FINAL PITTSBURGH-BEAVER VALLEY AREA OZONE MAINTENANCE PLAN AND REQUEST FOR REDESIGNATION AS ATTAINMENT FOR OZONE

MAY 15, 2001

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ACRONYMS AND ABBREVIATIONS

AEO	Annual Energy Outlook
AIM	architectural and industrial maintenance
CAA	Clean Air Act
CMSA	consolidated metropolitan statistical area
CO	carbon monoxide
CTG	Control Techniques Guideline
DEP	Department of Environmental Protection
DOT	Department of Transportation
EGAS	Economic Growth Analysis System
EPA	U.S. Environmental Protection Agency
FMVCP	Federal Motor Vehicle Control Program
FTP	Federal Test Procedure
GVWR	gross vehicle weight rating
HAP	hazardous air pollutant
HDDV	heavy-duty diesel vehicle
I/M	inspection and maintenance
LDGTs	light-duty gasoline trucks
LDGT1s	light-duty gasoline trucks 1 (< 6,000 pounds GVWR)
LDGT2s	light-duty gasoline trucks 2 (< 6,000 - 8,500 pounds GVWR)
LDGVs	light-duty gasoline vehicles
LRP	long range plans
MACT	maximum achievable control technology
MSA	metropolitan statistical area
MVMA	Motor Vehicle Manufacturers Association
NAAQS	National Ambient Air Quality Standard
NESHAP	National Emission Standard for Hazardous Air Pollutants
NO_x	oxides of nitrogen
OMS	Office of Mobile Sources
PennDOT	Pennsylvania Department of Transportation
PM_{10}	particulate matter under 10 microns
POTW	publicly-owned treatment works
ppb	parts per billion
ppm	parts per million
PSD	prevention of significant deterioration
psi	pounds per square inch
RACT	reasonably available control technology
REMI	Regional Economic Models, Inc.
RVP	Reid vapor pressure
SIC	Standard Industrial Classification
SIP	State Implementation Plan
TIPs	Transportation Improvement Programs
TSDF	treatment, storage, and disposal facility
VMT	vehicle miles traveled
VOC	volatile organic compound
VRS	vapor recovery systems

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EXECUTIVE SUMMARY

This report is a formal request to the U.S. Environmental Protection Agency (EPA) to redesignate the Pittsburgh-Beaver Valley Ozone Nonattainment Area to attainment of the health-based one-hour ozone National Ambient Air Quality Standard (NAAQS). It summarizes the progress of the area in attaining the ozone standard, demonstrates that all Clean Air Act (CAA) requirements for attainment have been adopted and presents a maintenance plan to assure continued attainment over the next ten years.

Analyses included in this document show that measured ambient air quality has attained the NAAQS for ozone and that the emission reductions responsible for the air quality improvement are both permanent and enforceable. This report also includes a maintenance plan that provides for maintenance of the ozone NAAQS for 10 years after redesignation.

The Pittsburgh-Beaver Valley Area was classified by the U.S. Environmental Protection Agency (EPA) as a moderate ozone nonattainment area on November 6, 1991. The primary years used by EPA for the purposes of establishing ozone designations and classifications were 1987 to 1989. For this base year period, the Pittsburgh-Beaver Valley Area ozone design value was 0.149 parts per million (ppm). The comparable design value for the 1998-2000 period is 0.123 ppm. The number of expected exceedances declined from 7.0 days per year during 1987-1989 to 1.0 days per year during 1998-2000.

Figures 1 and 2 show the estimated volatile organic compound (VOC) and oxides of nitrogen (NO_x) emissions by major source category for 1990, 1999, and the end of the maintenance period, 2011. VOC and NO_x are the primary precursors for ozone formation. Emission reductions that occur between 1990 and 1999 are primarily attributable to controls on highway vehicles, electric utility/industrial boilers and industrial VOC sources. Highway vehicle reductions are attributed to a combination of the Federal Motor Vehicle Control Program (FMVCP) (fleet turnover), the automobile test and repair program, stage II controls at service stations and lower gasoline volatility. Continued emission reductions are expected through the maintenance year of 2011 due to the Chapter 145 NOx SIP Call regulations for large boilers and turbines, the highway vehicle control programs including National Low Emission Vehicles (NLEV) and Tier II/low sulfur gasoline rules.

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Figure 1: VOC Emissions

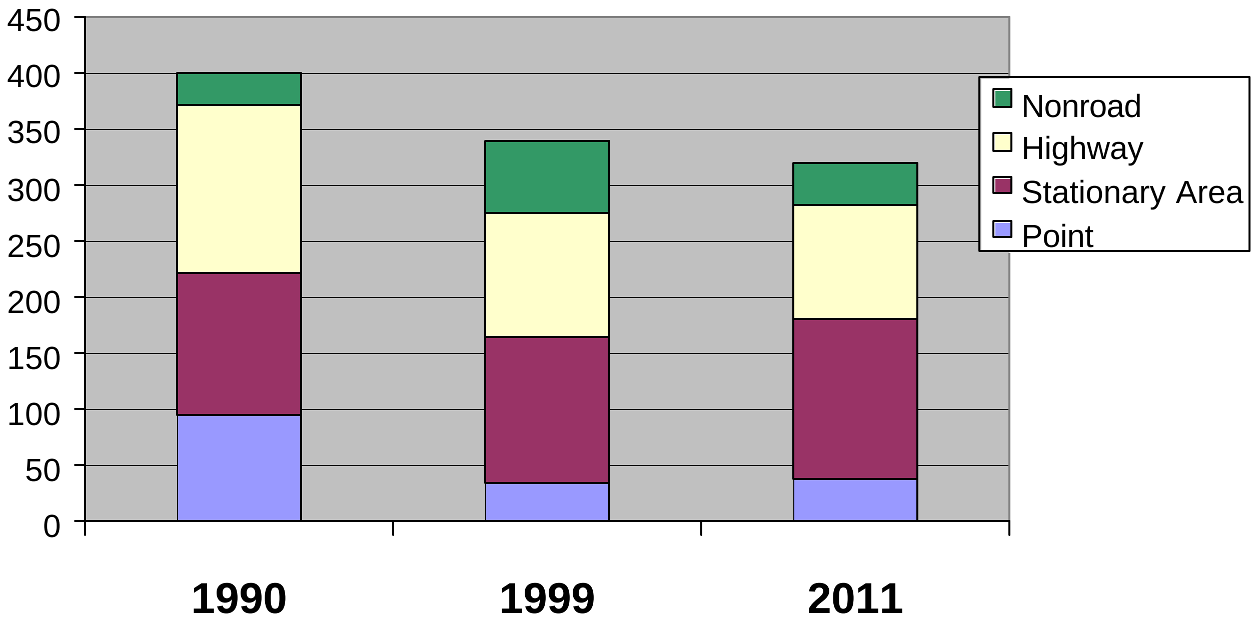
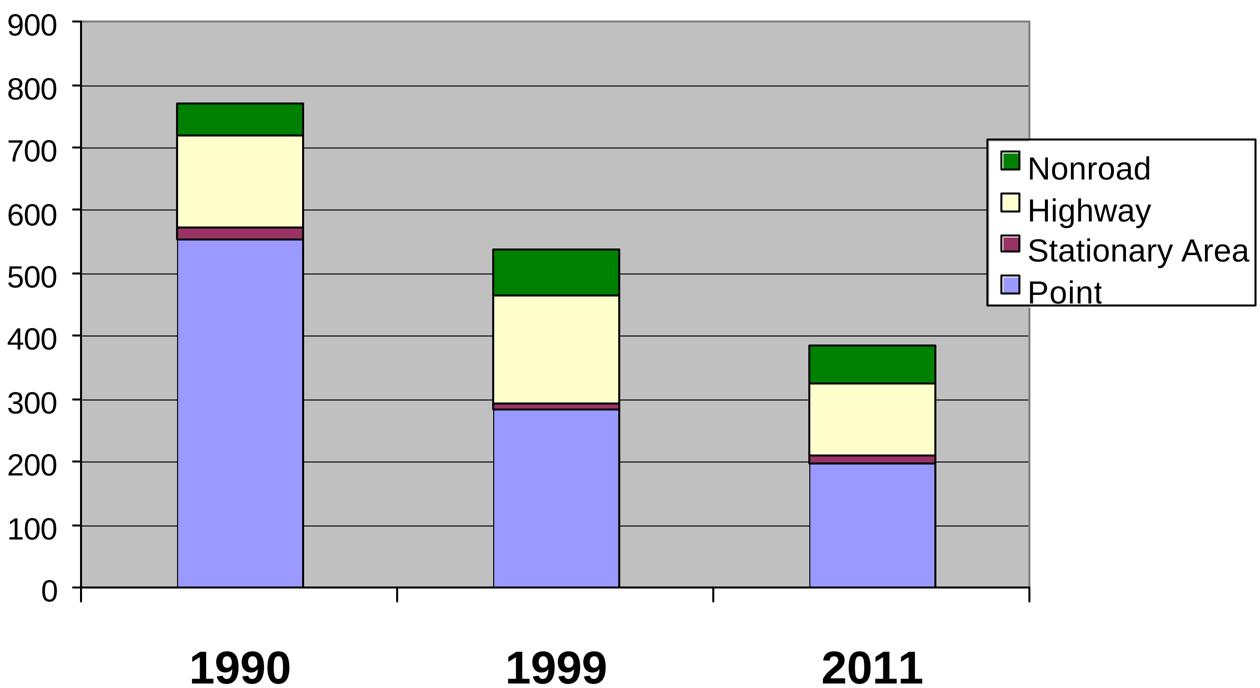


Figure 2: NO_X Emissions



The following are state and federal emission reduction strategies adopted since 1990 that are included in this plan.

Stationary Point Sources

Reasonably Available Control Technology regulations
NOx Memorandum of Understanding rules for utility and industrial boilers
Coke Oven NESHAPS
Prevention of Significant Deterioration review
New Source Review
Section 145 (NOx SIP Call) for utility and industrial boilers

Stationary Area Sources

EPA rules for:

- automobile refinish coatings
- many consumer products
- architectural and industrial maintenance coatings
- wood furniture coatings
- aircraft surface coatings
- marine surface coatings
- metal furniture coatings
- municipal solid waste landfills
- waste treatment, storage and disposal

Additional state regulations on automobile refinishing
Refueling (Stage II) at service stations

Highway Vehicles

Federal Motor Vehicle Control Program including onboard control of evaporative and refueling emissions
Southwestern Pennsylvania gasoline volatility controls
Vehicle emissions inspection/maintenance
National Low Emission Vehicle (NLEV) program
EPA's heavy-duty diesel engine standards (2004 program)
EPA's Tier 2/low sulfur gasoline program for light-duty vehicles

Nonroad Sources

EPA rules for large and small compression-ignition engines
EPA rules for smaller spark-ignition engines
EPA rules for recreational spark-ignition marine engines

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INTRODUCTION

The 1990 Amendments to the Clean Air Act (CAA) authorized EPA to designate ozone nonattainment areas and to classify them according to degree of severity. An area is designated as an ozone nonattainment area if a violation of the NAAQS for ozone has occurred in the past 3 years anywhere in the designated metropolitan statistical area (MSA) or consolidated metropolitan statistical area (CMSA). An ozone nonattainment area can be classified as marginal, moderate, serious, severe, or extreme, depending on the level of violations. Ozone design values are used for classifying areas into attainment and nonattainment categories. The ozone design value is a measure of the maximum ozone concentration expected to occur within an area.

This report constitutes a formal request to EPA to redesignate the Pittsburgh-Beaver Valley Ozone Nonattainment Area to attainment of the ozone NAAQS. The subsequent analyses clearly demonstrate that the ambient air quality in the Pittsburgh-Beaver Valley Nonattainment Area meets the national standards for ozone and the emission reductions responsible for the air quality improvement are both permanent and enforceable. This analysis demonstrates that the Pittsburgh-Beaver Valley Area has completed all criteria set forth in section 107(d)(3)(E) of the CAA and should be officially redesignated as attainment.

Section 107(d)(3)(E) of the CAA, as amended, states that an area can be redesignated to attainment if the following conditions are met:

1. The NAAQS has been attained;

2. The applicable implementation plan has been fully approved under Section 110(k);

3. The improvement in air quality is due to permanent and enforceable reductions in emissions;

4. The State has met all applicable requirements for the area under Section 110 and Part D; and

5. A maintenance plan with contingency measures has been fully approved under Section 175A .

An ambient air quality data analysis was performed that demonstrates that the NAAQS has been achieved within the Pittsburgh-Beaver Valley Area. Fully approved methodologies, as established by EPA, were used to calculate expected exceedances and design values.

Subsequently, a 1990 emissions inventory was compiled for VOC, and NO_x emissions, the primary contributing factors to ozone formation. In addition, 1999 emissions were estimated based on projected economic activity as part of the maintenance plan. This analysis supports the contention that contributing emissions are declining, which will likely lead to further reductions in ambient ozone levels.

Pennsylvania's State Implementation Plan (SIP) should be fully approved by the time the Pittsburgh-Beaver Valley Area is redesignated as attainment. At the present time, approval actions on remaining SIP modifications are currently being completed. However, since approval actions on SIP elements and the redesignation request may occur simultaneously, this should not delay or preclude the approval of this redesignation request. The ozone levels in the Pittsburgh-Beaver Valley Area are currently below the standard and all of the relevant requirements have been met by the Commonwealth of Pennsylvania.

An analysis of existing and potential control measures was also performed to determine the control options necessary for maintaining present ozone levels and implementing contingency measures in the event of any exceedance.

CHAPTER I
AMBIENT AIR QUALITY DATA ANALYSIS

A. INTRODUCTION

The Pittsburgh-Beaver Valley Ozone Nonattainment Area, established by EPA on November 6, 1991 (56 FR 56694, 1991), includes Allegheny, Armstrong, Beaver, Butler, Fayette, Washington and Westmoreland Counties. The analyses in this redesignation request examine the air quality data monitored in these counties and shows that ozone concentrations are now in attainment with the ozone NAAQS.

The Pittsburgh-Beaver Valley Area has been classified as a moderate nonattainment area for ozone. In order to be classified as moderate, an area must have a design value between 0.138 and 0.160 ppm. The primary years used by EPA for the purposes of establishing ozone designations and classifications were 1987 to 1989. Since that time, the air quality in the Pittsburgh-Beaver Valley Area has improved significantly, and is now in compliance with the established ozone NAAQS. This report shows that, based on the most recent 3-year period of analysis, the ozone design value now meets the 0.12 ppm standard and is expected to remain so in the coming years.

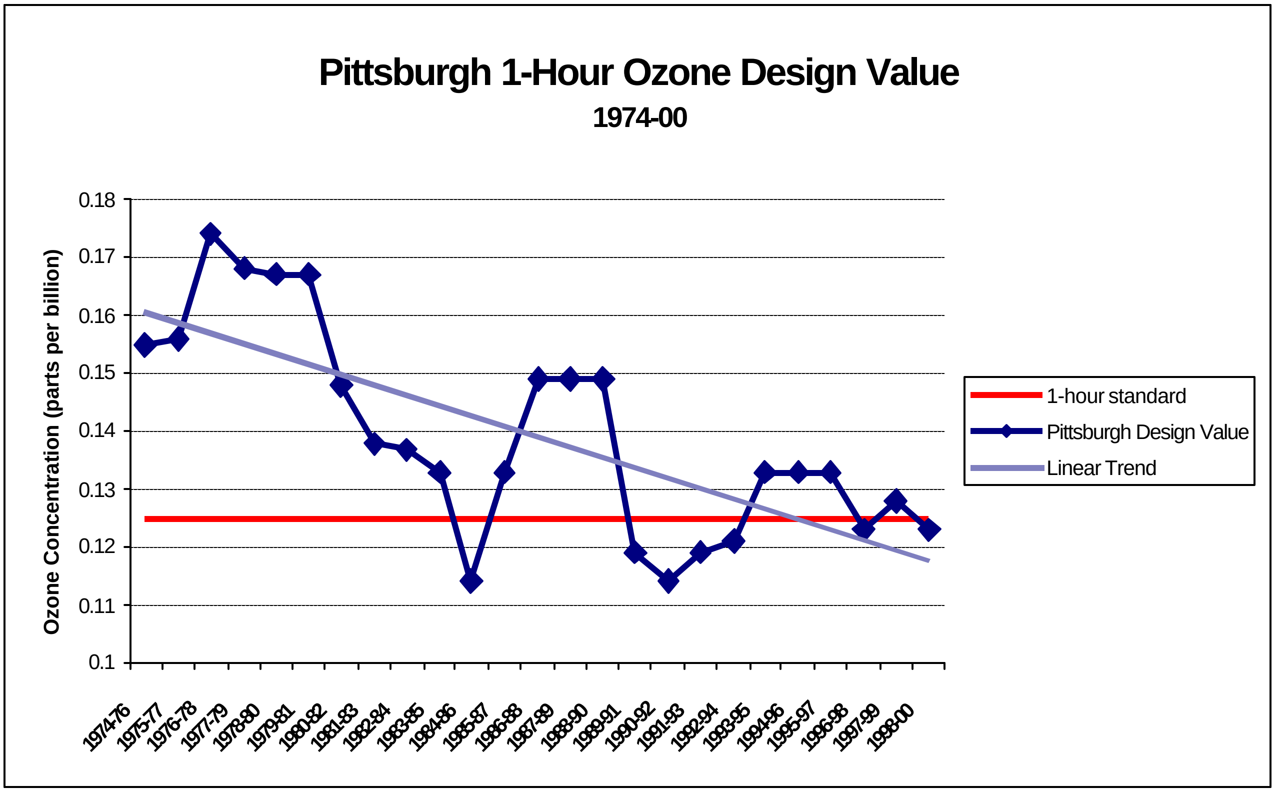
B. DESIGN VALUE DETERMINATION

Ambient ozone data were used to determine the base year and current year ozone design values. The ozone design value during the period from 1987 to 1989 was calculated by EPA to determine the level of nonattainment severity for a given region based on ambient data. The design value is discussed in further detail below. In this analysis, baseline and current year design values were calculated based on data from 1974 to 2000 for each 3-year period. These analyses show that ozone levels declined significantly during this time period.

The ambient air quality analysis is based on ozone data measured at monitoring sites in the Pittsburgh-Beaver Valley Area. There have been a total of 22 ozone monitors operating in the Pittsburgh-Beaver Valley Area during the1974-2000 time period. Of these 22 ozone monitors, only 19 had recording periods long enough to establish a monitor design value (three consecutive years). The number of monitors in the Pittsburgh-Beaver Valley Area has grown from 2 monitors in 1974 to 14 monitors in 2000. Ozone measurements were not taken in Allegheny County (the regions most populated county) until 1978.

Figure I-1 shows the Pittsburgh-Beaver Valley ozone design value during the 1974-2000 time period. A linear trend line is also depicted on this graph. Design values have decreased substantially over the 1974-2000 time period; decreasing from the 0.150-0.170 ppm range in the mid 70s to just below the NAAQS in 2000. Figure I-2 shows the number of monitor exceedances over the same time period. A linear trend line on this graph shows the number of exceedances has dropped by over 50% during the 1974-2000 time period. It is important to remember that design values and monitor exceedances have declined in spite of increased ozone monitor coverage, including ozone monitors in Allegheny County starting in 1978. Ozone design values along with the monitor defining the design value for the Pittsburgh-Beaver Valley Area are listed in Table I-1. Data from these monitoring sites were used to determine the actual and expected number of exceedances and the ozone design value.

Figure I-1



Pittsburgh 1-Hour Ozone Design Value
1974-00
Ozone Concentration (parts per billion)
0.18
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.1
1974-76
1975-77
1976-78
1977-79
1978-80
1979-81
1980-82
1981-83
1982-84
1983-85
1984-86
1985-87
1986-88
1987-89
1988-90
1989-91
1990-92
1991-93
1992-94
1993-95
1994-96
1995-97
1996-98
1997-99
1998-00
1-hour standard
Pittsburgh Design Value
Linear Trend

Figure I-2

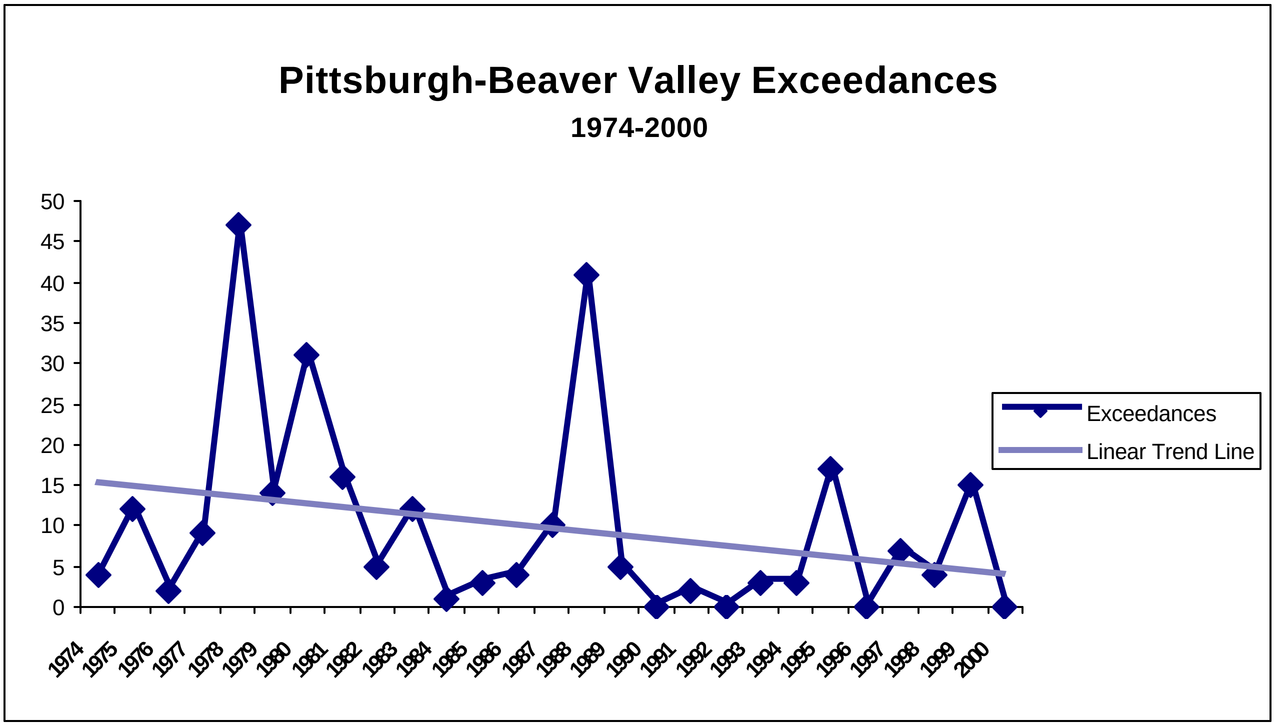

Pittsburgh-Beaver Valley Exceedances
1974-2000
0
5
10
15
20
25
30
35
40
45
50
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
Exceedances
Linear Trend Line

Table I-1
Pittsburgh-Beaver Valley Nonattainment Area
Ozone Design Values

Years	**Pittsburgh-Beaver Valley DV***	*Design Monitor*	*Number of Monitors*
1974-76	0.155	BADEN	2
1975-77	0.156	BEAVER FALLS	2
1976-78	0.174	BEAVER FALLS	3
1977-79	0.168	BEAVER FALLS	3
1978-80	0.167	LAWRENCEVILLE	5
1979-81	0.167	LAWRENCEVILLE	5
1980-82	0.148	LAWRENCEVILLE	7
1981-83	0.138	BRACKENRIDGE	7
1982-84	0.137	BRACKENRIDGE	7
1983-85	0.133	BRACKENRIDGE	7
1984-86	0.114	MIDLAND	8
1985-87	0.133	BRACKENRIDGE	7
1986-88	0.149	BRACKENRIDGE	7
1987-89	0.149	BRACKENRIDGE	7
1988-90	0.149	BRACKENRIDGE	8
1989-91	0.119	LAWRENCEVILLE	7
1990-92	0.114	LAWRENCEVILLE	9
1991-93	0.119	HARRISON TWP	9
1992-94	0.121	HARRISON TWP	9
1993-95	0.133	HARRISON TWP	8
1994-96	0.133	HARRISON TWP	9
1995-97	0.133	HARRISON TWP	11
1996-98	0.123	CHARLEROI	11
1997-99	0.128	PENN HILLS	12
1998-00	0.123	CHARLEROI	14

* Design values are in parts per million

The ambient air quality data analysis for ozone was completed using the appropriate regulations and guidance documents. Monitoring procedures were determined in accordance with 40 CFR, Part 58 (40 CFR, 1992a). For interpretation and calculation of the expected number of exceedances and the design value, appropriate regulations and corresponding guidance documents were used (EPA, 1979; 40 CFR, 1992b).

As the ozone-monitoring season extends from April 1 through October 31, data were analyzed for this period. Data for the Pittsburgh-Beaver Valley monitoring sites were retrieved from EPA's AIRS air monitoring data system. In determining the validity of an ozone value, the following conditions apply:

1. If the value is greater than the standard, it is valid, regardless of the number of hourly values available for that day.

2. If the value is less than the standard, validity was determined using the criteria below:

   - If data were available for 75 percent of the hours between 9 a.m. and 9 p.m. (i.e., 9 hours), then the daily maximum is valid.

   - If data were available for less than 75 percent of the hours between 9 a.m. and 9 p.m., the daily maximum is considered missing or invalid.

   - For purposes of calculating the expected number of days exceeding the standard, the days with missing or invalid data are further evaluated to determine if they can be assumed to have a daily maximum less than the standard. This is done by looking at the daily maxima from the day before and the day after. If these maxima are valid and less than 75 percent of the standard (i.e., 0.09 ppm), then the daily maximum for the day in question can be assumed to be less than the standard. This methodology does not allow 2 or more consecutive days of missing or invalid data to be assumed to be less than the standard.

The data required to evaluate the ozone levels for the Pittsburgh-Beaver Valley Area are: (1) the number of days exceeding the standard; (2) the expected number of days exceeding the standard; and (3) the ozone design value. The daily maximum ozone limit is 124 parts per billion (ppb), concentrations above which would be considered an exceedance. The number of days exceeding the standard must be less than or equal to 1 per year averaged over a 3-year period for an area to be in attainment with the ozone NAAQS. The expected number of days exceeding the standard takes into account days with incomplete or missing data.

To determine the overall number of days exceeding the standard, the ambient daily ozone levels were examined for each site during the ozone season for the Pittsburgh-Beaver Valley Area (April 1 through October 31). The four highest maximum hourly ozone values for each year were retrieved. Based on the valid data retrieved from the monitoring system, the number of maximum values greater than the standard is used as the number of exceedances.

Subsequent to determining the actual number of exceedances, the **expected** number of exceedances was calculated, taking into account days with missing or invalid data, days with a maximum assumed to be less than the standard, and the total number of days in the ozone monitoring period (i.e., 214 days).

This calculation was performed using the following formula:

$$e=v+[(v/n)*(N-n-z)]$$

where:

e	=	expected number of exceedances
v	=	number of days with maxima exceeding the standard
n	=	number days with valid maxima
N	=	number of days within the ozone monitoring season (4/1 to 10/31 = 214 days)
z	=	number of days with a maximum assumed to be less than the standard.

Monitoring sites may have years that are not valid. In order for a year of data at a particular site to be complete or valid, at least 75 percent of the days within the ozone season must have a valid daily maximum. Determining the number of years of complete monitoring is important in determining the expected number of exceedances and the design value for each site. For example, if there is one year within the 3-year period of analysis that is not valid for a specific monitoring site, the expected number of exceedances for the valid years will be calculated by dividing the expected exceedance values by 2 instead of 3, which could significantly increase the overall expected number of exceedances for the period of analysis (EPA, 1979). All monitoring data for the years included in this analysis were complete.

The expected number of exceedances was determined for each year between 1974 and 2000. These annual values were averaged over each of the 3-year periods within this timeframe to obtain an overall value for purposes of determining attainment under the CAA. As Table I-2 shows, the number of exceedances and the expected number of exceedances for the Pittsburgh-Beaver Valley Area were 15 and 19.6 days respectfully in the first 3-year period. These overall values were obtained by averaging the annual values over the 1974 to 1976 time period.

The level of the fourth highest daily maximum over a 3-year period of analysis is considered the "ozone design value," which is used to determine the ozone nonattainment classification. In order to determine the design value, the four highest daily maxima are selected for each year by monitoring site. The values for each site over the 3-year period are ranked from 1 to 12 (i.e., highest to lowest, respectively). By definition, the design value is the daily maximum with the rank equal to the number of years of complete monitoring plus 1. Since all years are valid for the monitoring site, the design value for each 3-year period is the fourth highest valid daily maximum.

Table I-2
Pittsburgh-Beaver Valley Nonattainment Area
Ozone Monitoring Data Summary

Year	*Design Monitor*	**Monitored Exceedances**	**Expected Exceedances**	**Average Expected Exceedances per year**	**Design Value**
1974-76	BADEN	15	19.6	6.5	0.155
1975-77	BEAVER FALLS	7	17.2	5.7	0.156
1976-78	BEAVER FALLS	26	39.7	13.2	0.174
1977-79	BEAVER FALLS	25	35.1	11.7	0.168
1978-80	LAWRENCEVILLE	22	27.5	9.2	0.167
1979-81	LAWRENCEVILLE	14	18.2	6.1	0.167
1980-82	LAWRENCEVILLE	8	10.3	3.4	0.148
1981-83	BRACKENRIDGE	11	13.2	4.4	0.138
1982-84	BRACKENRIDGE	8	8.7	2.9	0.137
1983-85	BRACKENRIDGE	7	7.3	2.4	0.133
1984-86	MIDLAND	2	2.5	0.8	0.114
1985-87	BRACKENRIDGE	5	5.1	1.7	0.133
1986-88	BRACKENRIDGE	18	19.9	6.6	0.149
1987-89	BRACKENRIDGE	19	20.9	7.0	0.149
1988-90	BRACKENRIDGE	15	16.8	5.6	0.149
1989-91	LAWRENCEVILLE	2	2	0.7	0.119
1990-92	LAWRENCEVILLE	1	1	0.3	0.114
1991-93	HARRISON TWP	2	2.1	0.7	0.119
1992-94	HARRISON TWP	2	2	0.7	0.121
1993-95	HARRISON TWP	9	9	3.0	0.133
1994-96	HARRISON TWP	8	8	2.7	0.133
1995-97	HARRISON TWP	10	10	3.3	0.133
1996-98	CHARLEROI	3	3	1.0	0.123
1997-99	PENN HILLS	4	4	1.3	0.128
1998-00	CHARLEROI	3	3	1.0	0.123

The average number of actual and expected exceedances, and the design values are presented in Table I-2 for each 3-year period from 1974 to 2000. For the base year determination (1987-89), the design value is 0.149 ppm. Since this value is above the NAAQS, the Pittsburgh-Beaver Valley Area was classified as a moderate ozone nonattainment area. Design values and ozone exceedances have declined since Pennsylvania first collected data in 1974. As noted in Table I-2 and Figure I-1 design values in the Pittsburgh-Beaver Valley Area are now currently below the NAAQS. The average number of expected exceedances has dropped from 7.0 for the 1987-1989 original designation 3-year period to 1.0 for the most recent period.

C. AMBIENT MONITORING ISSUES

1. Monitoring Sites

Twenty-two (22) ozone monitors have operated in the Pittsburgh-Beaver Valley Area during the 1974-2000 time period. Of these 22 monitors, only 19 had sufficient data (three consecutive years) to calculate ozone design values. Currently, there are 14 monitors operating in the Pittsburgh-Beaver Valley Area. In 1974 there were 2 ozone monitors operating in the Pittsburgh-Beaver Valley Area, and none in Allegheny County (the area's most populated county).

2. Climatic Trends

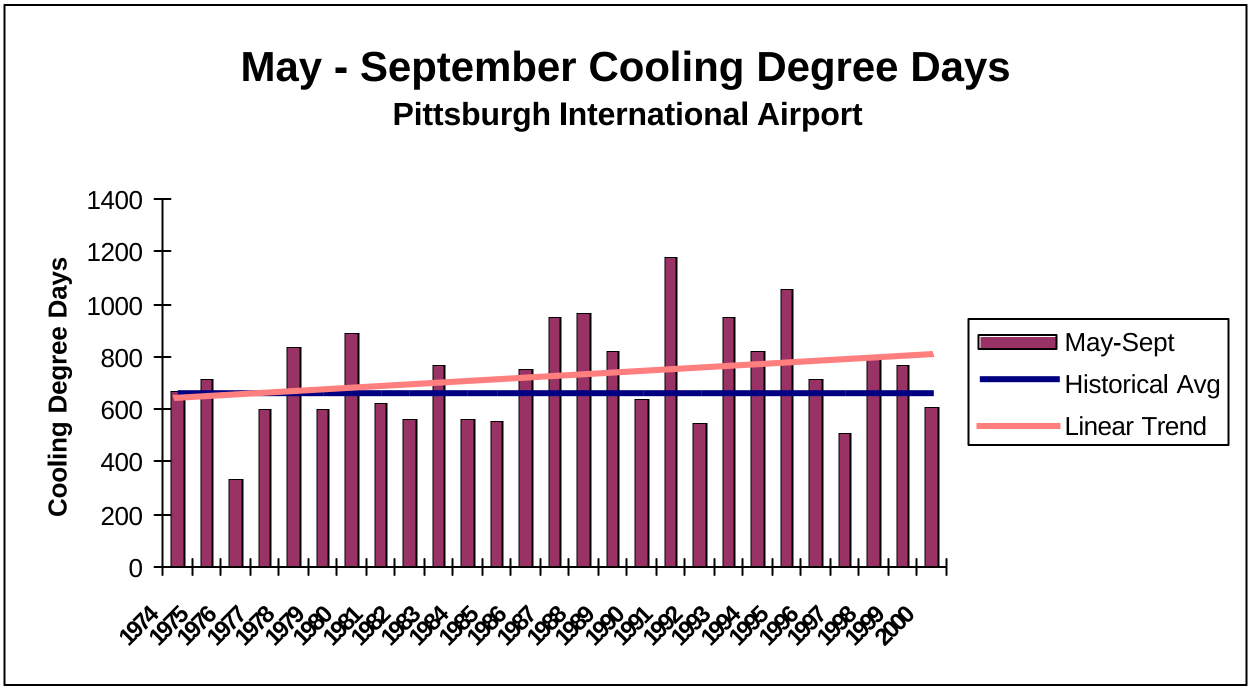
Climate can impact ozone concentrations in a particular area. Since ground-level ozone is a product of photochemical reactions, increases in sunlight intensity and temperatures can intensify ozone formation. To gauge the possible effects of climate on the Pittsburgh-Beaver Valley Area ozone exceedances and design values, climate trends at the Pittsburgh International Airport were examined. Several meteorological variables were examined to determine climate trends over the 1974-2000 time period. These included cooling degree-days, average monthly temperatures, 90° days (days in which max temperatures were ≥90°F), and precipitation. Climate data for the months of May through September were examined to coincide with the summer months when ozone concentrations are the highest.

Climate trend results for the Pittsburgh International Airport site indicate conditions conductive to producing high ozone concentrations (warm temperatures and clear skies) were more common in recent years than in the 1970's and 80's. All of the climate variables we reviewed, with the exception of precipitation, showed a general upward trend over time. This indicated conditions favorable for ozone formation were more likely to occur recently than in the past. Ozone trends in Pittsburgh-Beaver Valley Area, however, show exceedances and ozone design values decreasing over the same time period. This decline occurred even as the ozone-monitoring network became more enhanced. In short, ozone exceedances and design values have decreased in the Pittsburgh-Beaver Valley Area even though regional climatology has favored enhanced ozone production over the last decade. It is therefore likely that local emission control programs in the Pittsburgh-Beaver Valley Area are responsible for the decline in ozone exceedances and design values during the 1974-2000 time period.

a. Cooling Degree Days

Figure I-3 presents the number of cooling degree-days during the study period (1974-2000) along with a linear trend line and long-term average for the Pittsburgh International Airport. The figure shows cooling degree-days have generally increased over the study period. Cooling degree days gauge how warm a particular time period is, the higher the cooling degree number the warmer the time period. The recent increase in the cooling degree-days in the Pittsburgh-Beaver Valley Area contrasts with declining ozone exceedances and design values occurring over the same time period.

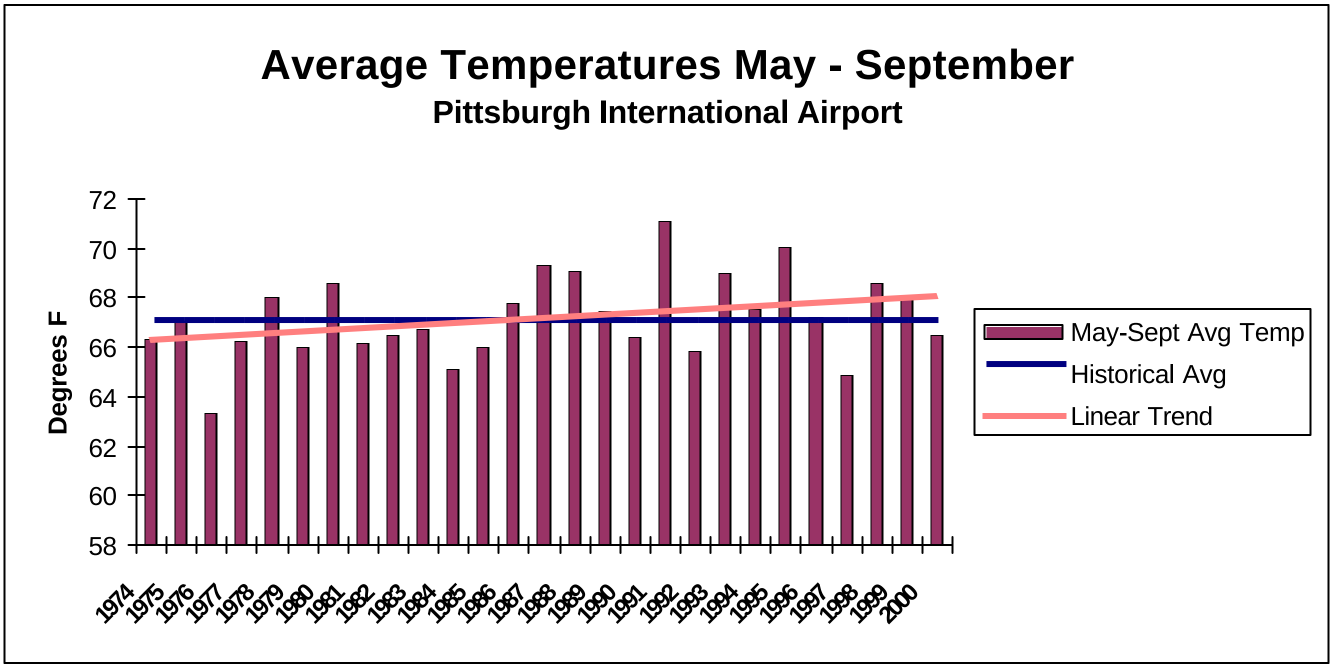
Figure I-3


May - September Cooling Degree Days
Pittsburgh International Airport
Cooling Degree Days
1400
1200
1000
800
600
400
200
0
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
May-Sept
Historical Avg
Linear Trend

b. Mean Temperature

Figure I-4 presents the average ozone season (May through September) temperatures at Pittsburgh International Airport from 1974 to 2000. Also included in this graph is the long-term average along with a linear trend line. Average temperatures for the 1974-2000 time period appear to be below the long-term average, though the temperature trend appears to be increasing. This temperature trend is consistent with the cooling degree trend. Both trends contrast with downward trends in ozone exceedances and design values in the Pittsburgh-Beaver Valley Area.

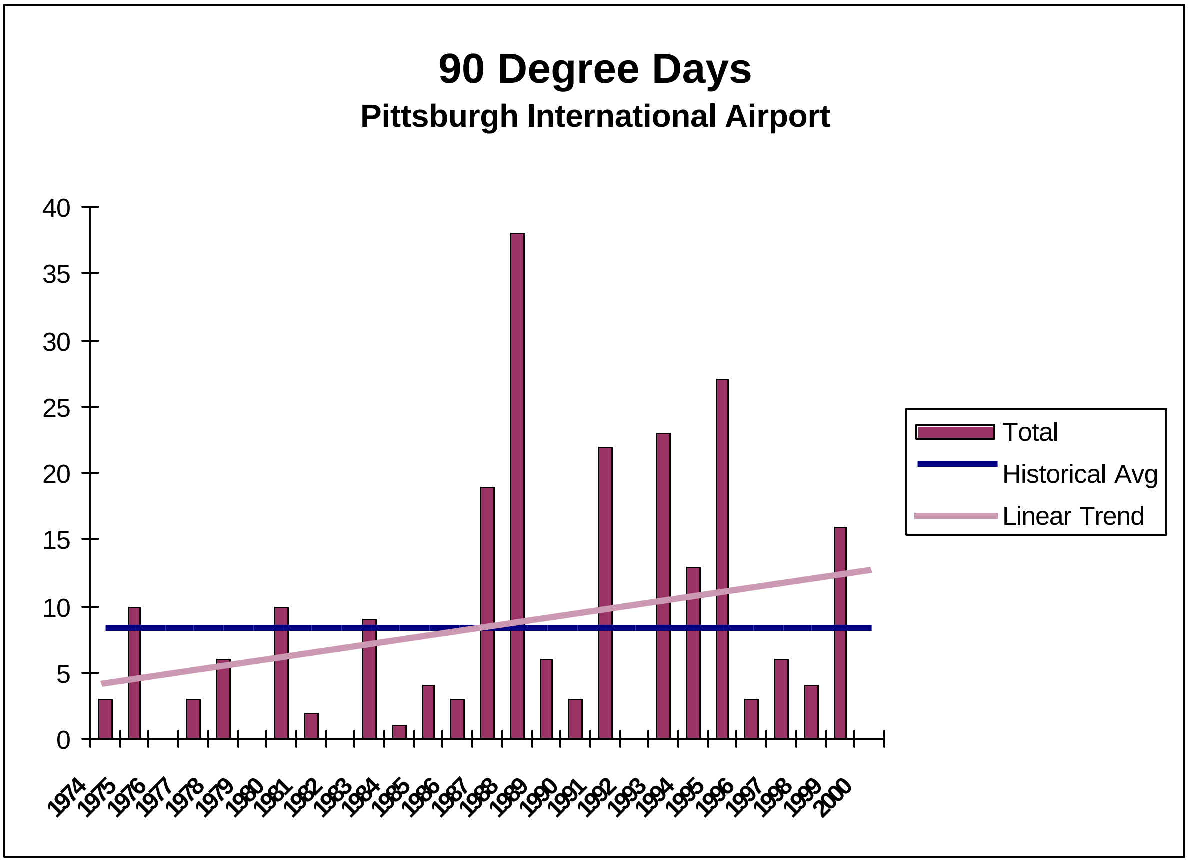
Figure I-4



c. 90 Degree Days

Figure I-5 shows the number of 90° days (days in which max temperatures are ≥90° F) at Pittsburgh International Airport during the study period. The number of 90°days is another measure of how warm a particular summer is. Also included in the graph are a linear trend line and the long-term average for the Pittsburgh International Airport. The data indicate a general increase in the number of 90°days over the study period. This upward trend is similar to trends observed in the cooling degree day and average temperature data, and opposite the trends observed in the ozone exceedance and design value data for the Pittsburgh-Beaver Valley Area.

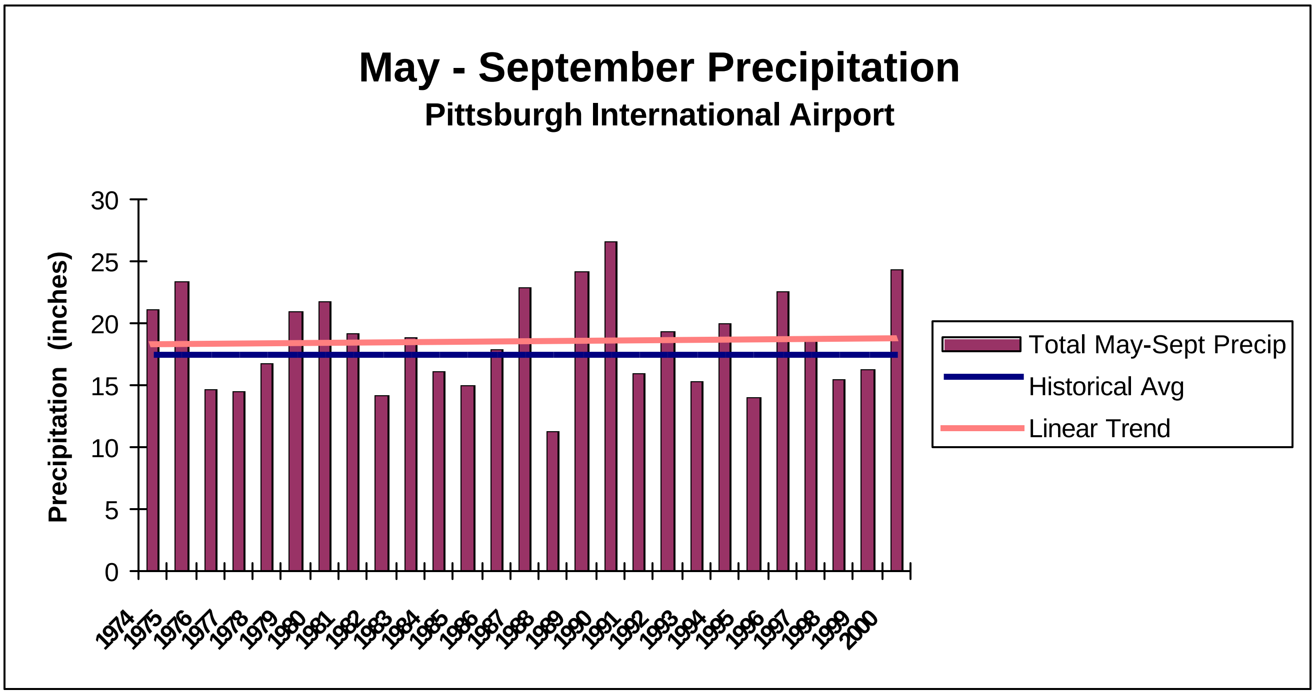
Figure I-5



d. Precipitation

Figure I-6 shows ozone season (May-September) precipitation at Pittsburgh International Airport during the study period. A linear trend line along with a long-term average is also shown on the graph. Summers with below average precipitation are more prone to having days with enhanced ozone production (less cloudy days). Dry summers also tend to be warmer than average, further increasing the likelihood of enhanced ozone production. Precipitation trends appear to be relatively unchanged during the study period.

Figure I-6



e. Climate Indexing

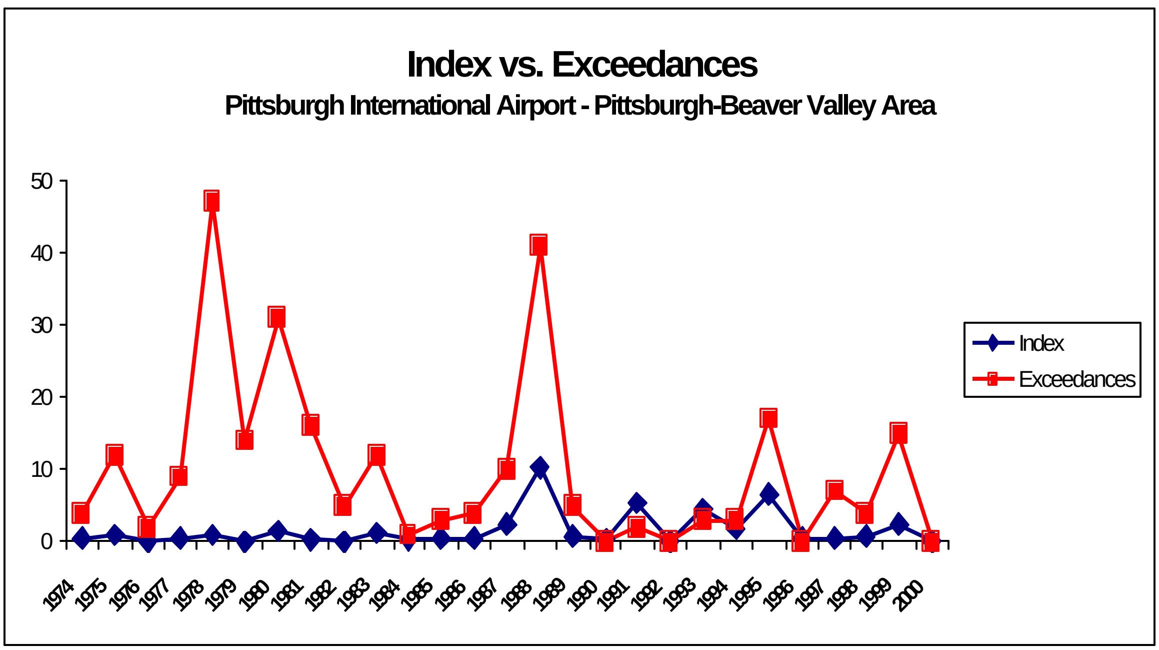
A number of climate variables have been reviewed in this chapter including cooling degree days, average temperatures, 90° days, and precipitation. All of these variable have some influence on ozone concentrations over the ozone season. Indexing attempts to encompass all of the information reviewed into one number so that different years can be compared with one another in a simplified way. The index developed in this study encompasses all of the climate variable reviewed previously and compares them with seasonal averages. The index is defined as follows:

$$I = \frac{[(90°\text{days}+1)_i \, (\text{Avg Temperature})_i \, (\text{Cooling Degree Days})_i \, / \, (\text{Precipitation})_i}{[(90°\text{days}+1)_{avg} \, (\text{Avg Temperature})_{avg} \, (\text{Cooling Degree Days})_{avg} \, / \, (\text{Precipitation})_{avg}}$$

where $(....)_i$ = year i value,
$(....)_{avg}$ = long-term average and
I = index

Figure I-7 shows index values for the Pittsburgh International Airport along with ozone exceedances in the Pittsburgh-Beaver Valley Area over the 1974-2000 time period. Index numbers appear to confirm conditions favorable for ozone formation occurred quite frequently in the last decade. Exceedances appear to be following fluctuations in the index during this time period. Prior to the mid 80s the index shows no year that is comparable to what was observed in the late 80s or 90s, though there are large peaks in monitor exceedances. This suggests that during the 70s and early 80s exceedances were caused by large anthropogenic emissions and as emissions have been reduced exceedances have aligned more with climatic forcing.

Figure I-7



CHAPTER II
EMISSIONS INVENTORY

This chapter provides an assessment of the ozone precursor emissions at the time the Pittsburgh-Beaver Valley Area was originally designated as nonattainment for ozone, and at the time when this Area measured attainment of the ozone one-hour average NAAQS. A 1990 inventory of VOC and NO_x emissions is used to represent emissions during the ozone nonattainment designation period (the base year). An estimate of 1999 VOC and NO_x emissions for the Pittsburgh-Beaver Valley Area is used for ozone precursor emissions during the period when the Pittsburgh-Beaver Valley Area demonstrated that it attained the 1-hour ozone NAAQS. This chapter describes these 1990 and 1999 ozone precursor emissions. Then, it presents information about the permanent and enforceable control measures that have been implemented in Pittsburgh-Beaver Valley Area to produce the VOC and NO_x emission reductions that have occurred between 1990 and 1999.

In 1996, the Commonwealth convened the Southwest Pennsylvania Ozone Stakeholder Working Group to develop a course of action for the attainment and maintenance of the one-hour ozone standard, tailored to meet the regional needs of the area. The group presented its recommendations in January 1997. The immediate recommendations of the group including NOx reductions from large boilers, an improved vehicle emission inspection/maintenance program, Stage II vapor recovery systems for gasoline stations and cleaner gasoline have been adopted and included in the emissions inventory for 1999 as appropriate. The Commonwealth has implemented these and other ozone reduction strategies as presented in this plan.

A. BASE YEAR (1990) EMISSION ESTIMATES

A base year emissions inventory for 1990 was developed in accordance with EPA guidance. Table II-1 shows the combined listing of stationary point and area source (stationary area, nonroad and highway) emissions for 1990 by source category. These 1990 emission estimates for the Pittsburgh-Beaver Valley Area are the same as those provided earlier to EPA by the Pennsylvania DEP as the revised SIP emission inventory for 1990 which was submitted on March 22, 1996 and supplemented on February 18, 1997.

TABLE II-1: Summary of 1990 Emissions (ozone season tons/day)

	Point Source		Area Source		Total	
Tier 2 Category	**VOC**	**NO_x**	**VOC**	**NO_x**	**VOC**	**NO_x**
Fuel Comb. Elec. Utility						
Coal	1.52	444.26	0.00	0.00	1.52	444.26
Oil	0.00	0.19	0.00	0.00	0.00	0.19
Gas	0.00	0.06	0.00	0.00	0.00	0.06
Internal Combustion	0.44	18.02	0.00	0.00	0.44	18.02
Fuel Comb. Industrial						
Coal	0.09	27.16	0.00	0.00	0.09	27.16
Oil	0.00	0.43	0.00	0.00	0.00	0.43
Gas	0.41	20.99	0.00	0.00	0.41	20.99
Other	0.00	0.45	0.00	0.00	0.00	0.45
Internal Combustion	0.01	0.03	0.00	0.00	0.01	0.03
Fuel Comb. Other						
Commercial/Institutional Coal	0.00	0.76	0.00	0.00	0.00	0.76
Commercial/Institutional Oil*	0.00	0.01	0.07	2.06	0.07	2.07
Commercial/Institutional Gas*	0.00	0.86	0.59	11.27	0.59	12.13
Other Non-Residential	0.00	0.54	0.00	0.00	0.00	0.54
Residential Coal	0.00	0.00	0.01	2.16	0.01	2.16
Chemical & Allied Product Mfg						
Organic Chemicals	0.54	0.15	0.00	0.00	0.54	0.15
Polymers & Resins	6.40	0.12	0.00	0.00	6.40	0.12
Agricultural Chemicals	0.48	2.54	0.00	0.00	0.48	2.54
Paints, Varnishes, Lacquers, Enamels	2.02	0.00	0.00	0.00	2.02	0.00
Other Chemicals	0.63	0.00	0.00	0.00	0.63	0.00
Metals Processing						
Non-Ferrous Metals Processing	0.05	0.43	0.00	0.00	0.05	0.43
Ferrous Metals Processing	63.60	21.30	0.00	0.00	63.60	21.30
Not Elsewhere Classified	1.05	0.26	0.00	0.00	1.05	0.26
Petroleum & Related Industries						
Petroleum Refineries & Related Industries	0.07	0.00	0.00	0.00	0.07	0.00
Asphalt Manufacturing	0.49	0.77	0.00	0.00	0.49	0.77
Other Industrial Processes						
Agriculture, Food, & Kindred Products	0.15	0.00	1.31	0.00	1.46	0.00
Rubber & Miscellaneous Plastic Products	0.15	0.00	0.00	0.00	0.15	0.00
Mineral Products	1.27	14.29	0.00	0.00	1.27	14.29
Fabricated Metals	0.01	0.80	0.00	0.00	0.01	0.80
Miscellaneous Industrial Processes	0.10	0.04	0.00	0.00	0.10	0.04
Solvent Utilization						
Degreasing	0.58	0.00	11.60	0.00	12.18	0.00
Graphic Arts	0.95	0.00	1.67	0.00	2.62	0.00
Dry Cleaning	0.00	0.00	0.51	0.00	0.51	0.00
Surface Coating	6.82	0.18	42.78	0.00	49.60	0.18

Tier 2 Category	Point Source VOC	Point Source NO_x	Area Source VOC	Area Source NO_x	Total VOC	Total NO_x
Other Industrial	0.46	0.00	0.00	0.00	0.46	0.00
Nonindustrial	0.00	0.00	24.84	0.00	24.84	0.00
Storage & Transport						
Bulk Terminals & Plants	1.29	0.00	0.00	0.00	1.29	0.00
Petroleum & Petroleum Product Storage	1.70	0.00	0.04	0.00	1.74	0.00
Petroleum & Petroleum Product Transport	0.50	0.00	0.16	0.00	0.66	0.00
Service Stations: Stage I	0.07	0.00	4.30	0.00	4.37	0.00
Service Stations: Vehicle Refueling	0.00	0.00	16.80	0.00	16.80	0.00
Service Stations: Breathing Losses	0.00	0.00	1.44	0.00	1.44	0.00
Organic Chemical Storage	2.97	0.00	0.00	0.00	2.97	0.00
Organic Chemical Transport	0.38	0.00	0.00	0.00	0.38	0.00
Bulk Materials Storage	0.02	0.10	0.00	0.00	0.02	0.10
Waste Disposal & Recycling						
Incineration	0.18	0.29	0.93	0.93	1.11	1.22
Open Burning	0.00	0.00	1.02	1.19	1.02	1.19
POTW	0.30	0.00	3.22	0.00	3.52	0.00
TSDF	0.00	0.00	12.48	0.00	12.48	0.00
Landfills	0.01	0.05	0.07	0.00	0.08	0.05
Highway Vehicles						
Light-Duty Gas Vehicles & Motorcycles	0.00	0.00	130.79	108.78	130.79	108.78
Light-Duty Gas Trucks	0.00	0.00	14.40	13.55	14.40	13.55
Heavy-Duty Gas Vehicles	0.00	0.00	2.28	2.27	2.28	2.27
Diesels	0.00	0.00	2.53	19.89	2.53	19.89
Off-Highway						
Non-Road Gasoline	0.00	0.00	19.66	25.06	19.66	25.06
Aircraft	0.00	0.00	5.97	2.08	5.97	2.08
Railroads	0.00	0.00	2.03	26.93	2.03	26.93
Miscellaneous						
Other Combustion	0.00	0.00	1.54	0.20	1.54	0.20
Health Services	0.06	0.00	0.00	0.00	0.06	0.00
Totals	**95.77**	**555.08**	**303.04**	**216.37**	**398.81**	**771.45**

NOTE: *Area source fuel combustion was not inventoried by sector and was therefore summarized under the Commercial/Institutional category.

B. 1999 EMISSION ESTIMATES

Ozone season daily VOC and NO_x emission estimates for the Pittsburgh-Beaver Valley Area are summarized in Table II-2. Some emission estimation methods for 1999 differed by sector from those used for the 1990 baseline inventory.

Pittsburgh-Beaver Valley Area highway vehicle emissions in 1999 were estimated using MOBILE5b and Pennsylvania Department of Transportation (PennDOT) estimates of vehicle miles traveled (VMT) by vehicle type and roadway type including updated planning assumptions and an improved methodology to allocate truck emissions. More information on highway vehicle methods is contained in Appendix A. Estimates of nonroad engine/vehicle emissions for source categories covered by the EPA NONROAD model were estimated using this NONROAD model which differs significantly from older emission factors/techniques used in the 1990 baseline. Estimates of 1999 VOC and NO_x emissions from all other area source categories were performed by projecting Pennsylvania's 1996 Periodic Emission Inventory estimates of area source emissions to 1999 using growth and control factors by source category. These improved and more accurate inventory techniques estimate higher emissions from previous techniques. For the purposes of this analysis the 1990 baseline has not been revised to reflect those higher emission estimates. Therefore, emission reductions from the 1990 baseline are conservatively underestimated but still show significant improvement.

For the majority of the nonroad mobile source categories, 1999 base year emission estimates were developed using EPA Office of Transportation and Air Quality's June 2000 NONROAD model (EPA, 2000). The NONROAD model estimates emissions for diesel, gasoline, liquefied petroleum gasoline, and compressed natural gas-fueled nonroad equipment types. The model was run for the Pittsburgh-Beaver Valley Area for inventory year 1999, specifying typical summer weekday emissions as the output. The RVP and temperature values replaced the model default values and are specific for Pittsburgh-Beaver Valley Area. The fuel sulfur content and percent oxygen used are default values. The temperature and fuel characteristic input values used for the Pittsburgh-Beaver Valley Area are summarized in Table II-3. In addition, for the recreational marine category, State-level NONROAD model default equipment populations for Pennsylvania were replaced with 1999 boat populations obtained from Pennsylvania's Fish and Boat Commission. Since the NONROAD model estimates county-level boat populations by allocating State populations to counties based on water surface area, county-level recreational marine equipment populations for the Pittsburgh-Beaver Valley Area are different from the model default values. Equipment populations for recreational marine SCCs are provided in Table II-4.

The 1999 point source emissions are estimated from 1996 point source emission estimates, as well, because the 1999 point source data base for the Pittsburgh-Beaver Valley Area is not yet completed. Point source 1999 emissions are estimated by first applying Bureau of Economic Analysis (BEA) growth factors by Source Classification Code (SCC) for fuel combustion SCCs and Department of Energy Annual Energy Outlook 1998 growth factors by Standard Industrial Classification (SIC) code for non-fuel combustion SCCs. The effects of controls that have been installed since 1996 on point sources in the area are accounted for by using the 1999 NO_x allowances established by Phase 2 of the Ozone Transport Commission Memorandum of Understanding.

Table II-2: Summary of 1999 Emissions (ozone season tons/day)

	Point Source		Area Source		Total	
Source Category	**VOC**	**NO_x**	**VOC**	**NO_x**	**VOC**	**NO_x**
Fuel Comb. Elec. Utility						
Coal	1.17	168.95	0.00	0.00	1.17	168.95
Oil	5.11	2.02	0.00	0.00	5.11	2.02
Gas	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.00	0.00	0.00	0.00	0.00	0.00
Internal Combustion	0.09	6.64	0.00	0.00	0.09	6.64
Fuel Comb. Industrial						
Coal	0.06	5.89	0.00	0.00	0.06	5.89
Oil	0.02	1.12	0.00	0.00	0.02	1.12
Gas	1.62	19.35	0.00	0.00	1.62	19.35
Other	0.01	0.00	0.00	0.00	0.01	0.00
Internal Combustion	0.76	16.73	0.00	0.00	0.76	16.73
Fuel Comb. Other						
Commercial/Institutional Coal	0.09	1.14	0.00	0.00	0.09	1.14
Commercial/Institutional Oil	0.03	0.58	0.00	1.01	0.03	1.59
Commercial/Institutional Gas	0.96	8.85	0.00	2.00	0.96	10.85
Misc. Fuel Comb. (Except Residential)	0.05	0.03	0.00	0.00	0.05	0.03
Residential Other	0.00	0.00	0.18	4.43	0.18	4.43
Chemical & Allied Product Mfg						
Organic Chemicals	0.14	0.00	0.00	0.00	0.14	0.00
Inorganic Chemicals	0.00	0.00	0.00	0.00	0.00	0.00
Polymers & Resins	4.38	0.02	0.00	0.00	4.38	0.02
Agricultural Chemicals	0.00	1.00	0.00	0.00	0.00	1.00
Paints, Varnishes, Lacquers, Enamels	1.39	0.01	0.00	0.00	1.39	0.01
Pharmaceuticals	0.00	0.00	0.00	0.00	0.00	0.00
Other Chemicals	1.41	0.00	0.00	0.00	1.41	0.00
Metals Processing						
Non-Ferrous Metals Processing	0.27	0.68	0.00	0.00	0.27	0.68
Ferrous Metals Processing	6.20	35.16	0.00	0.00	6.20	35.16
Metals Processing NEC	0.35	0.07	0.00	0.00	0.35	0.07
Petroleum & Related Industries						
Oil & Gas Production	0.00	0.00	0.00	0.00	0.00	0.00
Petroleum Refineries & Related Industries	0.01	0.00	0.00	0.00	0.01	0.00
Asphalt Manufacturing	0.00	0.02	0.00	0.00	0.00	0.02
Other Industrial Processes						
Agriculture, Food, & Kindred Products	0.26	0.00	1.02	0.00	1.28	0.00
Textiles, Leather, & Apparel Products	0.00	0.00	0.00	0.00	0.00	0.00
Wood, Pulp & Paper, & Publishing Products	0.00	0.00	0.00	0.00	0.00	0.00
Rubber & Miscellaneous Plastic Products	0.09	0.00	0.00	0.00	0.09	0.00
Mineral Products	0.37	13.30	0.00	0.00	0.37	13.30
Machinery Products	0.06	0.01	0.00	0.00	0.06	0.01
	Point Source		**Area Source**		**Total**	

Source Category	VOC	NO_x	VOC	NO_x	VOC	NO_x
Electronic Equipment	0.04	0.00	0.00	0.00	0.04	0.00
Miscellaneous Industrial Processes	0.20	0.04	0.00	0.00	0.20	0.04
Solvent Utilization						
Degreasing	1.28	0.00	20.32	0.00	21.60	0.00
Graphic Arts	0.14	0.01	6.67	0.00	6.81	0.01
Dry Cleaning	0.25	0.00	0.51	0.00	0.76	0.00
Surface Coating	2.59	0.02	47.84	0.00	50.43	0.02
Other Industrial	1.20	0.00	0.00	0.00	1.20	0.00
Nonindustrial	0.00	0.00	29.41	0.00	29.41	0.00
Storage & Transport						
Bulk Terminals & Plants	0.69	0.00	0.00	0.00	0.69	0.00
Petroleum & Petroleum Product Storage	1.37	0.00	0.00	0.00	1.37	0.00
Petroleum & Petroleum Product Transport	0.44	0.01	0.16	0.00	0.60	0.01
Service Stations: Stage I	0.00	0.00	0.43	0.00	0.43	0.00
Service Stations: Stage II	0.00	0.00	6.63	0.00	6.63	0.00
Service Stations: Breathing & Emptying	0.00	0.00	1.47	0.00	1.47	0.00
Organic Chemical Storage	0.71	0.00	0.00	0.00	0.71	0.00
Organic Chemical Transport	0.07	0.00	0.00	0.00	0.07	0.00
Inorganic Chemical Storage	0.00	0.00	0.00	0.00	0.00	0.00
Bulk Materials Storage	0.01	0.21	0.00	0.00	0.01	0.21
Waste Disposal & Recycling						
Incineration	0.00	0.00	3.29	1.24	3.29	1.24
Open Burning	0.00	0.00	5.30	1.06	5.30	1.06
POTW	0.06	0.00	5.21	0.00	5.27	0.00
Industrial Waste Water	0.13	0.00	0.00	0.00	0.13	0.00
TSDF	0.00	0.00	0.25	0.00	0.25	0.00
Landfills	0.18	0.25	1.04	0.00	1.22	0.25
Other	0.00	0.00	0.00	0.00	0.00	0.00
Highway Vehicles						
Light-Duty Gas Vehicles & Motorcycles	0.00	0.00	61.43	66.89	61.43	66.89
Light-Duty Gas Trucks	0.00	0.00	36.54	40.05	36.54	40.05
Heavy-Duty Gas Vehicles	0.00	0.00	6.14	10.87	6.14	10.87
Diesels	0.00	0.00	5.54	53.24	5.54	53.24
Off-Highway						
Non-Road Gasoline	0.00	0.00	54.44	4.49	54.44	4.49
Non-Road Diesel	0.00	0.00	9.64	64.13	9.64	64.13
Miscellaneous	0.00	0.00	0.01	6.65	0.01	6.65
Miscellaneous						
Other Combustion	0.00	0.00	0.05	0.01	0.05	0.01
Health Services	0.00	0.00	0.00	0.00	0.00	0.00
Cooling Towers	0.00	0.00	0.00	0.00	0.00	0.00
Fugitive Dust	0.00	0.00	0.00	0.00	0.00	0.00
Totals	**34.26**	**282.81**	**303.52**	**256.07**	**337.78**	**538.18**

Table II-3
Input Values for Pittsburgh-Beaver Valley Area NONROAD Model Run

Parameter	Input Value
Fuel RVP, psi	8.8
Oxygen Weight %	0%
Gasoline Sulfur	0.03%
Diesel Sulfur	0.33%
Liquefied Petroleum Gas/Compressed Natural Gas Sulfur	0%
Minimum Temperature, °F	67
Maximum Temperature, °F	96
Average Ambient Temperature, °F	86

Table II-4
Recreational Marine Equipment Populations, 1999

SCC	SCC Description	State	Pittsburgh-Beaver Valley Area
2282005010	Mobile Sources Marine Vessels, Recreational Pleasure Craft, Gasoline 2-Stroke Outboards	246,851	13,015
2282005015	Mobile Sources Marine Vessels, Recreational Pleasure Craft, Gasoline 2-Stroke Sterndrive	33,370	1,759
2282010005	Mobile Sources Marine Vessels, Recreational Pleasure Craft, Gasoline 4-Stroke Inboards	51,613	2,722
2282020005	Mobile Sources Marine Vessels, Recreational Pleasure Craft, Diesel Inboards	5,292	287
2282020010	Mobile Sources Marine Vessels, Recreational Pleasure Craft, Diesel Outboards	71	4
Total		**337,197**	**17,787**

C. PERMANENT AND ENFORCEABLE CONTROL MEASURES

This section summarizes the permanent and enforceable control measures that contributed to the reductions in ozone precursor emissions from 1990 to 1999 in the Pittsburgh-Beaver Valley Area. Table II-5 presents a summary of the emissions data in Tables II-1 and II-2 for point sources, stationary area sources, highway vehicles, and nonroad engines/vehicles.

Table II-5
VOC and NO_x Emissions Summary: 1990 and 1999
Pittsburgh-Beaver Valley Area

	VOC Emissions (tons per day)	
Major Source Category	**1990**	**1999**
Point Sources	96	34
Stationary Area Sources	128	130
Highway Vehicles	150* (176)	110
Nonroad Engines/Vehicles	28# (82)	64
Total	**402**	**338**

	NO_x Emissions (tons per day)	
Major Source Category	**1990**	**1999**
Point Sources	555	282
Stationary Area Sources	18	10
Highway Vehicles	144* (223)	171
Nonroad Engines/Vehicles	54# (83)	75
Total	**771**	**538**

* Highway vehicle emissions estimates for 1999 and beyond use newer techniques including an updated mobile model, more recent planning data and improved handling of truck VMT estimates. A revised estimate of the 1990 highway emissions using these improvements would result in emissions of 176 TPD for VOC and 223 TPD for NO_x.

Nonroad Engines/Vehicles emission estimates for 1999 and beyond use newer techniques including the EPA Nonroad Model. A revised estimate of the 1990 emissions using the Nonroad Model improvement would result in emissions of 82 TPD for VOC and 83 TPD for NO_x.

1. Point Sources

a. Reasonably Available Control Technology Regulations (RACT) and NOx MOU Phase II Rules

NO_x and VOC emissions from point sources are affected by RACT limits for major stationary sources established by Chapter 129.91 through 129.95 of the Pennsylvania Code (Title 25. Environmental Protection). Case-by-case RACT determinations were made, and any new control equipment installed by 1999. Further, Phase II of the NO_x Memorandum of Understanding requires certain sources (those with design capacities of 250 million British thermal units or more) to meet Phase II NO_x limits in 1999 (OTC, 1994). The reductions associated with the Phase II NO_x allowances are included in the 1999 emission estimates.

b. NESHAPS

Federal regulations under the National Emission Standards for Hazardous Air Pollutants (NESHAPS) covering by-product coke oven benzene emissions reduced VOC emissions as discussed in Pennsylvania's 15% Rate of Progress Plan.

c. Prevention of Significant Deterioration

The Clean Air Act established a program to review the impact that major new sources of air pollution would have on an area. The Prevention of Significant Deterioration (PSD) program requires new sources to implement Best Available Control Technology and conduct specific reviews to determine the new source's impact on the environment. Pennsylvania's PSD program was approved by EPA on August 21, 1984 (49 FR 33128).

d. New Source Review

New Source Review (NSR) is a permitting program that applies to new sources locating in nonattainment areas. The regulations require sources of NO_x and VOC to install lowest achievable emission reduction (LAER) control equipment and obtain offsets. Offsets are emission reductions that occur at another source. The new source must obtain offsets at a rate of 1.15 tons of offsets for each 1 ton of potential emissions from the new source. Thus, overall emissions in the region would be reduced by this program. Pennsylvania's NSR program was approved by EPA on December 9, 1997 (62 FR 64722).

2. Stationary Area Source Control Measures

There are a number of national rules and State regulations affecting area source VOCs that contributed to the emission reductions that occurred between 1990 and 1999. These include rules affecting the following source categories: automobile refinish coatings, consumer products, architectural and industrial maintenance (AIM) coatings, wood furniture coating, aircraft surface coating, and marine surface coating.

a. Automobile Refinish Coatings

Provisions of national VOC emission standards for automobile refinish coatings apply to automobile refinish coatings and coating components manufactured on or after January 11, 1999 for sale and distribution in the United States. It is estimated in this analysis that the national rule will be fully effective during the 1999 ozone season. A 37 percent reduction in VOC emissions is estimated.

b. Consumer Products

Provisions of national VOC emission standards for consumer products apply to consumer products manufactured or imported on or after December 10, 1998 for sale or distribution in the United States. This rule applies to a variety of consumer products including adhesives, household products, and personal care products. This national rule was fully effective during the 1999 ozone season. This VOC reduction is estimated to be 0.8 pounds per capita annually, or a 20 percent control efficiency with a 48.6 percent rule penetration, consistent with a 1995 memorandum from John Seitz, and the rule penetration assumption used in the OTC model rule analysis (Seitz, 1995).

c. Architectural and Industrial Maintenance Coatings

Provisions of national VOC emission standards for architectural and industrial maintenance coatings apply to each architectural coating manufactured on or after September 13, 1999 for sale or distribution in the United States. For any architectural coating registered under the Federal Insecticide, Fungicide, and Rodenticide Act, the provisions of this subpart apply to any such coating manufactured on or after March 13, 2000 for sale or distribution in the United States. The VOC limits do not apply to:

1. Coatings to be sold outside the United States.
2. A coating that is manufactured prior to September 13, 1999.
3. A coating that is sold in a nonrefillable aerosol container.
4. A coating that is collected and redistributed at a paint exchange.
5. A coating that is sold in a container with a volume of one liter or less.

For all area source categories affected by the architectural coatings rule, less than 100 percent compliance was estimated for the 1999 ozone season because the national rule was not fully effective then. EPA allowed States to claim a 15 percent reduction in architectural and industrial maintenance (AIM) coatings VOC emissions in their 1996 rate-of-progress plans, so that 15 percent value is applied in this analysis for 1999 emission estimates.

d. Wood Furniture Coating

In December 1995, EPA promulgated a Title III standard to control hazardous air pollutant (HAP) emissions from wood furniture coating (60 FR 62930, 1995). The four basic wood furniture manufacturing operations that are included in the affected emission source are: finishing, gluing, cleaning, and washoff operations. EPA estimated that the Wood Furniture Finishing MACT standard would reduce volatile HAP emissions by approximately 60 percent. In May 1996, EPA issued the final Control Techniques Guideline (CTG) document for control of VOC emissions from wood furniture manufacturing operations. EPA estimated that the application of presumptive RACT by facilities in ozone nonattainment areas and the ozone transport region would lead to a 31 percent reduction from current levels in VOC emissions from the wood furniture industry (EPA, 1996). In this analysis, a 30 percent VOC control efficiency was applied.

e. Aircraft Surface Coating

EPA promulgated the Aerospace Manufacturing National Emission Standard for Hazardous Air Pollutants (NESHAP) on September 1, 1995 (60 FR 45948, 1995). The final rule affects over 2,800 major source facilities that produce or repair aerospace vehicles or vehicle parts, such as airplanes, helicopters, and missiles (EPA, 1995). The rule was estimated to lead to a reduction in HAP emissions, many of which are also VOCs, by 60 percent, by 1998. A 60 percent VOC reduction is applied in this analysis.

f. Marine Surface Coating

In December 1995, EPA issued a NESHAP for shipbuilding and ship repair based on the maximum HAP limits for 23 types of marine coatings. To comply with the NESHAP, affected facilities may not apply any marine coating with a HAP content in excess of the applicable limit, and are required to implement the work practices specified in the rule. Most, if not all, existing *major source* shipyards are located in ozone nonattainment areas, and will have to control VOC emissions under Title I in addition to Title III (EPA, 1994). EPA developed the CTG for this source category in parallel with the NESHAP because of the overlap involving coating limits. The controls required for complying with the NESHAP also apply to VOCs, and constitute draft recommended best available control measures. A 24 percent VOC reduction is applied in this analysis (Serageldin, 1994) which is consistent with EPA estimates.

g. Treatment Storage and Disposal Facilities

Phase II Federal standards for facilities that manage hazardous wastes containing VOC's were promulgated by EPA on December 8, 1997. This results in a 94% reduction with a rule effectiveness of 80%.

h. Refueling Controls (Stage II)

Pennsylvania implemented a Stage II refueling program in the area. This program required vapor recovery nozzles on gasoline pumps which ensure that the gasoline vapors from the filling of motor vehicle gasoline tanks are collected and returned to the service station's storage tanks. This program was effective for 120,000 gallon per month stations and new stations starting in 1999. Emission reduction credit was therefore only taken for 44 percent of gasoline sales in the area.

3. Highway Vehicles

Even with the increase in VMT that occurred from 1990 to 1999, highway vehicle emissions of VOC decreased by 27 percent from 1990 to 1999, while NO_x emissions increased by 27 percent over the same time period using the old 1990 baseline data. Using the updated techniques consistent with the 1999 techniques, as shown previously in Table II-5 would show a VOC reduction of 38% and a NO_x reduction of 18%. These reductions can be attributed to a combination of the FMVCP (fleet turnover), the enhanced auto emissions testing program and lower gasoline volatility.

a. Federal Motor Vehicle Control Program (FMVCP)

The emission reductions from the FMVCP covering fleet turnover are permanent reductions. The effects of fleet turnover will continue to bring about significant reductions in highway vehicle emissions

Tier 1 tailpipe standards established by the CAA Amendments of 1990 include NO_x, VOC, and CO limits for light-duty gasoline vehicles (LDGVs) and light-duty gasoline trucks (LDGTs). These standards began to be phased in starting in 1994. NO_x standards are also specified for heavy-duty gasoline and diesel vehicles.

Evaporative VOC emissions has also been reduced in gasoline-powered cars as new Federal evaporative test procedures are used. New testing programs include the events of pre-conditioning, diurnal heat builds and exhaust, running loss, and hot soak tests.

Section 202 of the CAA Amendments of 1990 required EPA to regulate vehicle refueling emissions by requiring onboard emission control systems that would provide a minimum evaporative capture efficiency of 95 percent. In 1994, EPA issued a final rule implementing the control of vehicle refueling emissions through the use of vehicle-based systems. It applies to light-duty vehicles and light-duty trucks. The 1999 MOBILE5b runs include the effects of these standards.

b. Gasoline Volatility

The reduction in emissions attributable to the regulation of gasoline RVP is permanent and enforceable. A June 11, 1990 *Federal Register* notice set standards for fuel volatility by State for the summer ozone season that apply May through September. Phase I of these standards applied in 1989 through 1991. The Phase II standards, which are expressed in psi, apply in 1992 and subsequent years. These standards limit gasoline volatility to 9.0 psi in American Society for Testing and Materials Class C areas (Pennsylvania).

In 1999, the applicable summertime RVP standard, as required by the SIP approved PA gasoline volatility regulation Chapter 126 Subchapter C, for 1998 and subsequent years is 7.8 psi.

c. Automobile Emissions Test and Repair Program

A portion of the reduction in emissions is also attributable to the enhancement of the automobile emissions testing program initiated in October 1997. This program is an annual idle repair inspection program which also includes several anti-tampering visual inspections and a gas cap check.

CHAPTER III
STATE IMPLEMENTATION PLAN APPROVAL

One of the conditions of being redesignated to attainment is that the applicable implementation plan has been fully approved by EPA under Section 110(k) of the CAA. Another is that the State has met all applicable requirements for the area under Section 110 and Part D. This chapter addresses these two criteria.

EPA approved Pennsylvania's 1990 baseline VOC emission inventory on January 14, 1998. A 1990 baseline NOx inventory was submitted to EPA at the same time as the VOC inventory (with final submission of the 15 percent plan).

The stationary air pollution sources in the Pittsburgh-Beaver Valley Area during 1990 to 1999 were subject to the regulations of the Commonwealth of Pennsylvania, Pennsylvania Code in Title 25 Environmental Resources, Chapters 121-143. These regulations include Standards of Performance for New Stationary Sources promulgated by EPA under the Clean Air Act; Standards for Contaminants; National Emission Standards for Hazardous Air Pollutants; Construction, Modification, Reactivation and Operation of Sources; Alternative Emission Reduction Limitations; and Standards for Sources. Pennsylvania has federally approved programs for prevention of significant deterioration (PSD) , new source review and reasonably available control technology.

Pennsylvania adopted and implemented in 1997 an enhanced inspection and maintenance (I/M) program in the area. EPA approved Pennsylvania's I/M program on June 8, 1999.

EPA and the U.S. Department of Transportation (DOT) have issued regulations regarding criteria and procedures for demonstrating and assuring conformity of transportation improvement programs (TIP or program), long range plans (LRP or plan), and individual transportation projects with the requirements of the CAA and the SIP for the specific nonattainment area. Pennsylvania and Southwest Pennsylvania Commission have each complied with the conformity rules found in 40 CFR Part 51, issued November 24, 1993. On November 21, 1994, Pennsylvania submitted a Transportation Conformity SIP amendment to EPA. EPA subsequently revised its rules, requiring states to adopt new SIPs. Pennsylvania submitted such a SIP revision to EPA on August 11, 1998. Subsequently, a series of court actions overturned portions of the rule. EPA will again have to revise its rule. Pennsylvania and affected transportation planning organizations are complying with EPA guidance implementing changes not yet incorporated into regulation.

All transportation conformity analytical and test requirements have been applied in this nonattainment area. The nonattainment area has met all data and analytic requirements of 40 CFR Part 51, including the use of EPA's most recent approved mobile emissions modeling tool and emissions analysis for specified milestone years, incorporation of the most recent planning assumptions into the analysis, and emissions base calculation procedures. All process requirements included in 40 CFR Part 51 have been followed, including, but not limited to, public involvement, consideration and approval by the metropolitan planning organization. 40 CFR Part 51 was first implemented in the nonattainment area in 1994, with an affirmative TIP and LRP conformity finding by DOT in October 1994. The most recent conformity determination was approved by Federal Highway Administration on September 29, 2000.

In consideration of the above, the applicable implementation plan is approvable by EPA under Section 110(k) and meets all applicable requirements for the Pittsburgh-Beaver Valley Area under Section 110 and Part D.

CHAPTER IV
MAINTENANCE PLAN

Section 107(d)(3)(E) of the CAA states that a maintenance plan must be fully approved by EPA before an area can be redesignated as attainment for ozone. The maintenance plan is considered a SIP revision under Section 110 of the CAA and must show that the NAAQS for ozone will be maintained for at least 10 years after redesignation. The plan must also include contingency measures to address any violation of the NAAQS standard.

One of the requirements for ensuring that ozone levels in the Pittsburgh-Beaver Valley Area remain below the standard is to show that future emissions over the 10-year period of analysis will not lead to any exceedances of the standard. Emission estimates for 2007 and 2011 have been developed for this purpose. NO_x, and VOC emission levels will continue to decline from attainment year levels despite growth in population, economic output, and VMT.

The year 2011 was determined to be the appropriate one for preparation of this maintenance plan through consultation with EPA Region III staff. Emission projections have also been developed for 2007 to provide insight into emission levels trends at an interim point during the maintenance period.

A. GROWTH PROJECTIONS: 2007 and 2011

This section describes the data, methods, and assumptions used in developing estimates of emissions growth between 1999 and the two projection years – 2007 and 2011. It first presents the data sources and methods used in developing emissions growth factors for stationary area and non-electricity generating unit (EGU) point sources. Nonroad area source, highway vehicle source and EGU point source growth estimates are described subsequently.

1. Stationary Area and Non-EGU Point Sources

As indicated by Table IV-1, stationary area source emission growth factors were generally derived from EGAS Version 4.0 and regional projections of industrial sector economic output prepared by Standard and Poor's DRI (Pechan, 2001; Smith, 1999). Point sources covered by the EPA NOx SIP Call were grown in accordance with the federal NOx SIP Call.

Table IV-1
Overview of Emission Growth Surrogate Data Used for Stationary Area and Non-EGU Point Sources

Sector	Source Categories	Data Source
Stationary Area	All SCCs except below	EGAS 4.0 SCC-level output for Pittsburgh-Beaver Valley Area
	SCCs with base year emissions derived from per capita emission factors	EGAS 4.0 population forecast for Pittsburgh-Beaver Valley Area (1996-2007 = 6% growth; 1996-2011 = 7.7% growth)
Non-EGU Point	Non-EGU sources	EPA SIP Call growth projections

a. Stationary Area Sources

To develop estimates of emissions growth for stationary area sources, EGAS 4.0 was run in SCC-output mode for Pittsburgh-Beaver Valley Area for 2007 and 2011. The EGAS 4.0 SCC-output option was used because the area source component of the Pittsburgh-Beaver Valley Area inventory does not contain SIC code information that can be used to link with the EGAS 2-digit SIC-output option. The EGAS 2007 and 2011 emission growth factors represent growth from a 1996 base year. These SCC-level growth factors were applied to stationary area SCCs in the 1996 inventory to represent emissions growth excluding the effects of future year controls.

An exception to the use of EGAS SCC-based growth factors was made for the seven solvent utilization area source categories whose base year emission estimates are calculated using per capita emission factors. Population-based growth factors from EGAS 4.0 were linked to these source categories to project 1996-2007 and 1996-2011 emissions growth. The seven solvent utilization area source categories whose base year emissions estimates are based on per capita emissions factors are:

- SCC 2401001000 - Surface Coating, Architectural Coatings;
- SCC 2401005000 - Surface Coating, Auto Refinishing: SIC 7532;
- SCC 2401008000 - Surface Coating, Traffic Markings;
- SCC 2401100000 - Surface Coating, Industrial Maintenance Coatings;
- SCC 2415300000 - Degreasing, All Industries: Cold Cleaning;
- SCC 2415360000 - Degreasing, Auto Repair Services (SIC 75); and
- SCC 2465000000 - Miscellaneous Non-industrial: Consumer, All Products/Processes.

(EGAS 4.0 already uses population data as the emissions growth surrogate indicator for one of these seven categories [SCC 2465000000–Miscellaneous Non-Industrial: Consumer, All Products], but uses constant dollar output data as the surrogate indicator for the remaining six categories.)

Section D describes the post-base year control assumptions that were applied to estimate the final 2007 and 2011 year area source emission estimates.

b. Non-EGU Point Sources

Non-EGU point source growth was projected using the same methods that EPA used in their NO_x SIP Call analysis. EPA used Bureau of Economic Analysis (BEA) growth projections. A detailed discussion of this growth estimate can be found in the October 27, 1998 Federal Register (63 FR 57356).

2. EGU-Point Source Growth Factors

Projected growth in EGU emissions in Pennsylvania was estimated using the same methods that EPA used in their NO_x SIP Call analysis. A detailed discussion of this growth estimate can be found in the October 27, 1998 Federal Register (63 FR 57356). The EPA used the IPM model to estimate EGU growth throughout the eastern United States and correlated that to heat input increases. The IPM results estimated a 15% increase in heat input from 1996 through 2007 for the state of Pennsylvania. This 15 percent increase in expected EGU generation between 1996 and 2007 was converted to an annual growth rate of 1.36 percent to estimate appropriate growth factors for 1999 and 2011. A complete explanation of the IPM model can be found at the EPA website: www.epa.gov/capi/.

3. Highway Vehicles and Nonroad Sources

As with the 1999 highway vehicle emission estimates, MOBILE5b was used to estimate highway vehicle emission factors by vehicle type. The primary difference between the 1999 emission calculation assumptions and those used for the two future years, is the implementation of the federal Tier II Regulation. A summary of the highway vehicle emission modeling assumptions and the methods used for estimating growth in highway vehicle travel are described in detail in Appendix A.

Similar to the 1999 base year emission estimates, projection year emissions for the majority of nonroad mobile sources were developed using EPA Office of Transportation and Air Quality's June 2000 draft NONROAD model. The NONROAD model estimates emissions for diesel, gasoline, liquefied petroleum gasoline, and compressed natural gas-fueled nonroad equipment types. Certain nonroad categories, including commercial marine, aircraft, and locomotives, are not included in the model. Projection year estimates for these categories were developed similar to those used for area sources.

B. ATTAINMENT EMISSIONS INVENTORY

The 1999 base year emissions data that were presented in Table II-2 were used along with the growth and control factors described in this chapter to estimate ozone precursor emissions in 2007 and 2011. The maintenance plan year is 2011. The year 2007 is an intermediate year that has been used for many national and regional ozone modeling studies and serves as a check point for maintenance plan evaluation. A detailed summary of 2007 VOC and NO_x emissions in Pittsburgh-

Beaver Valley Area is shown in Table IV-2. The 2011 maintenance plan year summary is shown in Table IV-3. Table IV-4 presents a comparison of VOC and NO_x emissions by major source category for 1999, 2007, and 2011.

C. PERMANENT AND ENFORCEABLE CONTROL MEASURES

This section describes the permanent and enforceable adopted control measures that take effect subsequent to 1999 that contribute to reductions in future year emissions.

1. Stationary Area Source Control Measures - VOC

a. Vehicle Refueling

Evaporative hydrocarbon emissions associated with the transfer of fuel from underground storage tanks to motor vehicles are known as refueling emissions. Vehicle refueling emissions are controlled through the national onboard vapor recovery rule promulgated in January of 1994. This rule applies to all light-duty gasoline vehicles (LDGVs) and light-duty gasoline trucks (LDGTs) with a phase-in period beginning with the 1998 model year and differing by vehicle type. MOBILE5b includes the effects of this rule in its VOC emission factors for gasoline powered vehicles. In addition, Pennsylvania has implemented a Stage II vehicle refueling program in the area. This program was fully implemented in December 2000. The program affects approximately 90 percent of the gasoline sold in the area.

b. Automobile Refinish Coatings

The national VOC emission standards for automobile refinish coatings apply to automobile refinish coatings and coating components manufactured on or after January 11, 1999 for sale and distribution in the United States (63 FR 48806, 1998). In addition, Pennsylvania has adopted mobile equipment repair and refinishing regulations that specify improved coating application equipment, spray gun cleaning practices, and worker training. It is estimated that these measures will result in an additional 38 percent reduction of VOC from these operations.

TABLE IV-2: Summary of 2007 Emissions (ozone season tons/day)

	Point Source		Area Source		Total	
	VOC	NO_x	VOC	NO_x	VOC	NO_x
						0.00
Coal	1.29	91.43	0.00	0.00	1.29	91.43
Oil	5.65	2.26	0.00	0.00	5.65	2.26
Gas	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.00	0.00	0.00	0.00	0.00	0.00
Internal Combustion	0.10	3.70	0.00	0.00	0.10	3.70
						0.00
Coal	0.05	4.33	0.00	0.00	0.05	4.33
Oil	0.02	1.22	0.00	0.00	0.02	1.22
Gas	1.73	17.82	0.00	0.00	1.73	17.82
Other	0.01	0.00	0.00	0.00	0.01	0.00
Internal Combustion	0.85	18.70	0.00	0.00	0.85	18.70
						0.00
Commercial/Institutional Coal	0.11	1.32	0.00	0.00	0.11	1.32
Commercial/Institutional Oil	0.03	0.59	0.00	0.85	0.03	1.44
Commercial/Institutional Gas	1.03	9.90	0.00	2.08	1.03	11.98
Misc. Fuel Comb. (Except Residential)	0.05	0.03	0.00	0.00	0.05	0.03
Residential Other	0.00	0.00	0.17	4.13	0.17	4.13
						0.00
Organic Chemicals	0.16	0.00	0.00	0.00	0.16	0.00
Inorganic Chemicals	0.00	0.00	0.00	0.00	0.00	0.00
Polymers & Resins	4.92	0.02	0.00	0.00	4.92	0.02
Agricultural Chemicals	0.00	1.12	0.00	0.00	0.00	1.12
Paints, Varnishes, Lacquers, Enamels	1.56	0.01	0.00	0.00	1.56	0.01
Pharmaceuticals	0.00	0.00	0.00	0.00	0.00	0.00
Other Chemicals	1.58	0.00	0.00	0.00	1.58	0.00
						0.00
Non-Ferrous Metals Processing	0.24	0.61	0.00	0.00	0.24	0.61
Ferrous Metals Processing	5.56	31.51	0.00	0.00	5.56	31.51
Metals Processing NEC	0.32	0.06	0.00	0.00	0.32	0.06
						0.00
Oil & Gas Production	0.00	0.00	0.00	0.00	0.00	0.00
Petroleum Refineries & Related Industries	0.01	0.00	0.00	0.00	0.01	0.00
Asphalt Manufacturing	0.01	0.02	0.00	0.00	0.01	0.02
						0.00
Agriculture, Food, & Kindred Products	0.28	0.00	1.16	0.00	1.44	0.00
Textiles, Leather, & Apparel Products	0.00	0.00	0.00	0.00	0.00	0.00
Wood, Pulp & Paper, & Publishing Products	0.00	0.00	0.00	0.00	0.00	0.00
Rubber & Miscellaneous Plastic Products	0.11	0.00	0.00	0.00	0.11	0.00
Mineral Products	0.38	13.54	0.00	0.00	0.38	13.54
Machinery Products	0.08	0.01	0.00	0.00	0.08	0.01
Electronic Equipment	0.04	0.00	0.00	0.00	0.04	0.00

Miscellaneous Industrial Processes	0.20	0.03	0.00	0.00	0.20	0.03
						0.00
Degreasing	1.51	0.00	23.02	0.00	24.53	0.00
Graphic Arts	0.15	0.01	8.13	0.00	8.28	0.01
Dry Cleaning	0.26	0.00	0.59	0.00	0.85	0.00
Surface Coating	2.62	0.02	50.14	0.00	52.76	0.02
Other Industrial	1.42	0.00	0.00	0.00	1.42	0.00
Nonindustrial	0.00	0.00	30.41	0.00	30.41	0.00
						0.00
Bulk Terminals & Plants	0.79	0.00	0.00	0.00	0.79	0.00
Petroleum & Petroleum Product Storage	1.43	0.00	0.00	0.00	1.43	0.00
Petroleum & Petroleum Product Transport	0.50	0.01	0.17	0.00	0.67	0.01
Service Stations: Stage I	0.00	0.00	0.44	0.00	0.44	0.00
Service Stations: Stage II	0.00	0.00	2.82	0.00	2.82	0.00
Service Stations: Breathing & Emptying	0.00	0.00	1.50	0.00	1.50	0.00
Organic Chemical Storage	0.80	0.00	0.00	0.00	0.80	0.00
Organic Chemical Transport	0.08	0.00	0.00	0.00	0.08	0.00
Inorganic Chemical Storage	0.00	0.00	0.00	0.00	0.00	0.00
Bulk Materials Storage	0.01	0.19	0.00	0.00	0.01	0.19
						0.00
Incineration	0.00	0.00	4.13	1.56	4.13	1.56
Open Burning	0.00	0.00	5.62	1.12	5.62	1.12
POTW	0.06	0.00	6.05	0.00	6.11	0.00
Industrial Waste Water	0.14	0.00	0.00	0.00	0.14	0.00
TSDF	0.00	0.00	0.29	0.00	0.29	0.00
Landfills	0.20	0.28	1.21	0.00	1.41	0.28
Other	0.00	0.00	0.00	0.00	0.00	0.00
						0.00
Light-Duty Gas Vehicles & Motorcycles	0.00	0.00	55.34	50.59	55.34	50.59
Light-Duty Gas Trucks	0.00	0.00	31.40	32.12	31.40	32.12
Heavy-Duty Gas Vehicles	0.00	0.00	4.92	9.90	4.92	9.90
Diesels	0.00	0.00	6.56	36.51	6.56	36.51
						0.00
Non-Road Gasoline	0.00	0.00	36.73	4.48	36.73	4.48
Non-Road Diesel	0.00	0.00	5.68	54.17	5.68	54.17
Miscellaneous	0.00	0.00	0.01	8.44	0.01	8.44
						0.00
Other Combustion	0.00	0.00	0.05	0.01	0.05	0.01
Health Services	0.00	0.00	0.00	0.00	0.00	0.00
Cooling Towers	0.00	0.00	0.00	0.00	0.00	0.00
Fugitive Dust	0.00	0.00	0.00	0.00	0.00	0.00
Totals	**36.34**	**198.73**	**276.54**	**205.95**	**312.88**	**404.68**

TABLE IV-3: Summary of 2011 Emissions (ozone season tons/day)

	Point Source		Area Source		Total	
Source Category	**VOC**	**NO_x**	**VOC**	**NO_x**	**VOC**	**NO_x**
Fuel Comb. Elec. Utility						
Coal	1.36	91.43	0.00	0.00	1.36	91.43
Oil	5.96	2.26	0.00	0.00	5.96	2.26
Gas	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.00	0.00	0.00	0.00	0.00	0.00
Internal Combustion	0.11	3.70	0.00	0.00	0.11	3.70
Fuel Comb. Industrial						
Coal	0.05	4.35	0.00	0.00	0.05	4.35
Oil	0.02	1.26	0.00	0.00	0.02	1.26
Gas	1.79	17.36	0.00	0.00	1.79	17.36
Other	0.01	0.00	0.00	0.00	0.01	0.00
Internal Combustion	0.89	19.60	0.00	0.00	0.89	19.60
Fuel Comb. Other						
Commercial/Institutional Coal	0.12	1.40	0.00	0.00	0.12	1.40
Commercial/Institutional Oil	0.03	0.59	0.00	0.82	0.03	1.41
Commercial/Institutional Gas	1.07	10.38	0.00	2.11	1.07	12.49
Misc. Fuel Comb. (Except Residential)	0.05	0.04	0.00	0.00	0.05	0.04
Residential Other	0.00	0.00	0.17	4.05	0.17	4.05
Chemical & Allied Product Mfg						
Organic Chemicals	0.16	0.00	0.00	0.00	0.16	0.00
Inorganic Chemicals	0.00	0.00	0.00	0.00	0.00	0.00
Polymers & Resins	5.19	0.02	0.00	0.00	5.19	0.02
Agricultural Chemicals	0.00	1.18	0.00	0.00	0.00	1.18
Paints, Varnishes, Lacquers, Enamels	1.65	0.01	0.00	0.00	1.65	0.01
Pharmaceuticals	0.00	0.00	0.00	0.00	0.00	0.00
Other Chemicals	1.67	0.00	0.00	0.00	1.67	0.00
Metals Processing						
Non-Ferrous Metals Processing	0.23	0.59	0.00	0.00	0.23	0.59
Ferrous Metals Processing	5.34	30.25	0.00	0.00	5.34	30.25
Metals Processing NEC	0.30	0.06	0.00	0.00	0.30	0.06
Petroleum & Related Industries						
Oil & Gas Production	0.00	0.00	0.00	0.00	0.00	0.00
Petroleum Refineries & Related Industries	0.01	0.00	0.00	0.00	0.01	0.00
Asphalt Manufacturing	0.01	0.02	0.00	0.00	0.01	0.02
Other Industrial Processes						
Agriculture, Food, & Kindred Products	0.29	0.00	1.24	0.00	1.53	0.00
Textiles, Leather, & Apparel Products	0.00	0.00	0.00	0.00	0.00	0.00
Wood, Pulp & Paper, & Publishing Products	0.00	0.00	0.00	0.00	0.00	0.00
Rubber & Miscellaneous Plastic Products	0.12	0.00	0.00	0.00	0.12	0.00
Mineral Products	0.39	13.75	0.00	0.00	0.39	13.75
Machinery Products	0.09	0.01	0.00	0.00	0.09	0.01
Electronic Equipment	0.04	0.00	0.00	0.00	0.04	0.00

Miscellaneous Industrial Processes	0.21	0.03	0.00	0.00	0.21	0.03
Solvent Utilization						
Degreasing	1.60	0.00	24.37	0.00	25.97	0.00
Graphic Arts	0.15	0.01	8.68	0.00	8.83	0.01
Dry Cleaning	0.27	0.00	0.63	0.00	0.90	0.00
Surface Coating	2.66	0.02	54.01	0.00	56.67	0.02
Other Industrial	1.51	0.00	0.00	0.00	1.51	0.00
Nonindustrial	0.00	0.00	30.70	0.00	30.70	0.00
Storage & Transport						
Bulk Terminals & Plants	0.83	0.00	0.00	0.00	0.83	0.00
Petroleum & Petroleum Product Storage	1.46	0.00	0.00	0.00	1.46	0.00
Petroleum & Petroleum Product Transport	0.53	0.01	0.17	0.00	0.70	0.01
Service Stations: Stage I	0.00	0.00	0.45	0.00	0.45	0.00
Service Stations: Stage II	0.00	0.00	2.02	0.00	2.02	0.00
Service Stations: Breathing & Emptying	0.00	0.00	1.53	0.00	1.53	0.00
Organic Chemical Storage	0.84	0.00	0.00	0.00	0.84	0.00
Organic Chemical Transport	0.08	0.00	0.00	0.00	0.08	0.00
Inorganic Chemical Storage	0.00	0.00	0.00	0.00	0.00	0.00
Bulk Materials Storage	0.01	0.19	0.00	0.00	0.01	0.19
Waste Disposal & Recycling						
Incineration	0.00	0.00	4.50	1.70	4.50	1.70
Open Burning	0.00	0.00	5.74	1.15	5.74	1.15
POTW	0.06	0.00	6.59	0.00	6.65	0.00
Industrial Waste Water	0.15	0.00	0.00	0.00	0.15	0.00
TSDF	0.00	0.00	0.31	0.00	0.31	0.00
Landfills	0.21	0.30	1.32	0.00	1.53	0.30
Other	0.00	0.00	0.00	0.00	0.00	0.00
Highway Vehicles						
Light-Duty Gas Vehicles & Motorcycles	0.00	0.00	57.31	45.34	57.31	45.34
Light-Duty Gas Trucks	0.00	0.00	32.49	28.60	32.49	28.60
Heavy-Duty Gas Vehicles	0.00	0.00	4.88	10.22	4.88	10.22
Diesels	0.00	0.00	7.31	30.86	7.31	30.86
Off-Highway						
Non-Road Gasoline	0.00	0.00	32.49	4.34	32.49	4.34
Non-Road Diesel	0.00	0.00	4.49	46.77	4.49	46.77
Miscellaneous	0.00	0.00	0.01	9.34	0.01	9.34
Miscellaneous						
Other Combustion	0.00	0.00	0.05	0.01	0.05	0.01
Health Services	0.00	0.00	0.00	0.00	0.00	0.00
Cooling Towers	0.00	0.00	0.00	0.00	0.00	0.00
Fugitive Dust	0.00	0.00	0.00	0.00	0.00	0.00
Totals	**37.52**	**198.82**	**281.46**	**185.31**	**318.98**	**384.12**

Table IV-4
VOC and NO_x Emissions Summary: 1999, 2007, and 2011

	VOC Emissions (tons per day)		
Major Source Category	**1999**	**2007**	**2011**
Point Sources	34	36	38
Stationary Area Sources	130	136	142
Highway Vehicles	110	98	102
Nonroad Engines/Vehicles	64	42	37
Total	**338**	**313**	**319**

	NO_x Emissions (tons per day)		
Major Source Category	**1999**	**2007**	**2011**
Point Sources	282	199	199
Stationary Area Sources	10	10	10
Highway Vehicles	171	129	115
Nonroad Engines/Vehicles	75	67	60
Total	**538**	**405**	**384**

c. Architectural and Industrial Maintenance (AIM) Coatings

In 1998, EPA promulgated a national rule for reducing VOC emissions from specific types of AIM coatings (63 FR 48848, 1998). AIM coatings are used by contractors, industry, and households, and include: interior and exterior paints, industrial maintenance coatings, wood finishes, cement coatings, roof coatings, traffic marking paints, and specialty coatings. Provisions of national VOC emission standards for AIM coatings apply to each coating manufactured on or after September 13, 1999 for sale or distribution in the United States. For any coating registered under the Federal Insecticide, Fungicide, and Rodenticide Act, the provisions of this subpart apply to any such coating manufactured on or after March 13, 2000 for sale or distribution in the United States.

The national rule is assumed to be fully effective in 2007 and 2011. The EPA estimated a 20.2 percent reduction in baseline emissions from this rule after accounting for losses in emission reductions due to the rule's exceedance fee and tonnage exemption

(Herring, 1999). For this analysis, a 20 percent reduction was applied to the above three source categories in both 2007 and 2011.

d. Wood Furniture Coating

In December 1995, EPA promulgated a Title III standard to control hazardous air pollutant (HAP) emissions from wood furniture coating (60 FR 62930, 1995). The four basic wood furniture manufacturing operations that are included in the affected emission source are: finishing, gluing, cleaning, and wash-off operations. In May 1996, EPA issued the final Control Techniques Guideline (CTG) document for control of VOC emissions from wood furniture manufacturing operations. Pennsylvania adopted regulations in June, 2000 that implement the provisions of the CTG. EPA estimated that the application of presumptive RACT by facilities in ozone nonattainment areas and the ozone transport region would lead to a 31 percent reduction from current levels in VOC emissions from the wood furniture industry (EPA, 1996). In this analysis, a 30 percent VOC control efficiency was applied.

e. Metal Furniture Coating

Under Title III of the CAA, by November 2000, EPA is scheduled to regulate HAP emissions (including VOC) from metal product coating operations. HAPs are to be regulated initially based on maximum achievable control technology (MACT). A 30 percent VOC reduction is assumed in 2007 for the future MACT standard for this category which is consistent with EPA estimates.

f. Aircraft Surface Coating

EPA promulgated the Aerospace Manufacturing National Emission Standard for Hazardous Air Pollutants (NESHAP) on September 1, 1995 (60 FR 45948, 1995). The final rule affects over 2,800 major source facilities that produce or repair aerospace vehicles or vehicle parts, such as airplanes, helicopters, and missiles (EPA, 1995). In addition, in April, 1999 Pennsylvania adopted regulations implementing the VOC control provisions for aerospace coating operations defined in EPA's CTG for the industry. The rule was estimated to lead to a reduction in HAP emissions, many of which are also VOCs, by 60 percent, by 1998. A 60 percent VOC reduction is applied in this analysis.

g. Marine Surface Coating

In December 1995, EPA issued a NESHAP for shipbuilding and ship repair based on the maximum HAP limits for 23 types of marine coatings. To comply with the NESHAP, affected facilities may not apply any marine coating with a HAP content in excess of the applicable limit, and are required to implement the work practices specified in the rule. Most, if not all, existing *major source* shipyards are located in ozone nonattainment areas, and will have to control VOC emissions under Title I in addition to Title III (EPA, 1994). EPA developed the CTG for this source category in parallel with the NESHAP because of the overlap involving coating limits. The controls required for complying with the NESHAP also apply to VOCs, and constitute draft recommended best available control measures. A 24 percent VOC reduction is applied in this analysis (Serageldin, 1994) which is consistent with EPA estimates.

h. Municipal Solid Waste Landfills

The regulation of municipal solid waste landfills under the authority of the CAA will occur under both Title I and Title III. Title I regulations for this source category were proposed in May 1991, and promulgated in March 1996 (61 FR 9905, 1996). The national rule represents a New Source Performance Standard regulation for new municipal solid waste landfills under Section 111(b) of the CAA, and an emission guideline for existing landfills under Section 111(d). The rule regulates emissions of methane and nonmethane organic compounds, including VOC, HAPs, and odorous compounds. Required controls include a gas collection system, and a control device capable of reducing nonmethane organic compounds in the collected gas by 98 weight-percent. The national emission reduction expected from the emission guideline is 53 percent. In this analysis, a VOC control efficiency of 98 percent and rule penetration of 54 percent have been assumed. The rule penetration value reflects the fraction of landfill emissions that are affected by this rule.

2. Point Source Control Measures

The Commonwealth adopted 25 PA Code Chapter 145. This regulation establishes a cap on NO_x emissions from large sources beginning in the ozone season of 2003. The regulation applies to large EGUs rated at greater than 25 megawatts and large non-EGUs rated at greater than 250 mmBtu/hr. These sources are provided a fixed number of NO_x allowances for each ozone season. A NO_x allowance is the authorization to emit one ton of NO_x. The regulation allows affected sources to trade or sell allowances in order to achieve cost effective controls. The Chapter 145 regulation was modeled after the EPA Section 126 model rule published on January 18, 2000 in the Federal Register (65 FR 2674). The EPA analysis of the modeling program indicated that trading would not have a significant impact on local nonattainment areas. While the Department agrees with this conclusion, the Department will review the impact of trading on the Pittsburgh/Beaver Valley Area caused by trading NO_x allowances. Because the EGU budget is to be implemented via a trading program, in practice, 0.15 pounds NO_x per million British thermal units will be the average emission rate. Individual units will emit at higher, or lower, emission rates than this. Pennsylvania's attainment plan assumes that emission reductions will be achieved by all states subject to the NOx SIP Call. These reductions are necessary for Pittsburgh-Beaver Valley Area to achieve and maintain the one-hour ozone standard.

3. Highway Vehicle and Nonroad Measures

There are a number of permanent and enforceable measures that are expected to further reduce highway vehicle emission rates, so that they are lower in 2007 and 2011 than they are in 1999. The measures discussed below are in addition to those already listed in Chapter II, i.e., those that affected emissions in 1999.

Highway vehicle emissions in the OTC states will be reduced during the maintenance plan period by the NLEV Program. On March 9, 1998, EPA found the NLEV program to be in effect. Nine northeastern States and 23 manufacturers opted in to this program, and the opt-ins met the criteria set forth by EPA in its NLEV regulations. As a result, starting in model year 1999 in Pennsylvania – and other OTC States – new cars and light trucks meet NLEV emission standards.

EPA determined that additional reductions in NO_x and VOC emissions are needed from heavy-duty vehicles, and promulgated a new national emission standard, which is referred to as the HDDV 2.0 grams per brake horsepower-hour NO_x standard. This standard reduces HDDV emissions beginning with the 2004 model year

In 2000, EPA also established Tier 2 motor vehicle emission standards and gasoline sulfur control requirements. This set of emission standards reduces emissions from new passenger cars and light trucks, including pickup trucks, vans, minivans, and sport utility vehicles. The program is a comprehensive regulatory initiative that treats vehicles and fuels as a system, combining requirements for much cleaner vehicles with requirements for much lower levels of sulfur in gasoline.

This plan does not include emission reductions expected after 2007 from even more stringent standards for heavy-duty diesel powered trucks as well as highway diesel fuel sulfur control requirements. This rule was finalized by EPA in December 2000 and reaffirmed by the EPA Administrator on February 20, 2001.

While nonroad equipment populations increase between 1999 and 2007, and increase again between 2007 and 2011, nonroad VOC and NO_x emissions are declining over this same period, due primarily to implementation of the following Federal permanent and enforceable measures:

- Tier 1, Tier 2, and Tier 3 compression-ignition standards for diesel engines greater than 50 horsepower;
- Tier 1 and Tier 2 compression-ignition standards for diesel engines below 50 horsepower;
- Phase 1 and Phase 2 of the spark-ignition standards for gasoline engines less than 25 horsepower; and
- Recreational spark-ignition marine engine controls.

D. MOTOR VEHICLE EMISSION BUDGETS FOR TRANSPORTATION CONFORMITY

Pennsylvania proposes to establish new ceilings for highway emissions in order to ensure that transportation emissions do not impede clean air goals in the next decade. The Clean Air Act Amendments (Section 176c) provides a mechanism by which federal funded or approved highway and transit plans, programs and projects are determined not to produce new air quality violations, worsen existing violations or delay timely attainment of national air quality standards. EPA regulations issued to implement transportation conformity provides that motor vehicle emission "budgets" establish caps of these emissions which cannot be exceeded by the

predicted transportation system emissions in the future. Transportation agencies in Pennsylvania are responsible for making timely transportation conformity determinations. The Southwest Pennsylvania Commission holds that responsibility for the Pittsburgh-Beaver Valley area.

The following, once they are determined to be adequate for purposes of conformity by EPA, will establish transportation conformity budgets for the seven-county Pittsburgh area. DEP will revise these budgets with EPA's new modeling tool, MOBILE6, at an appropriate time.

Table IV-5: Motor Vehicle Emission Budgets

POLLUTANT	**VOCs**	**NOx**
1999	99,472 kg/day 109.65 tons/day	155,176 kg/day 171.05 tons/day
2007	89,102 kg/day 98.22 tons/day	117,136 kg/day 129.12 tons/day
2011	92,533 kg/day 102 tons/day	104,343 kg/day 115.02 tons/day

E. CONTINGENCY MEASURES

The Commonwealth of Pennsylvania will track the attainment status of the ozone NAAQS in the Pittsburgh-Beaver Valley Area by reviewing air quality and emissions data during the maintenance period. The Commonwealth will develop periodic emission inventories (every 3 years) beginning in 2002, and will evaluate these periodic inventories to see if they exceed the baseline (1999) maintenance inventory by more than 10 percent. If a 10 percent exceedance occurs, the Commonwealth will evaluate whether any further emission control measures should be implemented.

Contingency measures would also be considered if an ozone NAAQS exceedance occurs. If an exceedance occurs, the Commonwealth will evaluate whether additional emission control measures should be implemented. The Commonwealth of Pennsylvania contingency plan will be triggered in the event of a monitored violation of the ozone standard. A violation means recording four exceedances of the ozone NAAQS within a consecutive 3-year period at a specific monitoring site. If a violation occurs, the Commonwealth will adopt additional emission reductions, as expeditiously as practicable, in accordance with the Pennsylvania Air Pollution Control Act to return the area to attainment with the health-based one-hour standard. The Commonwealth will also continue to operate the air monitoring network in accordance with 40 CFR 58, with no reductions in the number of sites from those in the existing network unless pre-approved by EPA.

Contingency plan measures include the four VOC model rules currently being considered as additional measures for the Philadelphia Ozone Nonattainment Area. The VOC model rules have the potential to reduce emissions from consumer products, portable fuel containers, AIM coatings and solvent cleaning operations.

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