud cover). The selection of these parameters was greatly simplified by using the information available for this purpose on the CHIEF[5] Bulletin Board.

EPA's Emission Inventory Branch, Research Triangle Park, North Carolina, developed a file with the appropriate ozone days and meteorological data for those days. The time zone and latitude and longitude needed to run the model has also been provided on CHIEF. The file that was chosen was: PHI73088.MET for the Philadelphia nonattainment area.

Since much of the work involved in running the PC-BEIS model is in the selection of the typical ozone day and the collection of meteorological data, using the correct file from the EIB list reduces the time and effort needed to run the model. Therefore, much of the work outlined in the PC-BEIS guidance for picking the typical ozone day to be modeled is eliminated. Instead, the model was run using the meteorological files provided by EPA and the guidance that accompanied them. The following sections describe, in more detail, the model input for the model runs.

LOCATION DATA

The PC-BEIS model was used to model biogenic emissions for each county in each ozone nonattainment area. The model required the FIPS codes and latitude and longitude coordinates of each county for each modeling run. The coordinates provided with each meteorological file were used when that meteorological file was used to run the model.

METEOROLOGICAL DATA

The meteorological data provided by EPA through the CHIEF Bulletin Board contained the necessary relative humidity, cloud cover, wind speed, and temperature information in the format needed by the model. The meteorological data are from a typical ozone day selected using the criteria defined by the PC-BEIS user's guide[6]. The estimated daily biogenic emissions for each nonattainment area were modeled using the same day's meteorology and latitude and longitude, per the EPA's meteorology file guidance.

MODEL INPUT FILES AND RESULTS

The FIPS codes, latitudes and longitudes used for each county's model run, and the 1990 emission estimates are listed in Table 3.5.

Table 3.5 PC-BEIS Input Data and Results

County	FIPS Code	Latitude	Longitude	Emissions
Bucks	42017	40.30	75.30	35.96
Chester	42029	39.97	75.42	39.69
Delaware	42045	39.82	75.42	8.71
Montgomery	42091	40.23	75.43	24.84
Philadelphia	42101	39.88	75.23	6.38
			Total Emissions:	115.58

4. THE 1996 PROJECTED INVENTORY

The CAAA[7] requires that ozone nonattainment areas classified as moderate and above achieve a 15 percent reduction in VOC emissions by 1996. The reduction must be achieved from anthropogenic VOC emission levels reported in the state's 1990 Base Year Inventory after those levels have been adjusted downward to remove emission reductions achieved by the pre-1990 FMVCP and the use of 9.0 RVP gasoline. The 15% reduction plan must also offset the expected growth in VOC emissions between 1990 and 1996. Thus, the total reduction from 1990 actual emissions is greater than 15 percent. The Base Year Inventory has been discussed in section 3. This section presents the 1996 Projection Year Inventory which is the state's estimation of the level of VOC emissions expected in 1996, assuming no new additional regulatory strategies.

4.1 GROWTH FACTOR METHODOLOGY - BEA

The Projected Year Inventory is developed by applying growth factors to the Base Year Inventory. Guidance from the EPA[8] suggests four typical indicators of growth. In order of priority, these are:

1. Product output
2. Value added
3. Earnings
4. Employment

Surrogate indicators of activity developed by a state, such as population, may also be acceptable methods. The Bureau of Economic Analysis (BEA) provided projections[9] of income, employment and population from which appropriate growth factors were derived.

The BEA provides state specific historical data for 1973, 1979, 1983 and 1988 and projection estimations for 1995, 2000, 2005, 2010 and 2040 for each indicator it considers. We have not included 1973 and 1979 in our analysis because the economic changes in Pennsylvania in those years create a nonlinear growth rate. Data for 2010 and 2040 were also excluded because of a lack of confidence in the projections.

Since the BEA did not provide data for 1990 and 1996 these numbers are calculated by assuming a linear growth rate between the two closest years where data

exists (i.e. 1988, 1995 & 2000). For example, 1990 values are derived using the following formula:

$$IND90 = IND88 + (\frac{2}{7} \times (IND95 - IND88))$$

where:

IND*??* = BEA value for the chosen category for the year ***??***

The data were then reviewed in comparison to the 1983, 2000 and 2005 data to verify that the assumption of linear growth was valid.

4.1.1 POINT SOURCE GROWTH CALCULATION

Growth in the point source inventory was calculated, without exception, based on growth in income. The BEA projects growth in 57 industrial groups which can, for the most part, be matched to a two-digit Standard Industrial Classification (SIC) code.

The above equation was applied to generate 1990 and 1996 values. The resulting growth factors are listed in Table 4.1. Table 4.2 is a summary of the 1996 Projected Point Source Inventory with no new controls applied.

Table 4.1 Point Source Growth Factors By SIC Code

2-Digit SIC Code	Source Description	Growth Factor	2-Digit SIC Code	Source Description	Growth Factor
01	Agricultural Production-crops	1.054	45	Transportation By Air	1.193
02	Agricultural Production-livestock & Animal Special	1.054	46	Pipelines, Except Natural Gas	1.042
07	Agricultural Services	1.168	47	Transportation Services	1.175
08	Forestry	1.168	48	Communications	1.082
09	Fishing, Hunting And Trapping	1.168	49	Electric, Gas And Sanitary Services	1.115
10	Metal Mining	0.981	50	Wholesale Trade-durable Goods	1.083
12	Coal Mining	0.981	51	Wholesale Trade-nondurable Goods	1.083
13	Oil And Gas Extraction	0.994	52	Building Materials, Hardware, Garden Supply	1.099
14	Mining And Quarrying Of Nonmetallic Minerals	1.087	53	General Merchandise Stores	1.099
15	Building Construction-general Contractors & Bldrs	1.066	54	Food Stores	1.099
16	Heavy Construction Other Than Bldg Constr-contract	1.066	55	Automotive Dealers And Gasoline Service Stations	1.099
17	Construction-special Trade Contractors	1.066	56	Apparel And Accessory Stores	1.099
20	Food And Kindred Products	1.027	57	Home Furniture, Furnishings & Equipment Stores	1.099
21	Tobacco Products	0.871	58	Eating And Drinking Places	1.099
22	Textile Mill Products	1.006	59	Miscellaneous Retail	1.099
23	Apparel & Other Finished Products Made From Fabric	0.962	60	Depository Institutions	1.107
24	Lumber & Wood Products, Except Furniture	1.138	61	Nondepository Credit Institutions	1.107
25	Furniture And Fixtures	1.110	62	Security & Commodity Brokers, Dealers, Exchanges	1.093
26	Paper And Allied Products	1.078	63	Insurance Carriers	1.136
27	Printing, Publishing And Allied Industries	1.107	64	Insurance Agents, Brokers And Service	1.136
28	Chemicals And Allied Products	1.047	65	Real Estate	1.243
29	Petroleum Refining And Related Industries	1.002	67	Holding And Other Investment Offices	1.093
30	Rubber And Miscellaneous Plastics Products	1.119	70	Hotels, Rooming Houses, Camps, ect.	1.149
31	Leather And Leather Products	0.978	72	Personal Services	1.088
32	Stone, Clay, Glass And Concrete Products	1.021	73	Business Services	1.293
33	Primary Metal Industries	0.922	75	Automotive Repair, Services & Parking	1.145
34	Fabricated Metal Products, Except Machinery & Tran	1.072	76	Miscellaneous Repair Services	1.293
35	Industrial And Commercial Machinery & Computer Equipment	1.029	78	Motion Pictures	1.164
36	Electronic & Other Electrical Equipment & Componen	0.979	79	Amusement And Recreation Services	1.164
37	Transportation Equipment	1.050	80	Health Services	1.187
38	Measuring, Analyzing & Controlling Instruments	1.070	81	Legal Services	1.240
42	Motor Freight Transportation And Warehousing	1.079	82	Educational Services	1.102
44	Water Transportation	0.944	89	Services Not Elsewhere Classified	1.139

Source: BEA Regional Projections to 2040, U.S. Dept. of Commerce, June 1990

Table 4.2 The 1996 Projected Point Source Inventory - Uncontrolled

Category	Bucks	Chester	Delaware	Montgomery	Philadelphia	Total
Storage, Transport and Marketing	0.02	0.36	14.72	0.72	7.03	22.86
Industrial Processes	1.40	1.31	16.81	3.71	18.12	41.35
Industrial Surface Coating	20.12	6.71	34.09	1.85	10.18	72.95
Other Solvent Use	1.70	8.55	3.16	1.89	1.48	16.78
Waste Disposal	0.00	0.00	0.02	0.00	0.00	0.02
Misc. Sources	0.45	1.02	1.58	0.11	2.36	5.52
TOTAL:	23.70	17.95	70.37	8.29	39.18	159.48

4.1.2 AREA SOURCE GROWTH CALCULATION

With the exception of gasoline marketing operations, the area source inventory was projected based on BEA data. In most cases, the factors used were those of employment or population growth. Although guidance from EPA suggested that population or employment alone were not necessarily adequate indicators of emissions growth in comparison to income or value added growth, DEP found they were the best choice in Pennsylvania.

The area source inventory is based primarily on employment and population emission factors. Thus emissions are calculated using a factor of a given number of pounds of pollutant per employee or per person. As this is the EPA approved method for calculating emissions to determine the Base Year Inventory, consistency dictates their use, where available, in projected year inventories. Other areas, such as air transport, where emissions are based on a measurable activity level were considered on an individual basis and the best available factor was selected. See Table 4.3 for a comparison of activity indicators and growth indicators for area sources. The resulting growth factors, after applying the equation given in section 4.1, are detailed in Table 4.4. These factors were used to project the 1996 uncontrolled emissions - see Table 4.5.

Table 4.3 Area Source Activity and Growth Indicators

Source Category	Activity Indicator	Indicator of Growth
Transportation		
RAILROADS	Fuel Consumption	Railroad Employment
AIRCRAFT	LTO Cycles	Air Transport Employment
VESSELS	Fuel Consumption	Water Trans. Employment
Industrial Processes		
Surface Coating:		
AUTO REFINISH	Employment	Population
TRAFFIC LINE PAINTING	Population	Population
FACTORY FIN. WOOD	Employment	Durable Mfg. Employment
WOOD FURNITURE	Employment	Durable Mfg. Employment
METAL FURN & FIX	Employment	Durable Mfg. Employment
ARCHITECTURAL	Population	Population
ELECT INSULATION	Employment	Durable Mfg. Employment
METAL CANS	Employment	Fabricated Metal Employment.
MISC FIN. METALS	Employment	Fabricated Metal Employment.
MACH & EQUIP	Employment	Nonelectric Machine Mfg. Employ.
APPLIANCES	Employment	Electric Machine Mfg. Employment
MOTOR VEHICLES	Employment	Motor Vehical Employment
OTHER TRANS	Employment	Transportation Employment
MARINE	Employment	Durable Mfg. Employment
MISC MFG	Employment	Durable Mfg. Employment
HIGH PERF COATINGS	Population	Durable Mfg. Employment
OTHER SPEC COAT	Population	Durable Mfg. Employment
Other Industrial:		
PESTICIDES	Land area	Farm Employment
BIOPROCESS	Production	Population
GRAPHIC ARTS	Population	Printing & Publishing Employment
OFFSHORE	Population	No Growth Projected
DEGREASING	Employment	Durable Mfg. Employment

Source Category	Activity Indicator	Indicator of Growth
Combustion		
FUEL OIL COMB	Fuel Consumption	Population
COAL CON (RES)	Fuel Consumption	Population
NAT'L GAS & LPG	Fuel Consumption	Population
STRUCTURE FIRE	Number of Fires	No Growth Projected
FOREST FIRES	Number of Fires	No Growth Projected
ORCHARD HEAT	Population	Population
Gasoline Marketing		
VOC-NO STAGE I	Fuel Sales	VMT
STAGE I	Fuel Sales	VMT
STAGE II	Fuel Sales	VMT
TANK BREATH	Fuel Sales	VMT
AIRCRAFT REFUEL	Fuel Sales	Air Transport Employment
Waste Disposal		
SOLID WASTE LF	Throughput	Population
POTW	Throughput	Population
OPEN BURNING	Throughput	Population
SOLID WASTE INC	Throughput	Population
TSDFs	TRI Data (EPA)	Population
Consumer/ Commercial		
DRY CLEANING	Population	Population
COMM/CONSUM	Population	Population
Misc. Evaporative		
ASPHALT	Populaion	Population
LUST	Number of Tanks	Population
CATASTROPHIC	Individual Records	No Growth Projected

Table 4.4 Pennsylvania Area Source Growth Factors

Category	1983	1988	1990	1995	1996	1999	2000	2002	2005	'90-96 Growth
Air Trans. Emp.	11.2	16.4	17.4	19.9	20.3	21.3	21.7	22.1	22.8	**1.164**
Auto Repair Emp.	49.8	65.4	67.6	73.2	74.2	77.0	78.0	79.3	81.2	**1.097**
Chemical Mfg. Emp.	58.1	60.1	59.8	59.2	59.2	59.1	59.1	58.8	58.4	**0.989**
Construction Emp.	233.9	319.2	323.1	332.9	334.8	340.4	342.3	344.0	346.5	**1.036**
Durable Mfg. Emp.	637.6	621.7	615.2	598.9	596.8	590.7	588.6	584.0	577.1	**0.970**
Electric Mach. Emp.	106.7	94.3	91.4	84.3	83.3	80.3	79.3	77.8	75.6	**0.911**
Fabricated Metal Emp.	87.9	94.9	95.5	97.1	97.3	97.7	97.9	97.5	96.9	**1.018**
Farm Employment	95.1	90.1	89.1	86.6	86.2	85.0	84.6	83.6	82.2	**0.967**
Food Mfg. Emp.	91.0	91.9	91.6	90.8	90.7	90.4	90.3	89.5	88.4	**0.990**
Furniture Employment	19.4	22.5	22.9	24.0	24.2	24.9	25.1	25.4	25.8	**1.056**
Lumber Prod. Emp.	22.5	35.3	36.4	39.1	39.6	41.0	41.5	42.1	43.0	**1.088**
Motor Vehicle Emp.	24.6	25.1	24.8	24.2	24.1	23.7	23.6	23.4	23.0	**0.969**
Nondurable Mfg. Emp.	480.6	460.5	458.2	452.5	452.3	451.7	451.5	449.1	445.4	**0.987**
Nonelectric Mach. Emp.	109.3	109.4	108.4	105.9	105.4	104.1	103.6	102.9	101.9	**0.973**
Petroleum Prod. Emp.	14.9	10.5	10.4	10.0	10.0	9.8	9.8	9.7	9.5	**0.962**
Primary Metal Emp.	121.0	91.3	87.5	78.0	76.8	73.2	72.0	70.0	67.0	**0.878**
Printing & Publish. Emp.	75.1	87.7	89.3	93.4	94.1	96.3	97.0	97.8	99.1	**1.054**
Railroad Employment	22.7	18.3	17.4	15.3	15.1	14.4	14.2	13.8	13.3	**0.865**
Retail Trade Emp.	910	1038	1056	1100	1110	1138	1148	1158	1174	**1.051**
Total Pop. (in thousands)	11895	12001	12091	12316	12356	12475	12515	12597	12719	**1.022**
Transportation Emp.	35.8	37.3	37.1	36.6	36.6	36.5	36.5	36.3	36.1	**0.986**
Water Trans. Emp.	7.1	5.1	5.0	4.6	4.6	4.4	4.4	4.3	4.2	**0.920**
Wholesale Trade Emp.	254.7	286.4	291.5	304.4	306.4	312.2	314.2	317.1	321.4	**1.051**

Source: BEA Regional projections to 2040, U.S. Dept. of Commerce, June,1990

Table 4.5 The 1996 Uncontrolled Area Source Inventory

Category	Bucks	Chester	Delaware	Montgomery	Philadelphia	Total
Transportation	0.21	0.08	5.79	1.55	1.78	9.40
Industrial Processes	16.71	9.53	12.39	26.44	35.83	100.89
Combustion	0.11	0.07	0.14	0.18	0.44	0.95
Gasoline Marketing	5.61	4.44	3.62	7.36	7.20	28.23
Waste Disposal	0.88	1.65	1.08	9.49	9.42	22.50
Consumer/ Commercial	5.42	4.28	5.14	6.57	14.81	36.23
Misc. Evaporative	0.33	0.24	0.34	0.42	0.98	2.31
TOTAL:	29.28	20.28	28.49	52.00	70.46	200.50

4.1.3 NONROAD ENGINE GROWTH CALCULATION

Growth in emissions from nonroad engines was calculated using the same methodology used for the area sources. Table 4.6 compares the activity level indicators used by the EPA with the growth indicators used here for projection. Table 4.7 details the projected uncontrolled 1996 emissions.

Table 4.6 Comparison of Activity Level Indicators vs. Growth Indicators for Nonroad Engines

Category	Activity Indicator	Growth Indicator	'90-'96 Growth Factor
Lawn and Garden Equipment	Single Family Homes and Landscaping Emp.	Population	1.022
Airport Service Equipment	Aircraft Operations	Employment	1.164
Recreational Equipment	Establishments in SIC 557 (Motorcycle Dealers)	Population	1.022
Recreational Marine Equipment	Boat Registration and Water Area	Population	1.022
Light Commercial Equipment	Wholesale Trade Establishments	Employment	0.97
Industrial Equipment	Employment	Employment	0.97
Construction Equipment	Employment	Employment	1.036
Agricultural Equipment	Employment	Employment	0.967
Logging Equipment	Logging Establishments	Employment	1.088

Table 4.7 The 1996 Uncontrolled Nonroad Engine Inventory

Category	Bucks	Chester	Delaware	Montgomery	Philadelphia	Total
Lawn and Garden	8.32	6.58	6.71	11.91	14.41	47.93
Airport Equipment	0.00	0.00	0.00	0.00	0.90	0.90
Recreational Equipment	0.44	0.55	0.00	0.00	0.00	0.99
Recreational Vessels	3.15	4.06	1.13	2.41	1.42	12.17
Light Commercial Equipment	0.87	0.69	0.67	1.60	1.57	5.40
Industrial Equipment	0.63	0.42	0.49	1.19	1.20	3.93
Construction Equipment	1.43	1.08	1.25	2.58	2.34	8.68
Agricultural Equipment	0.48	0.72	0.02	0.31	0.00	1.53
Logging Equipment	0.10	0.12	0.03	0.12	0.01	0.38
TOTAL:	15.43	14.21	10.31	20.12	21.86	81.92

4.2 HIGHWAY VEHICLE EMISSIONS GROWTH

Highway vehicle emissions growth and, in the area source category, gasoline marketing growth are projected based on the projected increase in Vehicle Miles Traveled (VMT). This projection was derived from a Traffic Demand Model (TDM) and the Post Processor for Air Quality (PPAQ). For more information on this process see section 3.3.4 Highway Vehicle Sources.

Table 4.8 The 1996 Uncontrolled Highway Vehicle Inventory

Category	Bucks	Chester	Delaware	Montgomery	Philadelphia	Total
LDGV	30.09	18.85	20.30	35.11	48.51	152.86
LDGT1	1.28	1.01	0.84	1.65	2.07	6.85
LDGT2	1.02	0.80	0.62	1.24	1.50	5.18
HDGV	0.35	0.27	0.23	0.41	0.51	1.77
LDDV	0.34	0.23	0.25	0.43	0.18	1.44
LDDT	0.04	0.03	0.03	0.05	0.06	0.21
HDDT	0.23	0.19	0.16	0.31	0.33	1.21
MC	1.30	1.03	0.89	1.69	1.60	6.52
TOTAL:	34.65	22.42	23.32	40.90	54.76	176.04

5. THE RATE OF PROGRESS PLAN

As stated in Section IV, 42 U.S.C.A. §7511(b)(1) the State is required to submit a plan to the EPA for each ozone nonattainment area classified moderate or above that achieves a 15 percent net reduction in anthropogenic VOC emissions by November 15, 1996. The plan is to include measures mandated by the 1990 Clean Air Act Amendments and other additional measures the state finds necessary to achieve the 15 percent reduction. All measures, whether mandatory or optional, must produce "real, permanent, and enforceable" emission reductions if those reductions are to be counted toward meeting the 15 percent milestone[10].

5.1 CALCULATION OF THE 15% REDUCTION TARGET

VOC emissions in the five county Philadelphia area must be reduced by 89 tons per day (tpd), not including growth offsets, to comply with the mandate to reduce net anthropogenic VOC emissions by 15 percent between 1990 and November 15, 1996. This amount was arrived at through the following calculation.

1. A 1990 Baseline Inventory was created by removing biogenic emissions and perchloroethlyene[11] (Perc.) Compounds from the 1990 Base Year Emission Inventory *(1990 Baseline = 616 tpsd).*

2. Reductions from the Federal Motor Vehicle Control Program (FMVCP) and RVP were subtracted from the 1990 Baseline Inventory[12]. This produced the Adjusted Baseline Inventory *(Adj. Baseline = 616 - 33 = 583 tpsd)*.

3. The Adjusted Baseline inventory was multiplied by 15 percent. This produced the amount of the required 15 percent emission reduction by 1996 *(Reduction = 0.15 x 583 = 87 tpsd).*

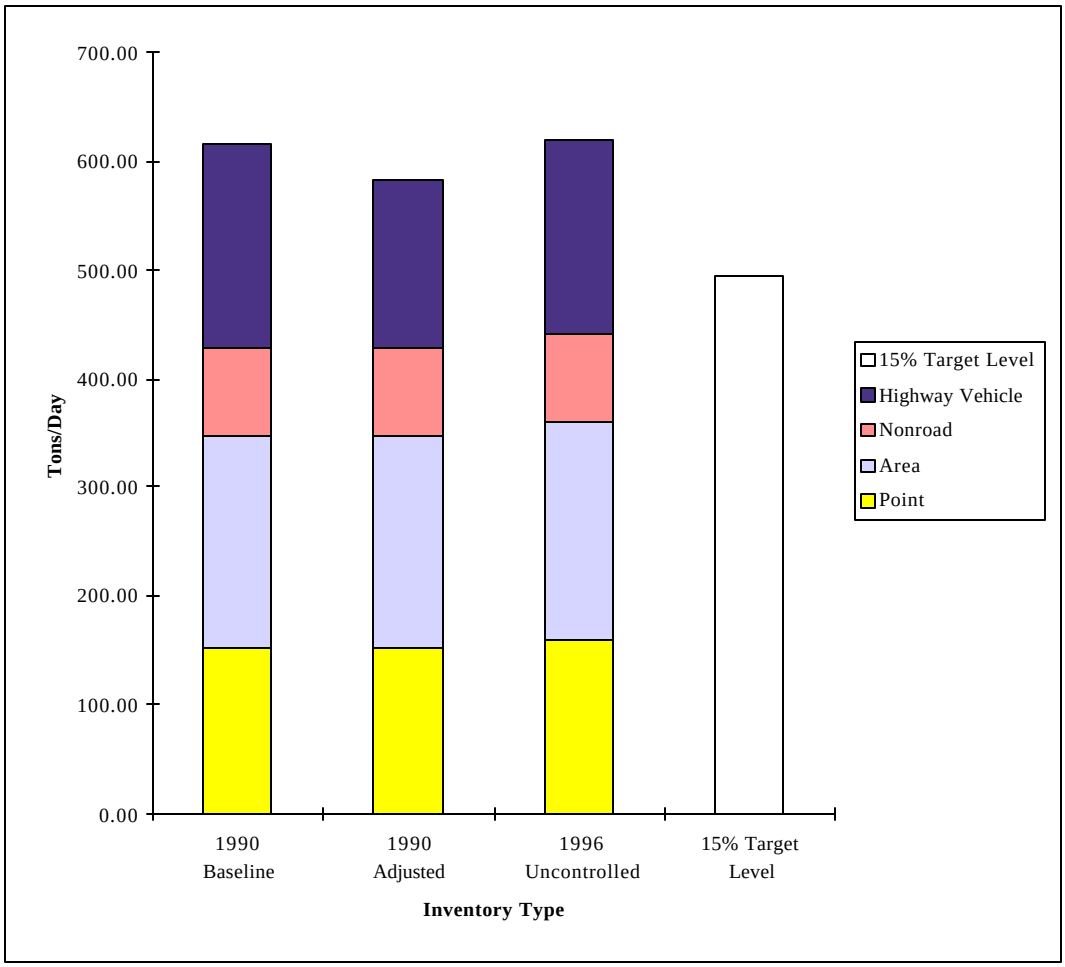
4. The 1990 Base Year Inventory for Point Sources was reviewed to determine where Reasonably Available Control Technology (RACT) "fix-up" emission reductions would apply. RACT "fix-ups" are defined as post-1990 corrections made to pre-1990 RACT regulations *(RACT fix-ups = 0.84 tpsd)*.

5. The reductions from the FMVCP, RVP and RACT fix-ups[13] were added to the target reduction value. This produced the total amount of emission reductions that the

State should expect to achieve by 1996, not considering growth *(Target Reduction = 87 + 33 + 0.84 = 121 tpsd)*.

6. The total amount of emissions reduction necessary was subtracted from the total amount of emissions in the 1990 baseline inventory. This produced the 1996 emission target level of 494 tons per day *(1996 Target Level = 616 - 121 = 494 tpsd. -- discrepancy due to rounding)*.

Figure 5.1 Inventory Summary with 1996 Target Level



5.2 ACCOUNTING FOR GROWTH IN EMISSIONS

Growth in emissions, which must be offset, was calculated using the methodologies described in Section 4.1 This resulted in 2.39 tons per day being added to the 1990 Base Line inventory to create the 1996 Projected Inventory. When the 1996 emission target level *(494 tpsd)* was compared with the 1996 Projected Emission Inventory *(618 tpsd)*, a shortfall of 124 tons per day in the ozone season was determined. Pennsylvania must eliminate this shortfall by November 15, 1996, to ensure compliance with the 15 percent emission reduction requirement of the Act. Table 5.1 details these calculations.

Regarding the negative growth from the unadjusted 1990 Baseline Inventory indicated for highway vehicles, the 1990 actual emissions increase by about 12% by 1996 due to a growth in vehicle miles travelled. However, emissions are reduced due to the Federal Motor Vehicle Control Program (FMVCP) that was in place prior to passage of the 1990 Clean Air Act Amendments. These emission reductions due to newer, cleaner cars replacing older vehicles in the general vehicle population cannot be claimed as part of the required 15% reduction. This is also true for the emission reductions due to the federal program to lower gasoline volatility to 9.0 psi. These two programs result in an emission reduction of 33.02 tpsd in 1996 (as shown in Table 5.1 of the plan). Therefore, the growth of 21.50 tpsd (a 12% increase from the 1990 base of 187.89 tpsd) and the noncreditable emission reduction of 33.02 tpsd leads to the net negative "growth" (11.52 tpsd as shown in the table) in highway vehicle emissions.

Table 5.1 Calculation of the 1996 Target Level

Category	**1990 Base** *tpsd*	**FMVCP/ RVP** *tpsd*	**1990 Adjusted** *tpsd*	**15% Reduction** *tpsd*	**RACT Fix-ups** *tpsd*	**1996 Target Level** *tpsd*	**'90-'96 Growth** *tpsd*	**1996 Projected Uncontrolled** *tpsd*
Point	152.75		152.75		0.84		6.73	159.48
Area	194.35		194.35				6.15	200.50
Nonroad	80.56		80.56				1.36	81.92
Highway Vehicle	187.89	33.02	154.87				-11.85	176.04
TOTAL	**615.56**	**33.02**	**582.53**	**87.38**	**0.84**	**494.31**	**2.39**	**617.95**

NOTE: The total shown in the '90-96 growth column is from the1990 Base (unadjusted) inventory.

5.3 RATE OF PROGRESS PLAN SUMMARY

In the previous sections a need for a reduction of 124 tons of VOC per summer day was demonstrated. To meet this requirement Pennsylvania expects to achieve emissions reductions of 135 tons per day from a variety of strategies. These measures can be classified as Federally mandated measures, pending Federal programs or State and local initiatives.

Federally mandated measures are control programs that were clearly mandated by the Clean Air Act. These measures make up the majority of the necessary emissions reductions. Table 5.2 summarizes these measures and the VOC reductions expected.

Pending federal programs and state and local initiatives are also critical to achieving a 15% reduction. Table 5.3 summarizes expected reductions from these sources.

The comparison between the 1990 Baseline, 1990 Adjusted Baseline, 1996 Uncontrolled and 1996 Controlled inventories is shown in Figure 5.2.

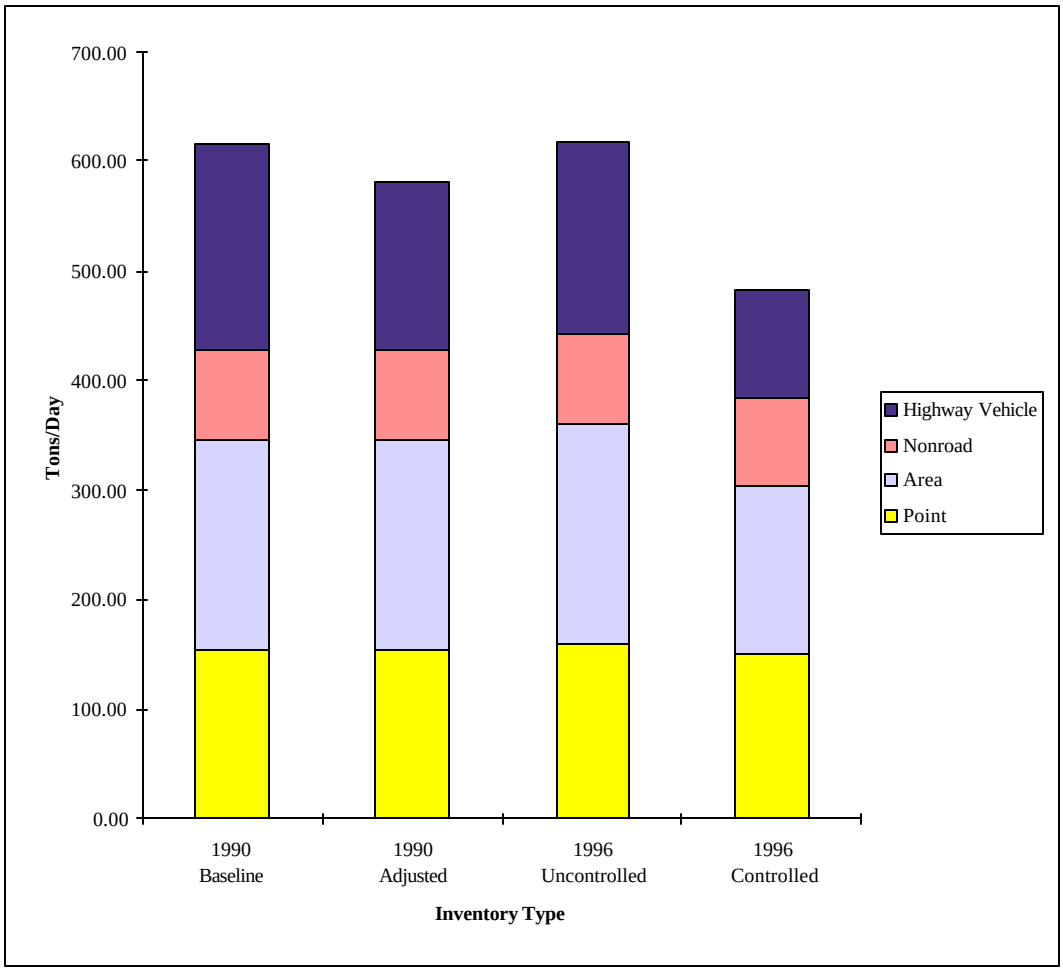
Table 5.2 Expected Reductions from Required Programs

Required Program	Expected VOC Reduction tons/day
Federal Reformulated Gasoline	26.48
Reformulated Gasoline - Nonroad	0.59
I/M	49.74
FMVCP/Tier 1	1.08
Stage II Vapor Recovery	17.02
Total VOC Reduction	**94.91**

Table 5.3 Expected Reductions from Other Programs

Program	Expected VOC Reduction tons/day
Federal AIM Regulation	7.28
TSDF Controls	9.45
Autobody Refinishing	6.30
Consumer Products	6.58
Facility Shutdowns	3.40
Total VOC Reduction	**33.00**

Figure 5.2 Inventory Summary with the 1996 Projected Controlled Inventory



6. THE VOC CONTROL MEASURES AND ACTIVITIES

This section provides a detailed description of the control measures and activities Pennsylvania will use to meet the 15% Rate of Progress requirement.

6.1 POINT SOURCE CONTROLS

6.1.1 SOURCE AND PROCESS SHUTDOWNS

Background:

Several sources which were operational in the 1990 and were included in the inventory have since shutdown.

Sources that did not apply to bank emission reduction credited (ERCs) within the regulatory deadlines established in 25 Pa. Code § 127.207(2), and therefore the listed reductions can be credited as permanent and enforceable emissions decreases.

In addition, Pennsylvania regulations require a 1.3:1 offset ratio for banked emissions. Therefore, sources that have banked emissions under the provisions of 25 Pa. Code 127(E) may use no more than 77% of these emissions at a later date. The remaining 23% are permanent reductions.

Table 6.3 lists the reduction generated from source or process shutdowns, and their status as banked or unbanked. This results in emission reductions of 3.4 tpsd.

Table 6.3 Facilities Reporting Shutdowns and Banked Credits

Company	County	NEDS ID	Tpsd Reduction	Banked	Credit
Rohm & Haas	Bucks	0009	0.06	Yes	0.02
United States Steel	Bucks	0055	0.05	Yes	0.01
Minnesota Mining & Mfg.	Bucks	0056	4.24	Yes	0.98
Quebecor Printing	Chester	0009	0.82	Yes	0.19
Reynolds Metals	Chester	0046	0.00	Yes	0.00
Sun R&M	Delaware	0025	0.17	Yes	0.04
B.P. Oil Inc	Delaware	0030	0.39	Yes	0.09
Congoleum Corp.	Delaware	0049	1.39	Yes	0.32
Phila. Textile Finishers	Montgomery	0024	0.04	No	0.04
Rohm & Haas	Philadelphia	1531	0.09	Yes	0.02
Allied Chemical	Philadelphia	1551	2.15	Yes	0.49
Crown Cork & Seal	Philadelphia	1555	0.47	Yes	0.11
Progress Lighting Co.	Philadelphia	1584	0.08	Yes	0.02
Acme Markets	Philadelphia	2002	0.04	No	0.04
S.K.F	Philadelphia	2067	0.25	No	0.25
Container Recyclers Ltd.	Philadelphia	5112	0.09	No	0.09
Quality Container Corp.	Philadelphia	5116	0.12	No	0.12
U.S. Mint	Philadelphia	9703	0.07	No	0.07
Sun Refining	Philadelphia	1501	0.17	Yes	0.04
Schneider Bros. Co.	Philadelphia	3292	0.14	No	0.14
Monarch Mfg. Works Inc.	Philadelphia	3492	0.07	No	0.07
Craftbilt Co.	Philadelphia	3551	0.13	No	0.13
U.S. Naval Base	Philadelphia	9702	0.12	No	0.12
				Total:	**3.40**

6.2 AREA SOURCE CONTROLS

6.2.1 ARCHITECTURAL AND INDUSTRIAL MAINTENANCE COATINGS

Background:

The CAAA requires the EPA to adopt regulations for certain coatings. The ongoing national regulatory negotiation for Architectural and Industrial Maintenance (AIM) coatings is in the process of defining the final requirement.

AIM coatings are field-applied coatings used by industry, contractors and home owners to coat houses, buildings, highway surfaces and industrial equipment for decorative and protective purposes. The different types of coatings include flat, non-flat and numerous specialty coatings. VOC reductions result from the evaporation of solvents from the coatings during application and drying.

Because the category consists primarily of non-shop-applied coatings, the only technically and economically feasible control strategies involve product reformulation. This can involve one or more of the following approaches:

- Replacing VOC solvents with non-reactive substitutes.
- Increasing the amount of solids.
- Altering the chemistry of the resin so less solvent is needed for the required viscosity.
- Switching to waterborne latex or a water soluble resin system.

Implementation:

This is a pending federal measure.

Target Reductions:

Based upon EPA guidance[15], an emissions reduction of 15 percent could be applied towards the requirements for the Rate of Progress plan. The reductions were calculated as follows:

$$Reduction = 96proj \times 15\%$$

The projected emissions were summed from the categories of Architectural Coatings, Special Purpose Coatings and High Performance Coating. This resulted in a 40 ton per day projection and, from the above equation, a 7 ton creditable reduction.

6.2.2 STAGE II VAPOR RECOVERY

Background:

This Federally mandated measure involves the installation of Stage II vapor recovery nozzles at gasoline pumps. This will reduce emissions of vapors in the fuel tank that are displaced by incoming gasoline.

Implementation:

Implementation of Stage II vapor recovery systems in the five county Philadelphia area was mandated in section 6.7(e) of the Air Pollution Control Act (35 P.S. § 4005(a)(1)). See also 25 Pa. Code §129.82.

Uncontrolled emissions for refueling emissions has an emission factor of 11.7 lbs. per 1000 gallons, according to Appendix IV of AP42. Fuel sales for 1990 for the Commonwealth of Pennsylvania were provided by the Department of Revenue. The fuel sales were apportioned by county based on the percentage of VMT of the county to the state, projected to 1996 based on growth in VMT expected by PENNDOT.

County	1990 VMT	1996 VMT	% Increase	1990 Fuel Sales	1996 Proj Fuel Sales
Bucks	12,850,047	14,298,031	11.27%	665,511	740,503
Chester	10,147,864	11,957,629	17.83%	525,563	619,292
Delaware	8,279,044	9,837,903	18.83%	428,776	509,510
Montgomery	16,839,970	19,013,693	12.91%	872,151	984,729
Philadelphia	16,485,462	17,151,283	4.04%	853,791	888,274
Totals	**64,602,387**	**72,258,539**		**3,345,792**	**3,742,308**

Mobile 5a version H was used to determine the emission factor for controlled Stage II. The assumptions were 95% Rule Penetration and 80% Rule Effectiveness. This produce an 76% efficiency which was used as an input along with the start year of 1993 and a phase in period of 2 years into the Mobile 5a version H input file of the 1996 Projected Control Strategy. The emission factor from the model was 1.18 grams per gallon which converts to 2.605 lbs/1000 gal.

Target Reductions:

Based on the following calculations, the emission reductions expected from the Pennsylvania Stage II program are 17 tpsd.

Emission Factor Calculation:

$$EF_{no\ Stage\ II} = \frac{11.7 lbs}{1000 gal}$$

$$Efficiency = RE \times RP = .80 \times .95 = 76\%$$

$$EF_{Stage\ II} = 1.18\ {}^{g}\!/_{gal} \times \frac{kg}{1000 g} \times 2.205\ {}^{lbs}\!/_{kg} = \frac{2.602 lbs}{1000 gal}$$

Emission Reduction Calculation

$$96 Emis_{No\ Stage\ II} = EF_{No\ Stage\ II} \times Gallons\ Sold_{1996 Daily}$$

$$= 11.7\ {}^{lbs}\!/_{1000 gal} \times 3{,}742{,}308 gal \times \frac{1 ton}{2000 lbs} = 21.89 tons$$

$$96 Emis_{Stage\ II} = EF_{Stage\ II} \times Gallons\ Sold_{1996 Daily}$$

$$= 2.206\ {}^{lbs}\!/_{1000 gal} \times 3{,}742{,}308 gal \times \frac{1 ton}{2000 lbs} = 4.87 tons$$

6.2.3 TREATMENT STORAGE and DISPOSAL FACILITIES

Background:

Treatment storage and disposal facilities (TSDFs) manage hazardous wastes containing VOCs and hazardous air pollutants (HAPs). These facilities manage dilute wastewaters, organic and inorganic sludges and organic and inorganic solids. The waste disposal is accomplished by incineration, land treatment, underground injection or landfills.

Implementation:

Federal measure.

Target Reductions:

Phase I standards were promulgated on June 21, 1990. The proposed Phase II standards would control emissions by 94%. This expected control level with an 80% rule effectiveness factor was used to calculate the 1996 emissions reduction. This results in a reduction of about 10 tpsd.

6.2.4 AUTOBODY REFINISHING

Background:

The EPA is in the process of adopting regulations controlling emissions from coatings used in autobody refinishing.

These coatings are, typically, shop-applied coatings used by industry, small businesses and vehicle owners to repair or recondition vehicles. VOC emissions result from the evaporation of solvents from the coatings during the following steps:

- Surface Preparation
- Surface Coating Application
- Cleaning of Application Equipment

There are several methods currently available to reduce emissions. The VOC content of surface preparation products is approximately 6.75 lbs/gal. There are products available with VOC levels below 1.7 lbs/gal. Similar reductions are also feasible from the reformulation of the surface coatings, including sealers and topcoats. High transfer efficiency spray systems has been shown to reduce emissions by 20-40%. Another technique is to install spray-gun cleaning equipment at body shops - this has been shown to reduce equipment cleaning emissions by 88%, and is already in use in many autobody repair shops.

The pending federal measure targets the surface coatings. These are responsible for approximately 70% of the emissions in this source category.

Implementation:

This is a pending federal measure.

Target Reductions:

Reductions from the reformulation of surface coatings are expected to be at least 37%. Because this rule affects a the limited number of manufacturers, RE adjustments are not required.

Projected emissions of 18.34 were taken from the 1996 uncontrolled area source inventory. When the 37% reduction factor is applied, as shown in the above equation, a 6 tpsd creditable reduction is achieved.

6.2.5 CONSUMER PRODUCTS

Background:

The EPA is in the process of adopting regulations controlling emissions from consumer products. These include items sold for household, personal and automotive use that contain VOCs. There are several definitions of consumer products. For the purpose of the pending federal measure they are considered to be any VOC containing products in one of the previously mentioned categories, with the exception of aerosol paints.

This category is, geographically, highly disbursed. There are still several effective alternatives for controlling emissions from this category. These include:

- Product Reformulation
- Use of non-VOC Propellants (including CO2, compressed air and HFC-152a)
- Use of alternative delivery systems (i.e. handpumps or solids)
- Product Substitution

Implementation:

This is a pending federal measure.

Target Reductions:

Reductions from this measure are expected to be at least 25%. After application of the default rule effectiveness factor, a 20% reduction should be applied towards the requirements for the Rate of Progress plan. The reductions were calculated as follows:

Percent Reduction (R): 25%
Default Rule Effectiveness (RE): 80%

$$Creditable\ \mathrm{Re}ductions = R \times RE = 25\% \times 80\% = 20\%$$

Projected emissions of 33 were taken from the 1996 uncontrolled area source inventory. When the 20% reduction factor is applied, as shown in the above equation, 7 tpsd creditable reduction is achieved.

6.3 NONROAD ENGINE CONTROLS

Background:

The use of reformulated gasoline also reduces emissions from nonroad engines. Federal phase 1 reformulated gasoline has, in an ASTM class "C" area, a RVP of 7.8 psi compared to the 9.0 psi RVP assumed in the nonroad calculation methodology.

Implementation:

See section 6.4.3 concerning implementation of the federal reformulated gasoline requirements.

Target Reductions:

This results in a 3.3% reduction in exhaust emissions and a 3.5% reduction in evaporative emissions[14] from two and four stroke gasoline engines.

These reductions were taken from the EPA provided evaporative and exhaust emissions resulting in reductions of 0.59 tpsd. No adjustments were made for double counting of refueling emissions and emission reductions in the nonroad and area source categories since most types of nonroad equipment are not refueled at gas stations.

6.4 TRANSPORTATION CONTROL MEASURES AND STRATEGIES

6.4.1 THE FEDERAL MOTOR VEHICLE CONTROL PROGRAM (FMVCP) AND TIER I NEW VEHICLE EMISSIONS STANDARDS

Background:

The Act requires new Federal motor vehicle emissions standards, called "Tier I Standards", to be phased in beginning in the 1994 model year. This program will be implemented by the Federal government and will affect light duty vehicles and trucks.

This program will require more stringent exhaust emission standards as well as a uniform level of evaporative emission controls, demonstrated through the new Federal evaporative test procedures. The Tier I exhaust standards are to be phased in beginning with model year 1994.

Implementation:

This is a federally implemented measure.

Target Reductions:

Emissions reductions from this program are estimated to be 1 ton of VOCs per day. The Mobile 5a version H model automatically applies these controls unless the input file has been modified to disable the CAAA tailpipe standards and the evaporative test procedure. Beginning with the 1994 model year, vehicles available to the consumer will have been certified to meet these federal Tier I emission standards.

6.4.2 ENHANCED VEHICLE INSPECTION AND MAINTENANCE (I/M)

Background:

This measure involves implementing an enhanced vehicle inspection and maintenance (I/M) program, with requirements stricter than the current "basic" program. In December 1995, Congress enacted the National Highway Systems Designation Act (NHS) which provided the opportunity for states to resubmit I/M programs for EPA's interim approval by March 27, 1996. Pennsylvania made its NHS submission on March 22, 1996.

The National Highway System Designation Act of 1995 (NHS), enacted November 28, 1995 provides that EPA shall not automatically discount decentralized programs and allows states to submit a program based on good faith estimates of projected emission credits. Previously, EPA had only allowed 50 percent credit for test and repair networks.

Implementation:

Pennsylvania currently has a basic I/M in the five county area. The Commonwealth is implementing a customer-friendly decentralized program which will meet EPA's high enhanced I/M standard. Annual inspections will be conducted at service stations or dealers by certified inspectors in conjunction with the safety inspection. Vehicles to be tested include gasoline-fueled cars and trucks of model year 1975 or newer which are 9,000 pounds or under. Some vehicles, such as antiques and classics, will continue to be exempt. All testing facilities will be certified by the Commonwealth. Hands-on training for inspection and repair technicians with a continuing education component will be emphasized.

System enhancements will significantly improve inspection station and motorist compliance. For example, the Pennsylvania State Police will be involved in enforcement. A safety inspection sticker cannot be issued to affected vehicles until the vehicle receives an emission sticker. Data system enhancements at the inspection stations will improve the timeliness of data collection which will enable the Commonwealth to determine problem stations and identify potential candidates for additional audits. Substantially more sophisticated testing equipment will be used.

An extensive public education and information program will take place well before the actual start date for testing.

Amendments to the Motor Vehicle Code (Act 72), enacted December 15, 1995, provide the Commonwealth with the legislative authority to implement the decentralized test and repair program. Additional details can be found in Pennsylvania's Enhanced I/M Program SIP submission of March 22, 1996.

Target Reductions:

Using EPA's Mobile 5a version H model, with inputs as shown in Appendix IV, an emission reduction of 50 tpsd was achieved. In light of the administrative and statutory changes in the I/M program which took place in late 1995, EPA policy provides that states may use a program start date of January 1995 for modeling purposes.

In January 1995, the Commonwealth submitted a 15% plan for the Philadelphia nonattainment area that included a centralized, test-only I/M program. The emission reduction in this SIP revision is slightly more than that projected in the January 1995 SIP revision because:

- the test-only program was biennial, while the new test and repair program will be annual. Therefore, in the current plan, the modeling for 1996 captures a full year of testing for all vehicles.

- no credits were available in the 1995 SIP revision for technician training and certification. Allowable credits have now been quantified by EPA and are included in this plan.

- the test includes an enhanced anti-tampering program.

6.4.3 REFORMULATED GASOLINE

Background:

This program requires the use of lower polluting "reformulated" gasoline in the Philadelphia CMSA. This will affect all gasoline powered vehicles and will also reduce evaporative emissions from service stations.

At a minimum, reformulated gasoline must not cause an increase in NOx emissions, have an oxygen content of at least 2.0 percent by weight, have a benzene content no greater than 1.0 percent by volume, contain no heavy metals and contain detergents. Most importantly, the Act requires a reduction in VOC and toxic emissions of 15 percent over baseline levels beginning in 1995 and 25 percent beginning in the year 2000.

Implementation:

This is a federally implemented program. This program began on January 1, 1995.

Target Reductions:

Use of reformulated gasoline is expected to reduce VOC emissions by 26 tons per day in the Philadelphia CMSA for highway vehicles.

7. CONTINGENCY MEASURES AND ACTIVITIES

Background:

States are required[15] to have specific contingency measures that will take effect with minimal further action by the state or the EPA if the state fails to reduce VOC emissions 15 percent by November 15, 1996, or if any of the state's nonattainment areas fail to meet the emission reduction milestones or NAAQS prescribed by the Act.

The contingency measures identified by the state must be sufficient to secure an additional 3 percent reduction in ozone precursor emissions in the year following the year in which the failure has been identified. If the shortfall is less than 3 percent, a contingency measure need only cover that smaller percentage. If the shortfall is greater than 3 percent, the state, in an annual tracking report, must either identify the additional actions it will take to cure the shortfall before the next milestone or maintain a reserve of contingency measures capable of covering a shortfall greater than 3 percent. Early implementation of an emission reduction measure to be carried out in the future is acceptable as a contingency measure.

Reductions in NOx can be substituted for a portion of the required VOC reductions. In this case, the NOx inventory must be reduced by an percent equivalent to the percentage VOC reductions it replaces.

This contingency plan is required to show measures sufficient to obtain a reduction of 18 tpsd of VOC, or a combination of VOC and NOx controls showing equivalent reductions. The contingency plan contains almost 29 tpsd of VOC reduction and NOx reductions equivalent to more than 1 tpsd of VOC reduction. Reductions from implemented measures which exceed the 3 percent contingency measure requirement will be used to meet the annual post-1996 Rate of Progress reduction requirements.

VOC Measures

7.1.1 IMPROVED RULE EFFECTIVENESS (RE)

Background:

This activity involves enhancing rule compliance by increasing or, in other ways, improving the implementation or enforcement of an existing rule which is already part of the SIP.

Section 3.3.2.2 contains an explanation of how rule effectiveness (RE) affects the emission inventory. Pennsylvania, in accordance with EPA guidance, applies 80%

RE to sources with control devices which cannot quantify their emissions through direct determination methods.

The projected emission reductions are based on an RE increase from 80 to 90% which yields a 10% improvement in RE. The amount of creditable reductions identified in this plan were calculated using this 10% improvement as applied to the sources specified in the attached plan at their inventory emission levels. Calculations using the proposed matrix activities, however, show that improvements well in excess of 10% will result from this initiative.

To estimate creditable emission reductions from RE improvements, state and local agencies require a method to quantify the predicted RE increase. The methodology must determine the impact of specific improvement activities available to a state or local agency. In the absence of any compliance or emissions data to quantitatively assess RE improvement activities, EPA's Ozone/Carbon Monoxide Programs branch developed an RE matrix[14]. The RE matrix is based on a questionnaire that the EPA used to estimate base rule effectiveness for source categories. The following principles guided the development of the matrix.

- All state and local agencies should be guaranteed at least 80% base RE.
- State and local agencies with an RE well above the 80% default should receive more emission reduction credit for an RE improvement.
- RE improvements should be documented in a permit or in a SIP.
- 100 percent RE is achieved in cases of direct determinations of emissions or elimination of VOCs or other pollutants through an irreversible process.

The matrix is divided into thirteen categories representing the range of activities and conditions that influence rule effectiveness. The 13 categories are:

- Training of Plant Operators
- Inspector Training
- Educational Opportunities for Source
- Procedures for Operation and Maintenance
- Clarity of Testing Procedures and Schedules
- Rule Effectiveness Evaluation Program
- Monitoring
- Type of Inspection
- Administrative Authority - Prison
- Administrative Authority - Fines
- Administrative Authority - Citations

- Media Publication of Enforcement Actions
- Follow-up Inspections

The matrix includes subcategories for six of these categories. Activities which are the most specific in the matrix are arranged in descending order with the first activity having the most significant impact on RE.

Implementation:

In order to achieve creditable rule effectiveness (RE) improvement emission reductions the following items describe the plan and those actions which are currently planned or in progress for implementation or enforcement of existing rules which are already part of the SIP.

The Department will implement this plan and achieve at least a 25 tpsd reduction. The plan contains the selected matrix activities to be implemented and sufficient sources to achieve the planned reduction. Preliminary calculations using the planned activities indicate an average RE of over 94% (see calculation in plan). This will result in reductions in excess of the emission reduction being used for credit in the 15% plan which can be credited to future 3% RFP requirements.

The matrix activities listed in the plan are the minimum items to be implemented and are currently in the process of being implemented at the affected facilities. This includes changes to Department procedures, plans and work practices, and the incorporation of activitiess through appropriate permit revisions at the sources identified in the plan. These activities will be completely incorporated prior to the protocol study.

The matrix activities were conservatively selected, each are fully implementable; for instance, for those activitiess requiring increased field inspections, the staff resources are available, staff work plans will incorporate these activities and records will be maintained which indicate that the required inspections took place.

Additional activities are possible however, and these are also identified, but were not included in the initial calculation of expected RE. These activities will be implemented if feasible which is quite likely in some instances. The addition of activitiess, along with the fact that the currently planned activities indicates an RE of over 94%, will ensure that the projected RE will equal or exceed the 90% level. Additionally, the sources identified in the plan constitute a preliminary set of affected sources; however, applicability is not necessarily limited to these sources. Nevertheless, without increasing the number of activities and/or source applicability, the projected

emission reduction will be exceeded since the projected RE is at least 94% and covers the minimum level of emissions per the sources listed.

The following is an outline of the RE improvement plan:

Actions/Schedule:
1. Select matrix activities and identify affected sources-*Completed*. However, more activities and sources will be added as practicable.
2. Plan development-*Completed*. Several meetings were held with the regional staff in order to develop the plan. The regional operations staff (field inspectors) was provided with background on RE and the proposed plan, including the SSCD. Matrix activities were selected in a collaborative effort. Affected sources were contacted to ensure feasibility of implementing those activities which would affect them directly.
3. Implement matrix activities-*In progress*. Activities will be added to permits and Department work plans. Each facility activities will be incorporated into Title V facility permits. Department activities, as listed, will be implemented by the Department. Documentation will be incorporated into training and operating plans.
4. SSCD- *In progress*. Initial contact with EPA Region III completed. Contact with EPA SSCD section must be made, and a schedule and specific protocol devised and agreed to which assures completion of the study.

Matrix/Activities:
Selected activities for upgrade actions as contained in the EPA's matrix. *{matrix item reference identification}*

1**.** ***Facility Activities*** - to be added to permit conditions. *(will affect 100% of plant emissions)*:

A. Training of plant operators
   a) Require formal operator introductory operator training course of 41-80 hours. *{A.1.b.}*
   b) Require operators to take annual refresher training annually of 25-40 hours. *{A.1.c}*
   c) Require appraisal and update of training program every 4 or more years. *{A.3.c}*

B. Procedures for operation and maintenance of control and/or process equipment.
   a) Have equipment operators follow and sign daily O&M instructions. *{D.a.}*

C. Monitoring.

a) Require source specific enhanced monitoring procedures with a detailed self-evaluation schedule and use these data for compliance purposes. *{G.1.a.}*
b) Enhanced monitoring records filed with agency every 4-6 months. *{G.2.b}*

2. Department Activities:

A. Inspector Training

a) Formal inspector introductory courses, more than 80 hours. *{B.1.a.}*
b) Receive source-specific, inspector -refresher course with annual hours averaging 41-80 hours. *{B.2.a}*
c) Frequency with which appraisal and update training program is held for inspectors, every six months to a year. *{B.3.b}*

B. Rule Effectiveness Evaluation Program

a) Highest level category specific rule monitoring and evaluation, SSCD protocol study. *{F.1.a}*
b) Highest level of follow-up from rule monitoring and evaluation, rule corrections made based on SSCD protocol study result. *{F.2.a}*

3. Potential additional activities - not included in preliminary calculation or plan:

A. Clarity of testing procedures and schedules

a) Specific guidelines on testing and test method requirements and frequency schedule. *{E.1.a}*

B. Educational opportunities for sources

a) Frequency in years of workshops held by regulatory authority for industry on regulatory requirements, every year to two years. *{C.1.c}*
b) Frequency in years with which information packages on regulatory requirements are sent by the regulatory authority to sources, every year to two years. *{C.2.c}*

C. Types of Inspection

a) Level 3: detailed engineering analysis of process parameters, internal inspection of process and/or control devices. *{H.1.b}*

Target Reductions:

Calculation Of Projected RE And Reductions**:**

The following calculations are done in accordance with EPA manual EPA 452/R-94-001, *Rule Effectiveness Guidance: Integration of Inventory, Compliance, and Assessment Applications*, Page 4-10, section 4.5 Example was followed. The matrix equation/methodology calculation provides a number representing the increase in RE.

Definitions:

The Rule Effectiveness Raw Score (RERS) is defined as:

$$RERS = \sum_{G=1}^{n} \{G(x_s) \sum_{F=1}^{m} [F(t, G(x_s), f)] - [F(t, G(x_s), o) \times y(t, o)]\}$$

Where:

$G(x_s)$ = Weight assigned to subcategory s of matrix category x

$F(t,G(x_s))$ = Weight assigned to activity t of subcatagory s

$F(t,G(x_s),o)$ = Value of activity t of subcatagory s *before* RE improvement is implemented

$F(t,G(x_s),f)$ = Value of activity t of subcatagory s *after* RE improvement is implemented

$y(t,o)$ = Emissions corresponding to facilities implementing activity t as a % of the total emissions from a source category *before* improvement is implemented, where applicable, or 1

$z(t,f)$ = Emissions corresponding to facilities implementing activity t as a % of the total emissions from a source category *after* improvement is implemented, where applicable, or 1

Example:

$G(A_1) = 9$
$F(e(A_1)) = 1$
$F(b(A_1)) = 8$
$F(e(A_1),o) = F(e(A_1)) \times 100\% = 1$
$F(e,b(A_1),f) = [F(b(A_1) \times 100\%)] + [F(e)(A_1) \times 0\%] = 8$
$F(e,b\ (A_1),f) - F(e(A_1),o) = 8 - 1 = 7$

Using the RERS equation the value to be summed with the other activities is: $7 \times G(A_1) = 63$,

Similarly,

$G(A_2) = 28$
$G(A_3) = 7$
$G(B_1) = 81$
$G(B_2) = 42$
$G(B_3) = 30$
$G(C_1) = 6$
$G(C_2) = 6$
$G(D) = 180$
$G(E) = 153$
$G(F_1) = 36$
$G(F_2) = 36$
$G(G_1) = 135$
$G(G_2) = 80$
$G(H) = 147$
$G(I) = 56$
$G(J_1) = 48$
$G(J_2) = 36$
$G(K) = 99$
$G(L) = 0$
$\underline{G(M) = 0}$
$RERS = 1269$

$RE(o) = 80\%$
$RERS = 1269$
$RERS(max) = 1818$

$RE(i) = (100\% - 80\%) \times (1269/1818) = 14.0\%$

$RE(f) = 80\% + 14.0\% = 94.0\%$

Calculation of the emission reduction should use the formula (4) on page 4-6 of the EPA guidance manual. However, it is in error (see Memo from John Silvasi for explanation). The correct method requires that the inventory method of calculating RE be used for RE_o and RE_f. Therefore, since the Department used the RE emissions calculation method from page 3-5, section 3.1.3.3 "Applying RE" which stated that:

RE emissions = Uncontrolled emissions × (1-(CE/100 × RE/100)

The reduction is thus equal to:

RE_f emissions at 90% RE-RE_o emissions at 80% RE

Each facility was calculated using its permitted CE and the a 90% RE, the calculations resulted in an emission reduction of 19 tons per day. Table 7.1 reflects the results of the calculations, and Table 7.2 lists the affected facilities.

Sample Calculation:
Source ID# 22-19035180

$$RE_o\ Emissions = 0.4 \times (1 - \left(\frac{95}{100} \times \frac{80}{100}\right)) = 0.10$$

$$RE_f\ Emissions = 0.4 \times (1 - \left(\frac{95}{100} \times \frac{90}{100}\right)) = 0.06$$

RE Emissions = RE_o - RE_f = 0.10-0.06 = 0.04

Table 7.1 Detail of Reductions from 90% and 94% Rule Effectiveness

Category	Reductions from 90% Rule Effectiveness					
	Bucks *tpsd*	**Chester** *tpsd*	**Delaware** *tpsd*	**Montgomery** *tpsd*	**Philadelphia** *tpsd*	**Total** *tpsd*
Storage Transport and Marketing of VOCs	0.00	0.00	0.00	0.00	0.00	0.00
Industrial Processes	0.00	0.00	0.00	0.00	0.75	0.75
Industrial Surface Coating	4.13	1.40	12.27	0.00	0.00	17.80
Other Solvent Use	0.16	0.18	0.00	0.09	0.00	0.43
Waste Disposal	0.00	0.00	0.00	0.00	0.00	0.00
Misc. Sources	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL:	**4.29**	**1.58**	**12.27**	**0.09**	**0.75**	**18.98**

Category	Reductions from 94% Rule Effectiveness					
	Bucks *tpsd*	**Chester** *tpsd*	**Delaware** *tpsd*	**Montgomery** *tpsd*	**Philadelphia** *tpsd*	**Total** *tpsd*
Storage Transport and Marketing of VOCs	0.00	0.00	0.00	0.00	0.00	0.00
Industrial Processes	0.00	0.00	0.00	0.00	1.04	1.04
Industrial Surface Coating	5.78	1.96	17.17	0.00	0.00	24.91
Other Solvent Use	0.23	0.25	0.00	0.13	0.00	0.61
Waste Disposal	0.00	0.00	0.00	0.00	0.00	0.00
Misc. Sources	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL:	**6.01**	**2.21**	**17.17**	**0.13**	**1.04**	**26.56**

Table 7.2 Rule Effectiveness Improvement - Facilities List

Company	Reductions From RE Improvement		
	80%-90% *tpsd*	**90%-94%** *tpsd*	**80%-94%** *tpsd*
Congoleum Corp	12.27	4.91	17.17
Dunmore Corp.	0.11	0.04	0.15
Paramount Packaging Corp.	0.24	0.10	0.33
Pre-Finished Metals Inc.	0.38	0.15	0.53
Cleveland Steel Container Corp.	0.02	0.01	0.02
Brown Printing Corp.	0.09	0.04	0.13
NVF Co.	1.40	0.56	1.96
Reynolds Metals Co.	0.18	0.07	0.25
Fasson Div. of Avery Prod.	3.56	1.42	4.98
Allied Chemical Corp.	0.12	0.05	0.16
Kurz-Hastings Inc.	0.63	0.25	0.88
Totals:	18.97	7.59	26.56

7.1.2 IMPROVED RULE EFFECTIVENESS (90-94%)

Background:

see section 3.3.2.2

Implementation:

Section 3.3.2.2 describes the implementation of this strategy.

Target Reductions:

Reductions of 8.63 tpsd from this strategy have been calculated.

7.1.3 HIGHWAY MARKING WATER BASE CONVERSION

Background:

The estimates for traffic marking VOC emissions are based on population numbers. Included in these estimates are all pavement marking activities. One portion of this activity, highway markings, is exclusively conducted by the Pennsylvania Department of Transportation (PENNDOT). The Department has quantified its use of VOC for this purpose in 1990 within the five county nonattainment area. A conversion to water base paint was completed in 1994. The Department has consented to permanently continue its use of water base paints capped at the 1994 level.

Implementation:

This measure required that emission levels were verified by the PENNDOT labs and field staff. A consent agreement will be executed to ensure the reduction is permanent.

Target Reductions:

The reduction is based solvent usage, painting season and average work-day patterns provided by PENNDOT. For planning purpose, PENNDOT assumes its painting crews work for a 100 day painting season.

1990 Highway Marking Paint Usage

Paint Type	lbs/gal VOC	Usage	VOC tpy
White	3	66000	99
Yellow	3.05	95000	145

1996 Projected Highway Marking Paint Usage

Paint Type	lbs/gal VOC	Usage	VOC tpy
White	.83	64000	26.5
Yellow	1.4	87000	61

Daily Emissions = Annual Emissions/Days of Usage
Daily Emissions$_{1990}$ = 244/100 = 2.44tpsd
Daily Emissions$_{1996}$ = 87.5/100 = .875tpsd

Reduction = Daily Emissions$_{1990}$ - Daily Emissions$_{1996}$
= 2.44tpsd - .875tpsd
= 1.565tpsd

Total reduction is about 1.57 tons per summer day.

NOx Measures

7.1.4 SOURCE AND PROCESS SHUTDOWNS

As stated in section 6.1.2 of this plan, Pennsylvania regulations require a 1.3:1 offset ratio for banked emissions. Several companies have banked NOx emissions in accordance with 25 Pa. Code 127(E).

Company Name	Tons NOx Banked
U.S. Steel Fairless Hill	1420.06
Martin Marietta Astro Space	6.78
Wyeth-Ayerst Labs	18.55
Marck Company Inc.	.21
Total	1445.60

This is equivalent to 3.96 tpsd of emissions. After the offset ratio is applied, a 1 tpsd reduction in NOx results.

To convert the NOx reduction to a creditable VOC reduction the following formula is used:

$$R_{VOC} = VOCbase \times \left(\frac{R_{NOx}}{NOxbase} \right)$$

$$R_{VOC} = 582.53 \, tons/day \times \left(\frac{1.19 \, tons/day}{415.55 \, tons/day} \right)$$

$$R_{VOC} = 1.67 tpsd$$

Where:

RVOC = Reduction in VOC
RNOx = Reduction in NOx
VOCbase = 1990 Adjusted Baseline VOC emissions
NOXbase = 1990 Adjusted Baseline NOx emissions

Total equivalent VOC reduction is 1.67 tpsd.

The following table summarizes the 1990 Adjusted Baseline NOx emissions:

1990 Baseline NOx Emission Summary

Source Type	NOx tpsd
Stationary	152.83
Mobile	143.39
Area	23.39
Non-Road	95.94
Total	415.55

8. PUBLIC HEARING SCHEDULE

Requirements for public process are detailed in 42 U.S.C.A. 7410(a)(2) and 40 C.F.R. 51.102(d)[16]. The public hearings on the 1990 Baseline Inventory, the 1990 Adjusted Baseline Inventory and the 1996 Projected Inventory were held on August 30, 1993, August 31, 1993 and September 1,1993. These hearings complied with all applicable requirements.

The public hearing for the 15 Percent Rate of Progress plan submitted November 15, 1993, was held on December 22, 1993. The Comment/ Response Document is available upon request.

The public comment period for this revision to the 15% plan, and for the applicable corrections to the 1990 baseline inventory was from June 24, 1996 to July 22, 1996. The public hearing was held on July 22, 1996.

9. REFERENCES AND ENDNOTES

[1] 42 U.S.C.A. §7401 et seq., as amended by the Clean Air Act Amendments of 1990, P.L. 101-594, November 15, 1990(act). Also referred to, in this document, as "the Act" and the "CAAA90."

[2] U.S. Environmental Protection Agency. 1991. Non-road Engine and Vehicle Emission Study-Report. EPA 21A-2001, Office of Air and Radiation, Washington, D.C., 1991. pp. 1 to 118.

[3] Memorandum from Phil Lorang, Director, Emission Planning and Strategies Division, U.S. Environmental Protection Agency, to EPA Regional Office Air Directors, Status of Nonroad Inventory Work. April 27, 1992. pp. 1 to 5.

[4] Procedures for Emission Inventory Preparation, Volume IV; Mobile Sources (EPA-450/ 4-81-06d (Revised)), January 1992 and The Users Guide to Mobile 5a Emission Factor Model (EPA-AA-TEB-91,01), April 1993.

[5] The Clearing House for Inventories/ Emission Factors (CHIEF); Subsystem of the Technology Transfer Network Bulletin Board System (TTN-BBS). maintained by U.S.E.P.A. Office of Air Quality Planning and Standards (OAQPS). Public access is available at 1200, 2400, 9600 bps (N,8,1) @ (919) 541-5742.

[6] Version of the Biogenic Emissions Inventory System (PC-BEIS). U.S. Environmental Protection Agency. Office of Air Quality Planning, Research Triangle Park, North Carolina, July 1991.

[7] 42 U.S.C.A. §7511a(b)(1)

[8] U.S.E.P.A., Procedures for Preparing Emissions Projections, July, 1991.

[9] U.S. Dept. of Commerce, Bureau of Economic Analysis, BEA Regional Projections to 2040, June, 1990.

[10] 40 C.F.R. Part 52; 57 Federal Register 13509 (1992)

[11] Perchloroethylene emissions were removed from the 1990 Baseline Inventory because of the EPA determination that it is a "negligibly reactive volatile organic compound" see EPA memo; Perchloroethylene Emissions from Degreasing, from G.T. Helms to EPA Regional Air Branch Chiefs, May 13, 1993.

[12] 42 U.S.C.A. §7511a(b)(1)(B) requires all states to eliminate the effect of both the January 1, 1990, FMVCP program and the June 11, 1990, Federal Reid Vapor Pressure (RVP) regulations from their 1990 Adjusted Baseline Inventory. Since both these measures pre-date the 1990 Clean Air Act Amendments states are not permitted to take credit for emission reductions from these sources

[13] RACT "fix-ups", like the FMVCP and RVP, may not be considered as part of the required 15% reduction under the Act since they were required prior to 1990 - even if they were not implemented before 1990. See 42 U.S.C.A. §7511a (b)(1)(D).

[14] Memorandum from Phil Lorang, Director, Emission Planning and Strategies Division, U.S. Environmental Protection Agency, to EPA Regional Office Air Directors, VOC Emissions Benefits for Nonroad Equipment with the Use of Federal Phase 1 Reformulated Gasoline, August 18, 1993.

[15] 42 U.S.C.A. §7502(c)(9)

[16] The listed regulations, in part, require the following:

- Prominent advertising in the affected area
- Availability of the proposed revisions for public review
- Notification to the local EPA Regional Office
- Notification to any affected local agencies
- Notification to any other affected state

APPENDIX I. DEFINITIONS

AADT	Average Annual Daily Traffic
AWDT	Average Weekday Traffic
AFS	AIRS Facility Subsystem
AIRS	Aerometric Information Retrieval System
ALAPCO	Association of Local Air Pollution Control Officials
AMS	Area and Mobile Subsystem
BAQ	PA DEP Bureau of Air Quality
BEA	U.S. Dept. of Commerce, Bureau of Economic Analysis
BPR	Bureau of Public Roads
BTSP	PA DOT Bureau of Transportation System Performance
CAAA	Clean Air Act Amendments of 1990
CAP	Compliance Advisory Panel
CFR	Code of Federal Regulations
CHIEF	Clearing House for Inventory/ Emission Factors
CMSA	Consolidated Metropolitan Statistical Area
CTG	Control Techniques Guidance
DEP	PA Department of Environmental Protection
DVMT	Daily Vehicle Miles Traveled
DVRPC	Delaware Valley Regional Planning Commission
E-GAS	Economic Growth Analysis System
EEA	Energy and Environmental Analysis Inc.
EIB	U.S. EPA Emission Inventory Branch
EPA	U.S. Environmental Protection Agency
ETR	Employer Trip Reduction
FIPS	Federal Information Procedures System
FMVCP	Federal Motor Vehicle Control Program
HPMS	Highway Performance Monitoring System
LTO	Landing Take-off Operations
MACT	Maximum Available Control Technology
MSS	Major Stationary Sources
NAAQS	National Ambient Air Quality Standards
NEDS	National Emissions Data System
OAM	Organization, Administration and Management
OAQPS	Office of Air Quality Planning and Standards
PC-BEIS	Biogenic Emissions Inventory System
PEDS	Pennsylvania Emissions Data System
PENNDOT	Pennsylvania Department of Transportation
Perc.	Perchloroethylene

PPAQ	Post Processor for Air Quality
RACT	Reasonably Available Control Technology
RMS	Roadway Management System
RVP	Reid Vapor Pressure
SIC	Standard Industrial Classification
SIP	State Implementation Plan
STAPPA	State and Territorial Air Pollution Program Administrators
TCM	Transportation Control Measure
TDM	Traffic Demand Model
TPD	Tons Per Day
TPSD	Tons Per Summer Day
TRI	Toxic Release Inventory
TTN	Technology Transfer Network
UAM	Urban Airshed Model
USR	Urban, Small-urban and Rural
VHT	Vehicle Hours of Travel
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound