The State of New Jersey
Department of Environmental Protection

State Implementation Plan (SIP) Revision for the Attainment and Maintenance of the Ozone National Ambient Air Quality Standard (NAAQS)

New Jersey 1996 Actual Emission Inventory and Rate of Progress (ROP) Plans for 2002, 2005 and 2007

March 31, 2001

Preface

This document addresses 42 U.S.C. §7511a(c)(2)(B), §182(c)(2)(B) of the Clean Air Act as amended in 1990, which requires all states with non-attainment areas classified as serious, severe or extreme to demonstrate reasonable further progress by submitting periodic rate of progress (ROP) plans. The purpose of these plans is to demonstrate the State's steady progress in reducing the emissions of volatile organic compounds (VOCs) (and equivalent oxides of nitrogen (NO_x) reductions) in an effort towards meeting the one-hour ozone National Ambient Air Quality Standard (NAAQS) by the attainment dates for each non-attainment area. As such, this document contains ROP plans for the milestone years of 2002 and 2005 for the Philadelphia/Wilmington/Trenton non-attainment area and for the years 2002, 2005, and 2007 for the Northern New Jersey/New York City/Long Island non-attainment area.

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Appendix I: 1996 Actual Emission Inventory

Appendix II: Inventory Projections for 1999, 2002, 2005, 2007

Appendix III: Public Participation

Acronyms and Abbreviations

AFB	Air Force Base
CO	Carbon monoxide
CE	Control Efficiency
DVRPC	Delaware Valley Regional Planning Commission
EGAS	Economic Growth Analysis System
FAA	Federal Aviation Administration
FIP	Federal Implementation Plan
FMVCP	Federal Motor Vehicle Control Program
gpm	grams per mile
GVWR	Gross Vehicle Weight Rating
HDDV	Heavy-Duty Diesel Vehicles
HC	Hydrocarbons
hp	horsepower
HPMS	Highway Performance Monitoring System
ICAO	International Civil Aviation Organization
I/M	Inspection and Maintenance
lm	Lane Miles
LTOs	Landing and Take-Off Cycles
MY	Model Year
kW	Kilowatts
MPO	Metropolitan Planning Organization
NAAQS	National Ambient Air Quality Standard
NJDEP	New Jersey Department of Environmental Protection
NJDOT	New Jersey Department of Transportation
NJTPA	North Jersey Transportation Planning Authority
NO_x	Oxides of Nitrogen
NNEM	National Non-road Emissions Model
OTAG	Ozone Transport Assessment Group
OTR	Ozone Transport Region
PPAQ	Post-Processor for Air Quality
ppb	parts per billion
ppm	parts per million
RACT	Reasonably Available Control Technology
RE	Rule Effectiveness
ROP	Rate of Progress
RP	Rule Penetration
SCC	Source Classification Code
SIP	State Implementation Plan
SJTPO	South Jersey Transportation Planning Organization
SUV	Sport Utility Vehicle
TDM	Travel Demand Model
tpd	tons per day
tpy	tons per year
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds
VMT	Vehicle Miles Traveled

Executive Summary

The purpose of this document is to demonstrate the State's compliance with 42 U.S.C. §7511a(c)(2)(B), §182(c)(2)(B) of the Clean Air Act, which requires all states with non-attainment areas classified as serious or higher to demonstrate reasonable further progress by submitting periodic rate of progress (ROP) plans. These plans show New Jersey's steady progress in reducing the emissions of volatile organic compounds (VOCs) (and equivalent oxide of nitrogen (NO_x) emissions) in an effort toward meeting the one-hour ozone National Ambient Air Quality Standard (NAAQS) by the attainment dates for each applicable non-attainment area in the State.

42 U.S.C. §7511a(b)(1), requires states with one-hour ozone non-attainment areas with air quality classified as moderate, serious, severe, or extreme to prepare plans detailing how these areas will reduce their VOC emissions by 15 percent from 1990 levels by 1996. For New Jersey, this requirement had to be met for the New Jersey portions of the Atlantic City, Northern New Jersey/New York City/Long Island, and Philadelphia/Wilmington/Trenton non-attainment areas. As discussed in Section II.D, New Jersey has satisfied the 1996 15 percent ROP requirements. The USEPA approved the NJDEP 15 percent plan on April 23, 1999. However, in addition to this requirement, 42 U.S.C. §7511a(c)(2)(B) calls for states with one-hour ozone non-attainment areas with air quality classified as serious, severe or extreme to reduce their VOC emissions by an additional 3 percent of the 1990 baseline VOC emission level averaged over each consecutive three (3) year period beginning in 1996 until the attainment date.

As discussed in greater detail in Section II.D, the State has already met the 1999 24 percent ROP requirement. The USEPA approved the state's 24 percent plan on April 23, 1999. This document contains the remaining ROP plans for each milestone year up to and including the attainment years for each applicable non-attainment area. Using control measures consistent with those in the State's demonstration of attainment of the one-hour ozone standard, it is shown that the ROP targets in Table ES-1 are readily met. In addition, the state has agreed to find further emission reductions, identified by the USEPA, and is currently working with other Ozone Transport Region states in this regard. Once these measures are adopted, projected controlled emission levels would decrease further.

Table ES-1
ROP Targets (tons per day)

Non-attainment Area (New Jersey portion)	VOC Emissions (tpd)	1990	2002	2005	2007
New York	VOC ROP Target Level	957.03	593.91	512.90	459.89
Philadelphia	VOC ROP Target Level	358.15	229.35	196.27	-

Regarding on-road emissions, during the 1990's, the public has purchased more sport utility vehicles (SUVs) that have higher emissions on a per mile traveled basis. To capture that effect, this SIP Revision contains revised estimates incorporating newer 1999 data for allocating vehicle miles traveled by vehicle class, and within each class, by vehicle age. In addition, the NO_x benefits from Phase II of the Reformulated Gasoline Program, the VOC and NO_x benefits from the Tier II Motor Vehicle Standard/Low Sulfur Gasoline Program, and the adverse effects of heavy duty diesel (HDD) defeat devices-that disengage the engine's emission control system during highway driving and the benefits from new engine standards have been incorporated. The resulting on-road emissions are used to propose new transportation conformity budgets as discussed below.

In Table ES-2 below, the resulting on-road emissions and new conformity budgets are compared to the prior budgets contained in the State's Attainment Demonstration SIP Revision[1] that were used to establish prior attainment year transportation conformity budgets. These changes result in higher emissions, except for the

[1] NJ SIP Revision; Update to Meeting the Requirements of the Alternative Ozone Attainment Demonstration Policy - Additional Emission Reduction and Transportation Conformity Budgets, April 26, 2000.

DVRPC 2005 NO_x budget which decreases. The increases are primarily due to the inclusion of the HDD effects discussed above and the new vehicle VMT and age distributions.

Table ES-2
Comparison of New Transportation Conformity Budgets to Prior Budgets for the Attainment Years

Transportation Planning Area	Attainment Year	VOC Emissions (tons per day)		NO_x Emissions (tons per day)	
		Prior SIP Budgets	New Budgets	Prior SIP Budgets	New Budgets
North Jersey Transportation Planning Authority (NJTPA)	2007	78.25	93.20	171.96	175.51
South Jersey Transportation Planning Organization (SJTPO)	2005	10.23	13.36	24.88	26.42
Delaware Valley Regional Planning Commission (DVRPC)	2005	32.29	38.03	58.56	55.62

Regarding these new budgets, it should be noted that in its proposed approval of New Jersey's One-Hour Ozone Demonstration[2], the USEPA required three efforts by New Jersey related to conformity budgets;

(1) to revise its transportation conformity budgets to reflect the Tier 2 Vehicle Standard/Low Sulfur Gasoline Program, which the State did in its April 26, 2000 SIP revision,

(2) to recalculate its transportation conformity budgets, if any of the new control measures required by Oct, 2001 pertain to motor vehicles, which the State has committed to do, and

(3) to revise its transportation conformity budgets again when the Mobile 6 model is available for SIP usage, which the State has also committed to do.

In committing to item (3), it was New Jersey's understanding that all the major emission estimate issues involving on-road emissions would be consolidated into the Mobile 6 model and not dealt with in a piecemeal fashion prior to the release of that Model.

However, because new vehicle registration data recently became available, the transportation conformity budgets being established at this time represent an additional intermediate step prior to the use of Mobile 6 to establish consistency between SIP and transportation conformity on-road emission estimates. However, these transportation conformity budgets reflect only certain emission estimation issues, such as vehicle VMT mix, that tend to increase emissions. It is the State's understanding that other issues that may tend to decrease emissions, such as longer catalyst operating lifetimes, will be incorporated into the Mobile 6 model. The net effect of all such changes may reduce the emissions in Table ES-2.

Finally, from an air quality perspective for purposes of insuring progress towards the 1-hour ozone standard and preparing for a new, stricter, 8-hour ozone standard, it should be noted that the State is attempting to preserve future air quality benefits from technological advances.

Toward that end, in its April 26, 2000 attainment demonstration SIP revision, the State proposed an enforceable transportation conformity policy under which the incremental emissions benefits (beyond that achieved in the attainment years) from the Tier II Motor Vehicle Standard/Low Sulfur Gasoline Program would be divided equally, with up to 50 percent of that benefit available for use for conformity determinations, and the remaining 50 percent set aside for future air quality needs. The USEPA has not yet taken action on that proposal.

[2] 64 Fed.Reg. 70380, December 16, 1999.

I. Introduction

This document demonstrates the State's compliance with 42 U.S.C. §7511a(c)(2)(B), §182(c)(2)(B) of the Clean Air Act as amended in 1990, which requires all states with non-attainment areas classified as serious, severe or extreme to submit periodic rate of progress (ROP) plans. These plans show New Jersey's steady, timely progress in reducing the emissions of volatile organic compounds (VOCs) (and equivalent oxide of nitrogen (NO_x) emissions) in an effort toward meeting the one-hour ozone National Ambient Air Quality Standard (NAAQS) by the attainment dates for each applicable non-attainment area in the State.

II. Background

A. Environmental and Health Impacts of Ozone and Legal Standards

Ozone (O_3) continues to be New Jersey's most pervasive air quality problem. Although the ozone found in the earth's upper atmosphere (stratosphere) forms a layer that protects us from the sun's ultraviolet radiation, the ozone formed near the earth's surface (troposphere), hereafter referred to as ground-level ozone, is breathed by or comes in contact with people, animals, crops and other vegetation, and can cause a variety of health and other effects. Ground-level ozone is produced in complex chemical reactions when its precursors, VOCs and NO_x, react in the presence of sunlight. The primary man-made sources of these ozone precursors are the evaporation of solvents and fuels (consumer products and gasoline) and combustion by-products (power plants, on-road sources, industry, highway vehicles and other engines).

As it forms, ground-level ozone and its precursors, especially NO_x, can be transported by the wind, resulting in high ozone levels in areas downwind of the original pollution source. The combination of higher summer temperatures, sunlight, local emissions, and atmospheric transport conditions contribute to a summertime elevated peak in ozone concentrations. Therefore, unlike primary pollutants, e.g., sulfur dioxide and lead, which are emitted directly and can be controlled at their source, reducing ozone concentrations poses a difficult challenge because the precursors are emitted from many different sources, and from various geographic locations. As such, controls at any one source may not solve the ozone problem.

Breathing elevated levels of ground-level ozone can[3]:

- decrease lung function, primarily in children active outdoors;
- increase respiratory symptoms, such as coughing and chest pain upon inhalation, particularly in highly sensitive individuals;
- increase hospital admissions and emergency room visits for respiratory causes among children and adults with pre-existing respiratory diseases, such as asthma;
- cause inflammation of the lungs;
- cause possible long-term damage to the lungs; and
- promote allergic reactions.

In addition to its health effects, ground-level ozone interferes with various plant's ability to produce and store nutrients.[4] This causes the plants to become more susceptible to disease, insects, other pollutants and harsh weather. This impacts annual crop production throughout the United States, resulting in significant losses, and injures native vegetation and ecosystems. Ground-level ozone also damages certain man-made materials, such as textile fibers, dyes, and paints.[5]

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[3] 62 Fed. Reg. 60317, (November 7, 1997).

[4] A USEPA Fact sheet on the New 8-Hour Ozone and Fine (2.5 microns) Particulate Matter Health Standards, July 1997.

[5] ibid.

The current national ambient air quality standard (NAAQS) for ozone is a one hour average of 0.12 parts per million (ppm), not to be exceeded more than three days over a three year period. Therefore, the fourth highest value over a three year period, termed the design value, determines whether or not an area is below the standard. New Jersey has made progress toward reducing the spacial extent of the area that is above the one-hour ozone standard (see Figure 3). However, 18 of its 21 counties are still in two USEPA - designated non-attainment areas where the standard is still being exceeded - either within or outside New Jersey. Figure 1 shows the New Jersey portions of the New York/Northern New Jersey/ Long Island and Philadelphia/Wilmington/Trenton non-attainment areas. Therefore these two non-attainment areas and the 18 New Jersey counties within them remain subject to ROP requirements.

On July 18, 1997, the United States Environmental Protection Agency (USEPA) found that the current one-hour National Ambient Air Quality Standard (NAAQS) for ozone was no longer sufficiently protective of public health. As such, the USEPA revised the ozone health standard to be set at 0.08 parts per million (ppm) averaged over an 8-hour period. The USEPA's plan for compliance with this standard was based on the three year average of the fourth highest 8-hour averaged concentration reading at a given monitoring site. This three year average is termed the 8-hour design value.

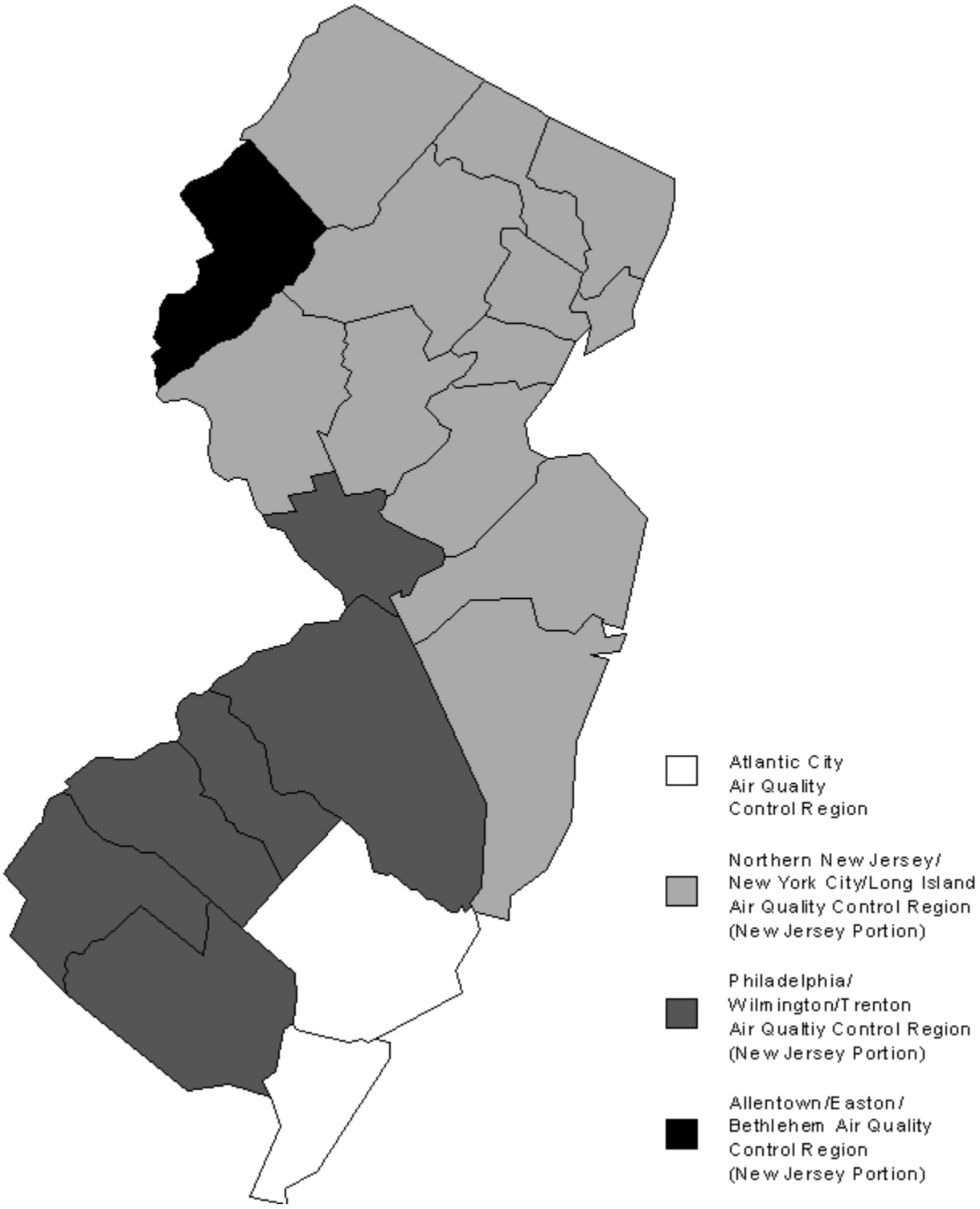
Subsequent to this revision, several states and associations petitioned the U.S. Circuit Court of Appeals for the District of Columbia to review the new standard, and, on May 14, 1999, the Court issued its ruling. In essence, the court remanded the 8-hour ozone and fine particulates NAAQS back to USEPA for greater clarification of the criteria used to set the standards under Sections 108 and 109 of the Clean Air Act. The court ruled that the USEPA interpreted Sections 108 and 109 too broadly to satisfy constitutional standards (Justice Tatel dissenting). Essentially, the court said that because ozone and fine particulates do not have specific thresholds for the presence or absence of health effects, the USEPA had to articulate clearer criteria for choosing the specific levels it set. It found that the criteria the USEPA used were too broad to justify why the standards were set at their particular levels. The DC Circuit viewed such broad discretion in setting the level of the standards under Sections 108 and 109 as a constitutionally impermissible delegation of legislative authority from Congress to the USEPA (U.S. Constitution, Art. I, §). But rather than ruling Sections 108 and 109 unconstitutional, the court remanded the standards back to the USEPA with the opportunity to provide a more constitutionally permissible set of criteria to justify the level of the standards.

The Court also found that any control requirements under the new 8-hour ozone standard are unenforceable because of the specific classifications, dates and controls set forth by Congress for the 1-hour ozone standard in the Clean Air Act Amendments of 1990. Thus, the USEPA does not intend to move forward with control measures to address the 8-hour standard. It did however decide that preparatory work toward designation of the non-attainment areas was permissible under the Court's decision and requested Governors to submit area recommendations by June 30, 2000. New Jersey made such preliminary recommendations on August 1, 2000.[6]

The USEPA recommended review by the United States Supreme Court through the Department of Justice and the Supreme Court agreed to hear the case. New Jersey has supported the 8-hour ozone standard and was a party to this appeal. The matter was argued on November 7, 2000. The Supreme Court on February 27, 2001 unanimously upheld the constitutionality of the 1970 Clean Air Act provision authorizing the USEPA to set NAAQS. The Court instructed the USEPA to develop an implementation Plan consistent with Part D, Subpart 2 of the Clean Air Act, and remanded certain other issues back to the D.C. Circuit Court of Appeals for resolution.

[6] Letter dated August 1, 2000 from Robert C. Shinn, Commissioner of New Jersey's Department of Environmental Protection to Jeanne M. Fox, Regional Administration, USEPA – Region II.

Figure 1: Air Quality Control Regions in New Jersey



In regards to reductions of regional emissions, the USEPA has issued a proposed approval, dated November 28, 2000, of New Jersey's plan for meeting the state NO_x emission cap requirements in the USEPA's NO_x SIP call. Several trade associations, corporations and some states have challenged the USEPA rule requiring these NO_x caps. The US Court of Appeals for the DC Circuit and the US Supreme Court have found in favor of the USEPA on this issue.

Another mechanism through which New Jersey has sought emission reductions is by filing a petition using section 126 of the Clean Air Act. The USEPA has yet to take any action on the NJ petition. The USEPA has granted similar petitions from a number of northeastern states. The petition has been challenged and is currently in the US Court of Appeals for the DC Circuit.

B. Clean Air Act and Legal Requirements

Pursuant to the area classification criteria in the Clean Air Act, the State of New Jersey was geographically divided into four air quality control regions for the one-hour ozone NAAQS, as shown in Figure 1. 42 U.S.C. §7511a(b)(1) requires states with one-hour ozone non-attainment areas with air quality classified as moderate, serious, severe, or extreme to prepare plans detailing how these areas will reduce their VOC emissions by 15 percent from 1990 levels by 1996. For New Jersey, this requirement had to be met for the New Jersey portions of the Northern New Jersey/New York City/Long Island, and Philadelphia/Wilmington/Trenton non-attainment areas. As discussed in Section D, New Jersey has satisfied the 1996 15 percent ROP requirements. However, in addition to this requirement, 42 U.S.C. §7511a(c)(2)(B) calls for states with one-hour ozone non-attainment areas with air quality classified as serious, severe or extreme to reduce their VOC emissions by an additional 3 percent of the 1990 VOC adjusted baseline emission level averaged over each consecutive three (3) year period beginning in 1996 until the attainment date.

These future year ROP requirements have to be met for the New Jersey portions of the Northern New Jersey/New York City/Long Island non-attainment area (hereafter referred to as the New York non-attainment area), and Philadelphia/Wilmington/Trenton non-attainment area (hereafter referred to as the Philadelphia non-attainment area). As discussed in Section D below, New Jersey has satisfied the 1999 24 percent ROP requirements. This document provides the ROP plans for the years 2002 and 2005 for both the New Jersey portion of the New York and Philadelphia non-attainment areas, and the ROP plan for 2007 for the New York non-attainment area.

C. Relationship between the ROP Requirement and the Attainment Demonstration

On August 31, 1998, New Jersey submitted to the USEPA a SIP revision containing a demonstration of attainment of the 1-hour ozone NAAQS for the New York and Philadelphia non-attainment areas.[7] This original attainment demonstration submittal is hereafter referred to as the State's Phase II Ozone SIP. The Phase II Ozone SIP submittal provided for an attainment demonstration as required by 42 U.S.C. §7511a(c)(2)(A), §182(c)(2)(A) of the Clean Air Act and addressed the USEPA's subsequent requirements regarding attainment demonstration for the 1-hour NAAQS for ozone.[8,9] In addition to including a demonstration of attainment of the 1-hour NAAQS for ozone for the New York and Philadelphia non-attainment areas, and a list of the control measures adopted by the State to date, the Phase II Ozone SIP committed the State to:

1) submit, by December 31, 2000, post-1999 Rate of Progress (ROP) Plans and any adopted regulations needed to achieve the post-1999 emission reductions;
2) implement the New Jersey portion of the USEPA regional NO_x cap (NO_x SIP Call);
3) undertake a midcourse review and submit a report to the USEPA by December 31, 2002;

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[7] NJ SIP Revision, Meeting the Requirements of the Alternative Ozone Attainment Demonstration Policy-Phase II Ozone Submittal, August 31, 1998.

[8] Memorandum dated March 2, 1995 from Mary D. Nichols, Assistant Administrator for Air and Radiation, USEPA to the USEPA Regional Administrators, Regions I-X. This Policy is commonly referred to as "The March 2nd Policy."

[9] Memorandum dated December 29, 1997 from Richard D. Wilson, Acting Assistant Administrator for the USEPA Office of Air and Radiation to the Regional Administrators, USEPA, Regions I-X entitled "Guidance for Implementing the 1-Hour Ozone and Pre-Existing PM_{10} NAAQS".

4) evaluate additional control measures which are not currently implemented for potential future implementation; and,
5) propose such reasonable and necessary control measures needed to address any shortfall identified in the mid-course review which are necessary for attainment.

In reviewing the attainment demonstrations submitted by New Jersey, as well as other states' submittals (such as New York, Pennsylvania and Maryland), the USEPA performed its own analyses and determined that further emission reductions were necessary to insure attainment by the applicable dates. For New Jersey, the USEPA's analyses results were reasonably similar to the uncertainty analysis results New Jersey presented in its Phase II Ozone SIP to quantify the uncertainties incorporated its air quality projections. Therefore, considering both the USEPA and the prior state analyses, the State revised its attainment demonstration to include a commitment to a process designed to secure New Jersey's fair share of the additional emission reductions identified by the USEPA.[10]

As discussed in Section IIB, the purpose of the ROP submittal is to demonstrate steady incremental progress (3 percent of the 1990 VOC baseline emission level averaged over each consecutive 3 year period beginning in 1996) leading towards the ultimate goal of attainment. The purpose of the attainment demonstration, however, was to assess the overall emission reductions necessary to actually achieve attainment, which could be greater than or less than the ROP incremental reductions. If the attainment demonstration shows that a state needs less than 3 percent over each consecutive 3 year period to reach attainment, it can petition the USEPA to reduce the ROP requirement for their particular state.[11] In New Jersey's case, however, attaining the standard requires emission reductions that exceed ROP requirements. By way of illustration, the control measures in the attainment demonstration were incorporated here in the ROP SIP, and the resulting controlled emission levels in Tables 29 and 30 show that the controlled emissions for the New York and Philadelphia non-attainment areas are well below the targets derived from the 3 percent reduction over each consecutive 3 year period ROP requirement. For example, for the New York non-attainment area for 2007 the sum of the New Jersey VOC and NO_x percentage emission reduction is 83.51 percent as compared to a 48 percent ROP test requirement. Therefore, for New Jersey, the emission reductions needed to attain the ozone standard significantly exceed the three percent per year ROP requirements.

D. ROP SIP History

The State submitted its original 1996 15 percent ROP plans to the USEPA on November 15, 1993.[12] Subsequently, on December 31, 1996, New Jersey submitted to the USEPA, as part of its Phase I Ozone SIP submittal, a revision which updated its 1993 15 percent ROP plans and included its 1999 24 percent ROP plans to the USEPA.[13] The USEPA granted conditional interim approval to New Jersey's Phase I Ozone SIP submittal on June 30, 1997.[14] The USEPA's approval of New Jersey's Phase I Ozone SIP was conditional based on the

[10] The State of New Jersey Department of Environmental Protection, State Implementation Plan (SIP) Revision for the Attainment and Maintenance of the One-Hour Ozone National Ambient Air Quality Standard, Update to Meeting the Requirements of the Alternative Ozone Attainment Demonstration Policy-Additional Emission Reduction Commitment and Transportation Conformity Budgets, April 26, 2000.

[11] 42 U.S.C. §7511a(c)(2)(B)(ii).

[12] The State of New Jersey Department of Environmental Protection and Energy, State Implementation Plan (SIP) Revision for the Attainment and Maintenance of the Ozone National Ambient Air Quality Standards, Meeting the Federal Clean Air Act Requirements of November 15, 1993, November 15, 1993.

[13] The State of New Jersey, Department of Environmental Protection, State Implementation Plan (SIP) Revision for the Attainment and Maintenance of the Ozone National Ambient Air Quality Standards, Meeting the Requirements of the Alternative Ozone Attainment Demonstration Policy, Phase I Ozone SIP submittal, December 31, 1996.

[14] 62 Fed. Reg. 35100, (June 30, 1998).

modeling contained in the 15 percent and 24 Percent Rate of Progress Plans.[15] On December 12, 1997, the USEPA disapproved the 15 percent ROP plans' portion of New Jersey's Phase I Ozone SIP due to the realization that the benefits claimed in these plans for the State's enhanced I/M program would not be obtained.[16]

On February 5, 1999, the State submitted revised 15% ROP (and 24% ROP) plans that no longer relied on the benefits anticipated from the enhanced I/M program. These revised plans were approved by the USEPA on April 23, 1999.[17] On December 13, 1999, the State began implementation of its enhanced I/M program.

In summary, the State currently has approved 15 % and 24 % ROP plans for 1996 and 1999. The next step in the process is to submit the remaining ROP plans for three year periods out to the attainment years for each of the applicable non-attainment areas. As required by the Clean Air Act, the New York non-attainment area has an attainment date of 2007. As such, ROP plans for 2002, 2005 and 2007 were needed for this area. Similarly, the Clean Air Act requires that the Philadelphia non-attainment area attain the 1-hour ozone NAAQS by 2005. As such, this area needed ROP plans for 2002 and 2005. As part of it Phase II Ozone SIP[18], the State of New Jersey committed to developing its required post-1999 ROPs by December 31, 2000.[19]

E. The ROP Test and Emission Target Levels

Section 42 U.S.C. §7511a(c)(2)(B) of the Clean Air Act calls for ROP VOC emission reductions of at least 3 percent per year from the baseline emissions described in subsection (b)(1)(B). That subsection defines baseline emissions as the "total amount of actual VOC and NO_x emissions from all anthropogenic sources in the area", for the year 1990, excluding certain pre-1990 reductions.

New Jersey established this baseline inventory in its Phase I Ozone SIP[20] and, with one minor revision in its revised 15 percent plan[21], continues to use it herein as the basis for establishing its ROP target levels for 2002, 2005 and 2007.

This section describes the emission reduction "test" used by New Jersey to determine compliance with the statutory ROP requirements. The steps involved are designated below as A, B, C, D, E, and F to correspond with the rows in Tables 29 and 30 in Section V.A, where the numerical results for emission projections for both non-attainment areas are presented and compared to their required targets. As discussed below, the USEPA guidance is very specific about how to calculate the percentage reductions in VOC emissions required by the Clean Air Act.

Step A: Calculate a 1990 Base Year Actual Emission Inventory. This inventory should include emissions from biogenic sources. New Jersey calculated this inventory

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[15] In a letter dated May 29, 1997, New Jersey committed to perform the remodeling necessary to estimate the emissions reductions that would result from the enhanced I/M program, as implemented, within 12 months from the effective date of the USEPA's approval action (that is, by July 30, 1998).

[16] Letter dated December 12, 1997 to New Jersey Governor Christine Todd Whitman from Regional Administrator Muszynski, and a similar but more detailed letter dated December 12. 1997 to Commissioner Robert C. Shinn, Jr., NJDEP and Commissioner John J. Haley, Jr., New Jersey Department of Transportation, from Deputy Regional Administrator William J. Muszynski, P.E., USEPA, Region II. This action was later formalized by the USEPA at 63 Fed. Reg. 45399 (August 26, 1998).

[17] 64 Fed. Reg. 19913 (April 23, 1999).

[18] The State of New Jersey Department of Environmental Protection, State Implementation Plan (SIP) Revision for the Attainment and Maintenance of the Ozone National Ambient Air Quality Standards, Meeting the Requirements of the Alternative Ozone Attainment Demonstration Policy,
Phase II Ozone SIP Submittal, August 31, 1998. Transmitted under a cover letter dated August 31, 1998 from Robert C. Shinn, Jr., Commissioner of the NJDEP to Jeanne Fox, Regional Administrator, United States Environmental Protection Agency.

[19] NJ SIP Revision, Meeting the Requirements of the Alternative Ozone Attainment Demonstration Policy-Phase II Ozone Submittal, August 31, 1998.

[20] The State of New Jersey, Department of Environmental Protection, State Implementation Plan (SIP) Revision for the Attainment and Maintenance of the Ozone National Ambient Air Quality Standards, Meeting the Requirements of the Alternative Ozone Attainment Demonstration Policy, Phase I Ozone SIP submittal, December 31, 1996.

[21] NJ SIP Revision, Revision to the New Jersey 15 Percent Rate of Progress Plan, February 8, 1999.

and included it as part of its Phase I Ozone SIP.[22] It was updated in February, 1999.[23] The numbers for 1990 in Row A of Tables 29 and 30 were extracted from this updated inventory.

Step B: Adjust the 1990 Base Year Actual Emission Inventory by removing the biogenic emissions and non-reactive, non methane hydrocarbons subject to existing USEPA Guidance. This adjusted inventory is hereafter referred to as the baseline inventory. Although the USEPA has determined that acetone is no longer defined as an a VOC[24], the baseline inventory used in this SIP revision to demonstrate ROP compliance includes acetone as a VOC. This is because the USEPA has not yet issued guidance on how to identify acetone emissions in all sectors of the emission inventory, as had previously been done for perchloroethylene emissions.

Step C: Calculate the emission benefits achieved from pre-1990 control measures that cannot be applied to the percentage reduction requirement. For New Jersey, this only includes the benefits achieved from the Federal Motor Vehicle Control Program (FMVCP). These benefits vary with the projection year as the number of FMVCP vehicles on the road changes.

Step D: Adjust the baseline inventory by subtracting the benefits achieved from the FMVCP, since these reductions are not creditable towards the percentage reduction requirement. The resulting inventory is hereafter referred to as the adjusted baseline inventory.

Step E: As discussed in Section B. above, the Clean Air Act requires non-attainment areas classified as serious or above to reduce VOC emission from the 1990 adjusted baseline emission by 3 percent averaged over each consecutive three (3) year period beginning in 1996 until the attainment date. Therefore for 2002, an additional VOC emission reduction beyond the 15 percent reduction required in 1996 of 3 percent times 6 years is required. This results in a required 18 percent reduction. Therefore the full emission reduction required in 2002 is 33 percent (15 percent plus 18 percent). Following the same logic, the VOC reduction required in 2005 is 42 percent and 48 percent in 2007 (noting that the 2007 reduction applies only to the New York non-attainment area). These percentage reduction goals are presented in Row E of Tables 29 and 30 (Section V.A).

Step F: Develop VOC emission target levels for each year of interest (that is, 2002, 2005, and 2007) by reducing the 1990 adjusted baseline emissions by the percentages calculated in Step E. To demonstrate compliance with the ROP "test," the projected inventories for those years, incorporating the benefits of control measures, must be below these target levels.

F. Air Quality Perspective

In developing these ROP plans, the NJDEP reviewed air quality data to determine whether or not the trends were generally consistent with the emission projections included as part of this SIP revision (see Figures 3-8 below). In reviewing these figures, please note that the 1-hour ozone standard is 0.12 parts per million (ppm), which is rounded to 124 parts per billion (ppb) for operational monitoring purposes. Similarly, the 8-hour ozone standard is 0.08 ppm, which for operational monitoring purposes is rounded up to 84 ppb. The regulatory measure for the

[22] The State of New Jersey, Department of Environmental Protection, State Implementation Plan (SIP) Revision for the Attainment and Maintenance of the Ozone National Ambient Air Quality Standards, Meeting the Requirements of the Alternative Ozone Attainment Demonstration Policy, Phase I Ozone SIP submittal, December 31, 1996.

[23] NJ SIP Revision, Revision to the New Jersey 15 Percent Rate of Progress Plan, February 8, 1999.

[24] 60 Fed. Reg. 31633 (June 16, 1996).

USEPA's 1-hour standard is termed the "1-hour design value," and is the fourth highest ozone concentration at the site over consecutive 3-year periods. The regulatory measure for the USEPA's 8-hour standard is termed the "8-hour design value," and is the 3 year average of the 4th highest 8-hour averaged ozone concentration at a monitoring site for each year. The design value for an area is the highest design value for all the monitoring sites in the area.

New Jersey's ozone monitoring sites are shown in Figure 2. As shown in Figures 4, 6 and 8, the monitoring sites have been grouped into two regions, North/Central New Jersey and Southern New Jersey. North/Central New Jersey refers to the following monitoring sites: Monmouth University, Rider University, New Brunswick, Flemington, Cliffside Park, Bayonne, Newark-Rutgers and Bayonne. Southern New Jersey refers to the following monitoring sites: Ancora State Hospital, Collier's Mills, Camden, Clarksboro, Nacote Creek and Millville.

Figures 3 and 4 illustrate a significant reduction in the geographic extent of standard exceedances from 1990 to 1999, with diminishing progress since 1994. The air quality data in Figures 5, 6, 7, and 8 indicates progress in reducing the number of days when the standard was exceeded and the 1-hour and 8 hour standard design values as defined above in the 1990 to 1994 time frame. This is consistent with the emission reduction projections from 1990 to 1996 shown in Tables 29 and 30. Since then, ozone concentrations appear to have leveled off. However, in interpreting this data it is critical to remember that emissions of NO_x, and to a lesser extent VOC, outside and upwind of New Jersey, play a major role in forming the ozone concentrations within the State, so that a close correlation between emission reductions and ozone concentrations in New Jersey is not necessarily expected. Nevertheless, the leveling off of trends reinforces the need for New Jersey to maintain a steady rate of progress in emission reductions towards attaining the 1-hour standard in the State, as well as in areas downwind of New Jersey.

Figure 2
State of New Jersey Ozone Monitoring Network 1999

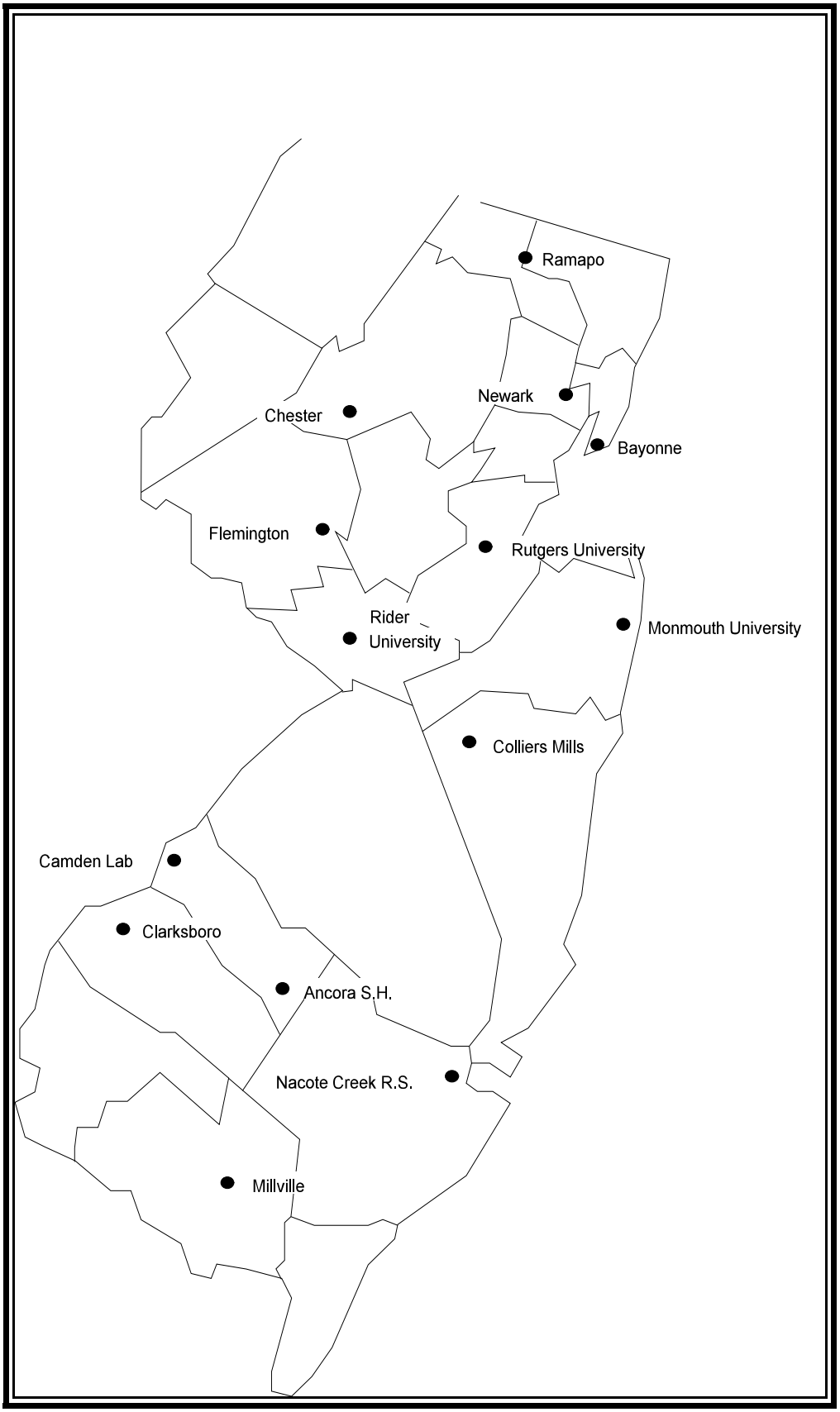


Figure 3
Sites in New Jersey Not Attaining the 1-Hour Ozone Standard

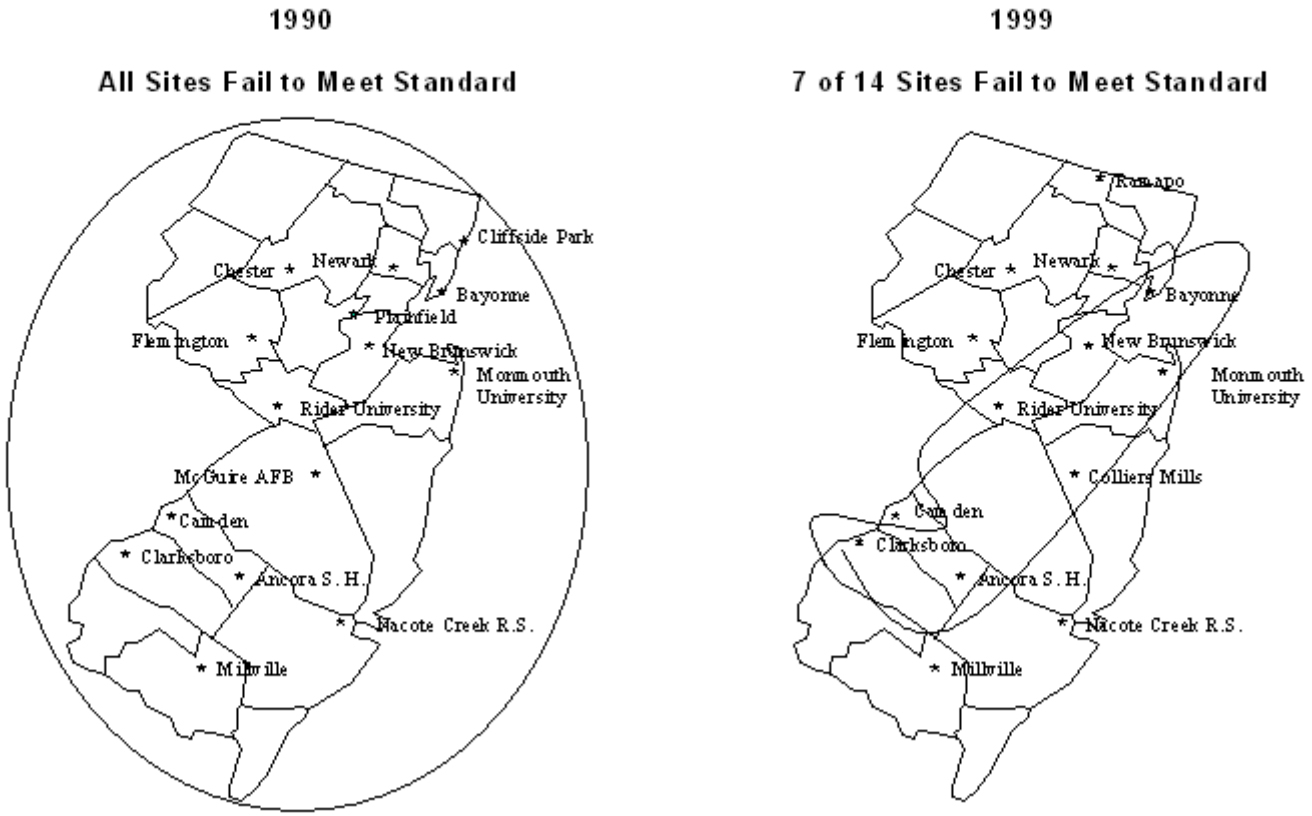


Figure 4
Total Number of Monitoring Site Exceedances of the 1-hour Standard
Each Year in New Jersey

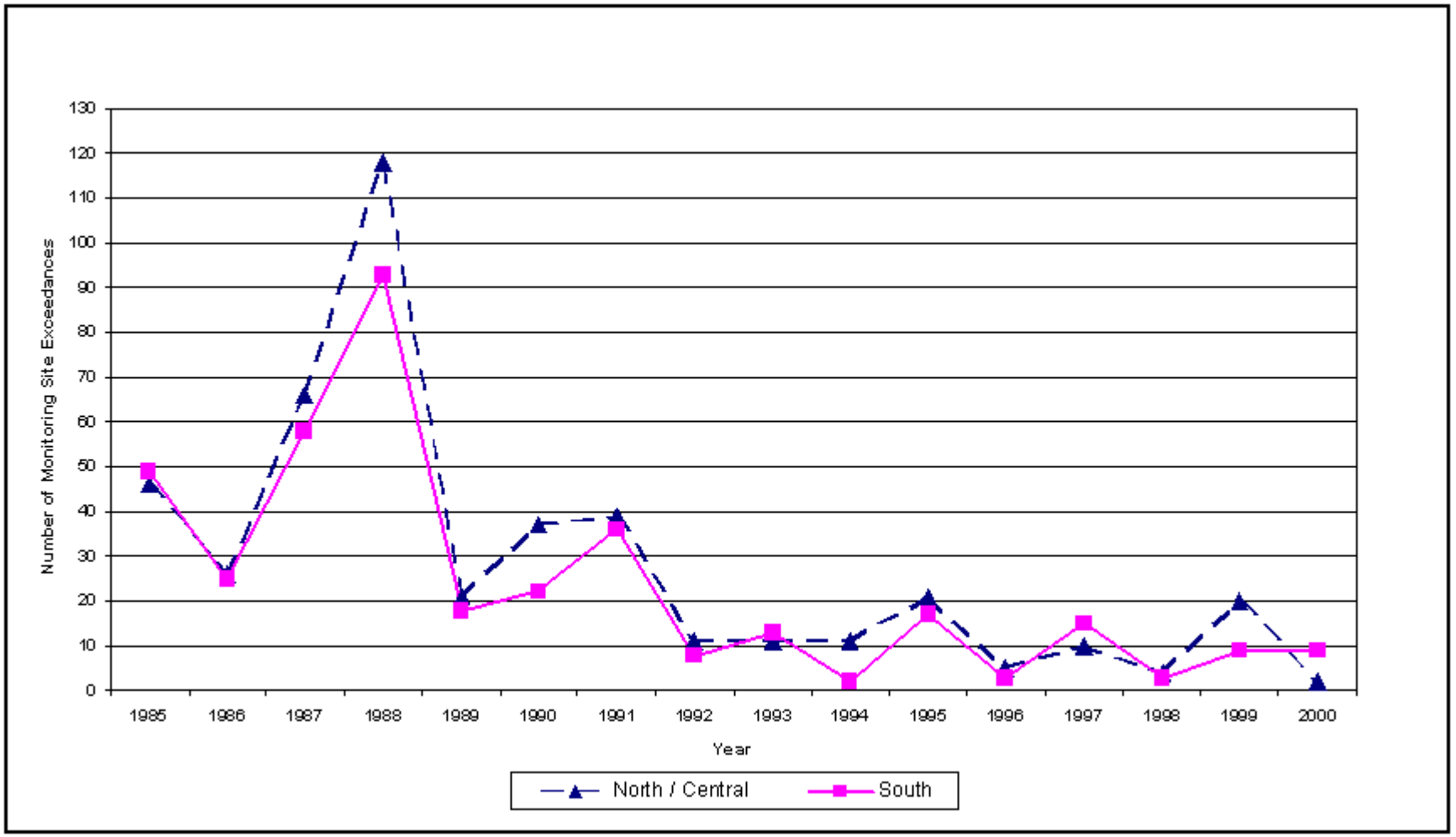


Figure 5
Days on Which the 1-Hour Ozone Health Standard Was Exceeded in New Jersey, 1988 - 2000

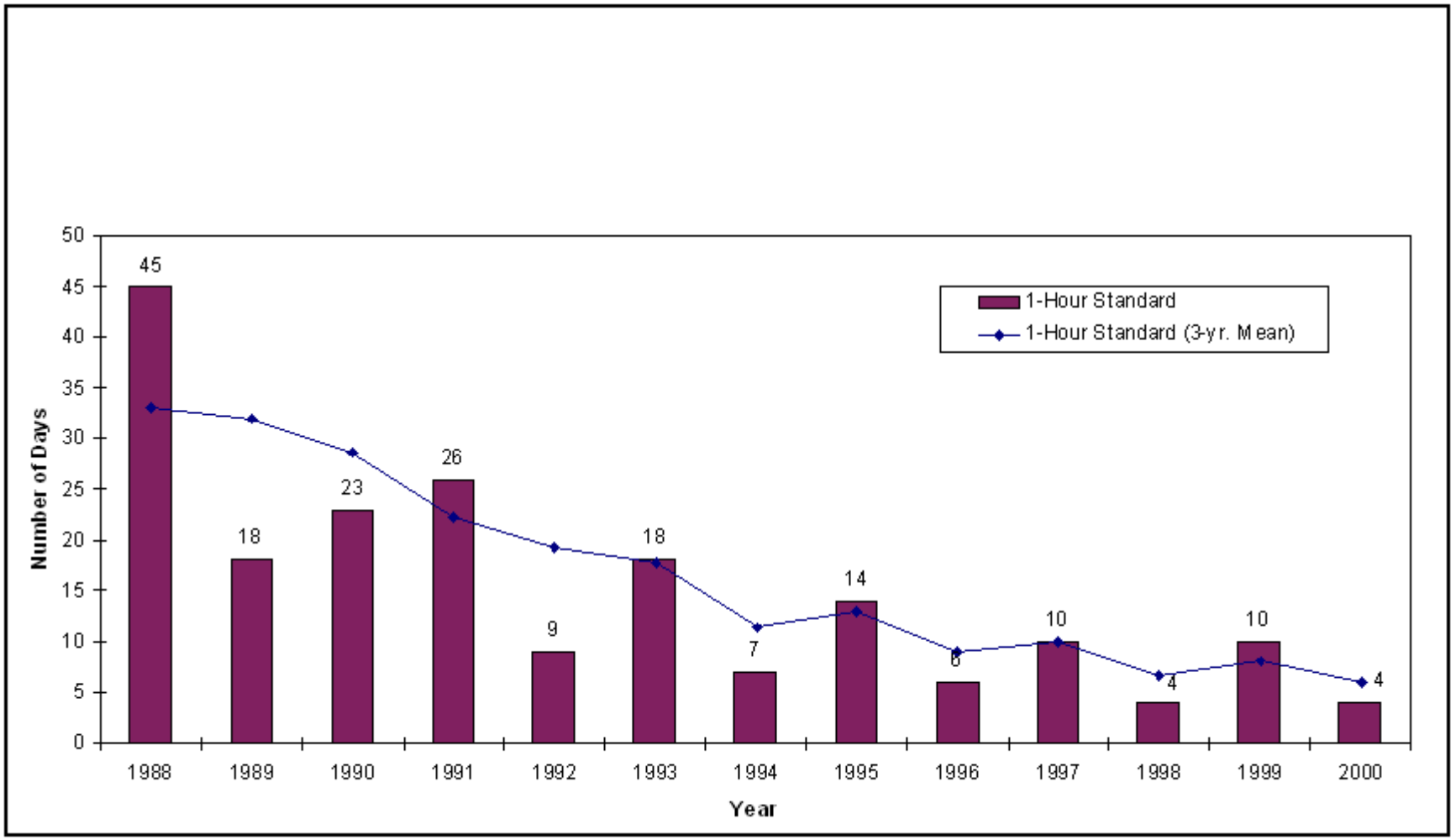


Figure 6
1-Hour Standard: Maximum Design Values, North/Central and Southern New Jersey

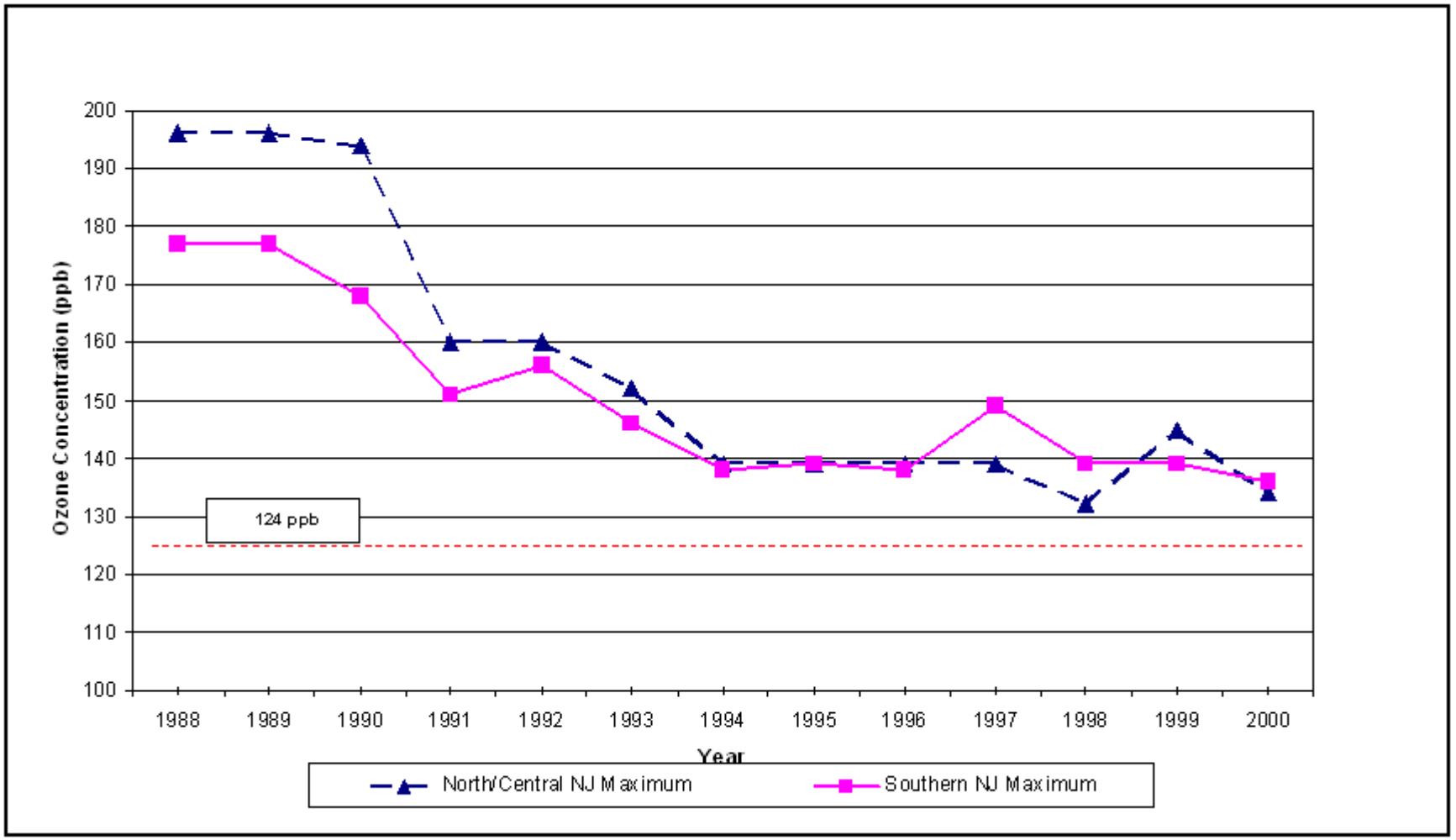


Figure 7
Number of Days on Which the 8-Hour Ozone Health Standard*Was Exceeded in New Jersey, 1988 - 2000

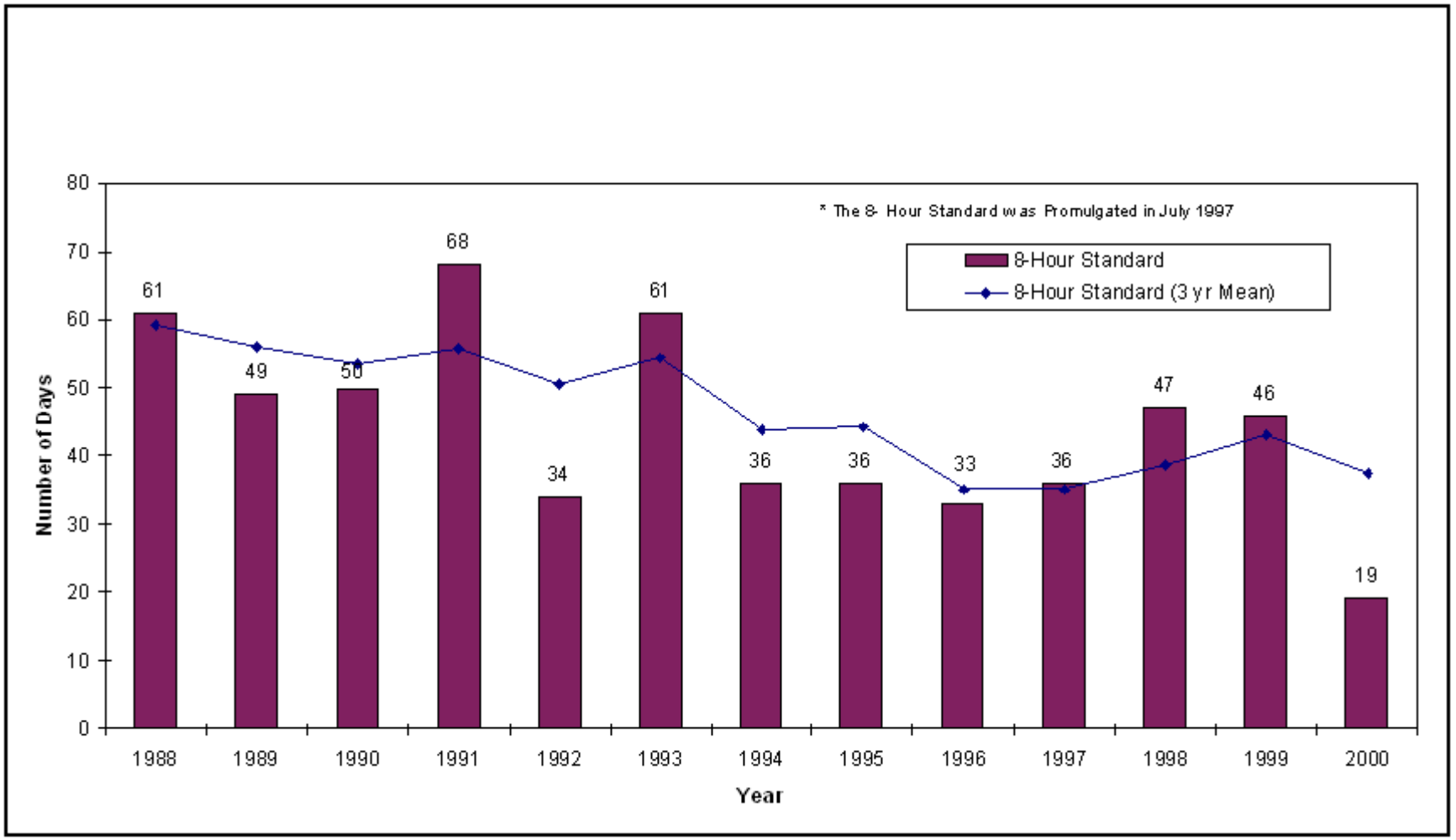
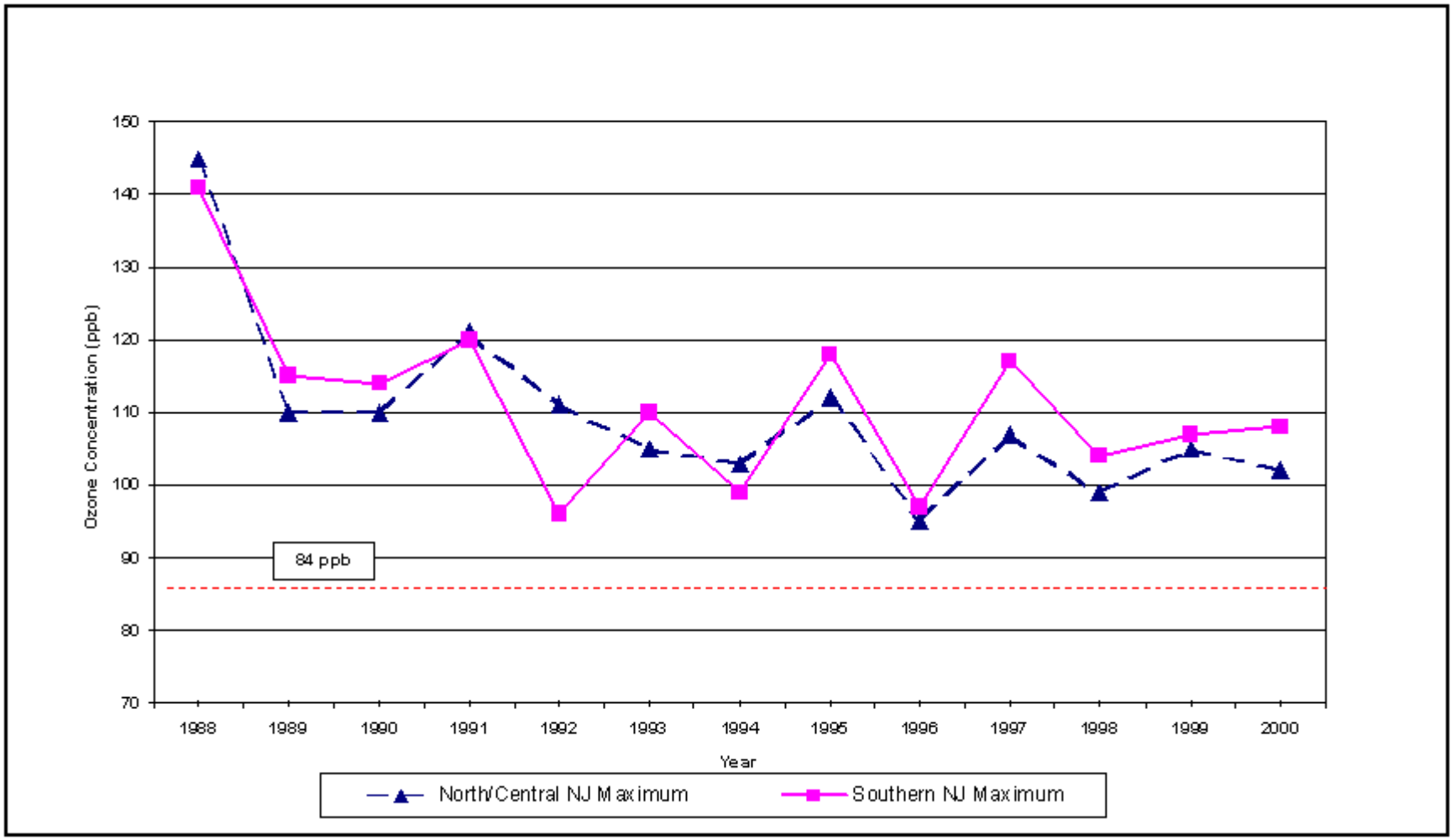


Figure 8
8-Hour Standard: Design Values, North/Central and Southern New Jersey



III. The 1996 Actual Emission Inventory

The Clean Air Act requires, at 42 U.S.C. §7511a(a)(3), that states prepare periodic emission inventories every three years, until their attainment date. As such, New Jersey was required to complete a periodic inventory for the years 1996, and 1999, and beyond. Nationally, delays in inventory development impacted the completion of a 1993 inventory, and USEPA decided that it was not required. Therefore, New Jersey did not complete a 1993 periodic inventory. This document contains the 1996 periodic inventory.

Similar to the 1990 baseline inventory, the 1996 periodic emission inventory is a compilation of the emissions from sources of biogenic (natural) VOC and NO_x, and sources of anthropogenic (human-made) VOC, NO_x and carbon monoxide in the outdoor air. The sources are divided into five general categories, each of which make up one component of the inventory:

- point sources;
- area sources;
- on-road sources;
- non-road sources; and
- biogenic sources.

A point source is a stationary facility which has the potential to emit 10 or more tons per year (tpy) of VOC, 25 or more tpy of NO_x, or 100 or more tpy of carbon monoxide. Area sources encompass more widespread sources that may be abundant, but that are too numerous to count individually. These are sources for which emissions are estimated as a group rather than individually.[25] On-road sources include nonstationary sources, such as automobiles, trucks, buses and motorcycles.[26] Non-road sources include emissions from thirteen non-road vehicle and equipment categories which include: commercial marine vessels, locomotives, aircraft, pleasure craft, and agricultural, airport, construction and mining, industrial, lawn and garden for commercial and residential use, logging, railroad, and recreational equipment. Biogenic sources are biological sources of emissions, such as trees, agricultural crops or microbial activity in soils or water.[27]

The inventory includes only those emissions that occur during the peak ozone season, i.e., when outdoor air concentrations of ozone tend to be highest. New Jersey's peak ozone season occurs during the months of June, July and August.[28]

In response to a comment received during the comment period for this SIP revision, updated vehicle registration data was used to recalculate the 1996 on-road source emissions.

The 1996 periodic emission inventory is presented in Table 1 by non-attainment area. Tables 2 and 3 present the 1996 periodic VOC and NO_x emission inventory data by source category. For a more detailed discussion of the development of this inventory and its results, please refer to Appendix I.

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[25] USEPA, 1997, *EIIP Volume I: Introduction and Use of EIIP Guidance for Emissions Inventory Development,* definitions

[26] Ibid

[27] Ibid

[28] For the purposes of inventory development, the USEPA requires states to define their peak ozone season as the consecutive three month period when the greatest number of accedences of the ozone NAAQS occur. See USEPA, Emission Inventory Requirements for Ozone State Implementation Plans, March 1991; USEPA, Highway Mobile Source Interim Guidance, Attachment E, Temperature Determination, February 28, 1982. Following the USEPA guidance, prior to the development of the 1990 baseline inventory, the NJDEP determined the peak ozone season by examining the frequency, geographic extent and severity of ozone NAAQS exceedences over consecutive three month periods during the years 1988 through 1990. The consecutive three months from 1988 to 1990 which had the highest number of ozone exceedences were June, July and August.

Table 1
New Jersey 1996 Ozone Season Emission Inventory
by Pollutant and Non-Attainment Area (New Jersey Portion)

Non-attainment Area - NJ Portion	VOC (Tons/Day)	NO_x (Tons/Day)	Carbon Monoxide (Tons/Day)
Atlantic City NAA	161.19	77.83	276.72
New York NAA	1,011.77	692.63	3,091.56
Philadelphia NAA	467.68	270.50	961.51
Allentown/Bethlehem/Easton NAA	37.82	21.58	110.79
Total for State	**1,678.46**	**1,062.57**	**4,440.58**

Table 2
New Jersey 1996 Ozone Season VOC Emission Inventory by Source

Sources	VOC (Tons/Day)	% of Total Inventory
Point Sources	173.22	10.32
Area Sources	304.98	18.17
On-road Sources	309.01	18.41
Non-road Sources	203.73	12.14
Biogenic Sources	687.52	40.96
Total for State	**1,678.46**	**100.00**

Table 3
New Jersey 1996 Ozone Season NO_x Emission Inventory by Source

Sources	NO_x (Tons/Day)	% of Total Inventory
Point Sources	291.05	27.39
Area Sources	39.66	3.73
On-road Sources	453.82	42.71
Non-road Sources	269.24	25.34
Biogenic Sources	8.80	0.83
Total for State	**1,062.57**	**100.00**

A. Projection Overview

In order to determine future inventories, it is necessary to account for increases in the inventory due to economic or population growth out to the year of interest and then account for the reductions achieved from control measures, Federal or State, which were applicable prior to or in that year. The projected emission inventories for 2002, 2005 and 2007 are "grown" from the 1996 actual emission inventory and then "controlled".
Projection of future year emissions requires determination of appropriate growth factors and the applicable control efficiency, rule effectiveness and rule penetration for each sector and sub-component of the inventory. There are two ways this can be accomplished. Growth factors and incremental controls, beyond 1996, can be applied (the lower "zig-zag" line in Figure 9) or the "uncontrolled" 1996 inventory can be grown and then total controls can be applied from an uncontrolled state (the upper and far right-side line in Figure 9). To facilitate future planning of new control measures, this SIP revision provides the data from both approaches. The difference in the controlled and uncontrolled emissions will give the emission reductions (benefits) associated with instituted control measures. A detailed discussion of the various mathematical associations expressed in this figure can be found in Section A of Appendix II.

1. Starting Inventory

As discussed in Section II, 42 U.S.C. §7511a. requires the preparation of periodic ROP plans. In accordance with the Clean Air Act, the emission target levels in future years for these plans are to be based on the adjusted baseline emission inventory which, for New Jersey, is the inventory showing actual 1990 emissions adjusted to exclude the benefits from any program not credible towards the percentage reductions.

The Act also requires a projection of future inventories to compare to those targets. In developing such future inventories, the state sought to use the most current data and methods available to it, in order to provide the best predictions possible. This required a departure from both the inventory star year (1990) and some of the methodologies used in the state's Phase I Ozone SIP. Specifically, this entailed:

For the point source sector:
- the use of industry-reported 1996 inventory emissions data from the Clean Air Act mandated state's emission statement program as the starting point from which to grow and control that sector, as opposed to survey-type 1990 data in the Phase I Ozone SIP, and,
- the use of more current EGAS and DOE growth factors;

For the area source sector:
- the use of updated USEPA EIIP emission factors,
- the use of actual 1996 activity data, as opposed to the predicted values in the Phase I Ozone SIP, and,
- the use, as the starting point for growth and controls, a new 1996 inventory based on the above;

For the non-road sector:
- the use of a new USEPA non-road model for many source subcategories, and,
- the development of new 1996 inventory numbers and a new growth and control approach for three subcategories not included in the model, and;

For the on-road sector:
- the use of new vehicle registration data, and,
- the incorporation of RFG II NO_x, Tier II Vehicle/Low Sulfur Gasoline and HDD effects.

Regarding the use of the 1996 actual emission inventory as the starting point for certain emission category projections, it should be noted that USEPA's proposed policy is to use the 1996 emissions inventory for the future 8 hour ozone designation[29]. Therefore, the state decided that the future predicted emissions in this ROP plan would be considerably more accurate if the 1996 actual emission inventory were used as the starting point from which to apply future year growth factors and controls. However it is important to note that this only applies to the point source and area source sectors and certain non-road categories for which growth factors are applied to the 1996 inventory numbers. Most of the non-road and the on-road sectors use computer models to generate future

[29] USEPA Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations, April 1999, pgs. 6 and 7.

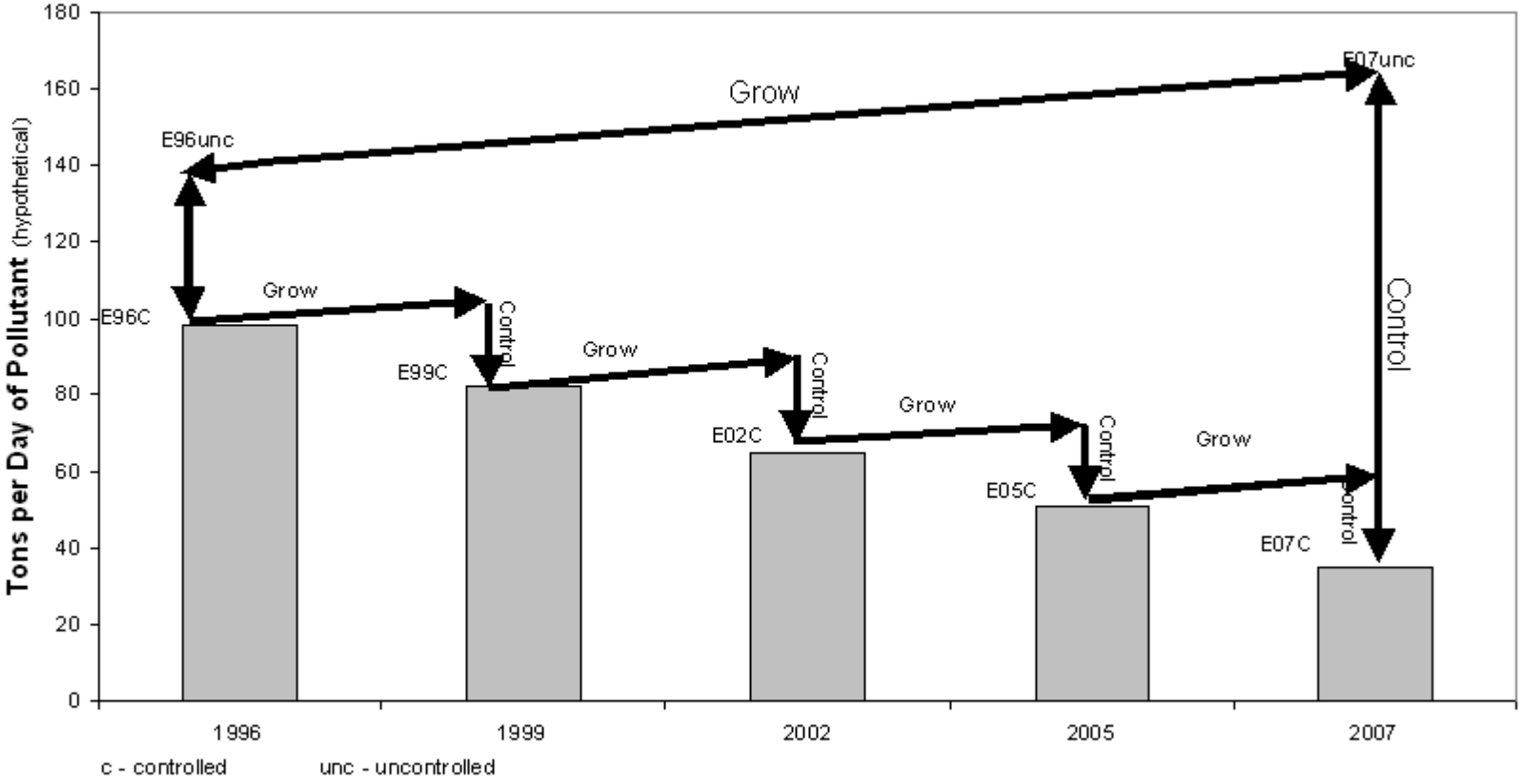
year inventories which have already internalized growth effects and which rely solely on state inputs for the projection year. Therefore the 2002, 2005, and 2007 inventories in this SIP for those two sectors generally are independent of New Jersey's 1996 start year inventory.

2. Methodology of Applying Growth and Controls

In order to determine rate of progress it is necessary to first grow the inventory to the year of interest and then account for the reductions achieved from any control measures, federal or State, which were applicable prior to or in that year. The projected emission inventories for 2002, 2005 and 2007 are "grown" from the 1996 actual emission inventory and then "controlled".

In order to project future year emissions, it is necessary to determine appropriate growth factors and the applicable control efficiency, rule effectiveness and rule penetration for each component of the inventory. There are two ways this can be accomplished. Growth factors and incremental controls, beyond 1996, can be applied (the lower "zig-zag" line in Figure 9) or the "uncontrolled" 1996 inventory grown and then total controls can be applied from an uncontrolled state (the upper line in Figure 9). To facilitate future planning of new control measures, this SIP revision provides the data from both approaches. This is desirable because the benefits from new incremental control measures may be expressed relative to an uncontrolled state or relative to the current controlled state. The difference in the controlled and uncontrolled emissions will give the emission reductions (benefits) associated with instituted control measures. A detailed discussion of the various mathematical associations expressed in this figure can be found in Section A of Appendix II.

Figure 9
Projection of New Jersey Air Emission Inventory



3. Control Measures Overview

Once the emission inventories are grown, the next step is to determine which control measures within each of the various emission sectors would be in place during or prior to that year, and includes the emission reduction benefits from those control measures at that time. Once the grown emissions are "controlled," the emissions that are expected with each and every control measure in place are compared to ROP emission target levels. The combined effect of growth and controls represents the inventory projection. The combination of control measures represents a coherent set of actions that are directed towards meeting the ROP requirements. The control measures included in this SIP revision are consistent with those in the state's previous attainment demonstration submittal of August 31, 1998, and also add the effects of RFG II NO_x, the Tier II Motor Vehicle Standard/Low Sulfur Gasoline Program, the adverse effects of HDD defeat devices and the beneficial effect of new HDD engine standards. The control measures included in the projections, and the years the ROP plans were affected by them, are outlined in Table 4 below.

Table 4
New Jersey Statewide ROP Plan Use of Control Measures

Control Measure	1996 Actual	1999	2002 ROP	2005 ROP	2007 ROP
AREA SOURCES (area source categories in parentheses):					
NJ Control Measures 1990-1996					
NAC 7:27-16.5, Marine Tank Vessel Loading and Ballasting Operations (marine vessel loading and ballasting of gasoline)					
NAC 7:27-23, Prevention of Air Pollution From Architectural Coatings and Consumer Products (architectural surface coatings, traffic paints, other product coatings, high performance maintenance coatings, other special purpose coatings)					
NAC 7:27-24, Control and Prohibition of Volatile Organic Compounds from Consumer and Commercial Products (commercial and consumer solvents)					
EPA Control Measures-1990-1996:					
EPA CFR 40, Ch 1, Subchapter C Part 60 Subpart Cc: Emission Guidelines and Compliance Times for Municipal Solid Waste Landfills and Subpart WWW: Standards of Performance for Municipal Solid Waste Landfills (landfills)					
EPA Control Measures-Post 1996:					
EPA CFR 40,Ch 1,Subchapter C, Part 59 National Volatile Organic Compound Emission Standards for: Automobile Refinish Coatings (auto. refinishing coatings), Architectural Coatings (architectural surface coatings, traffic paints, other product coatings, high performance maintenance coatings, other special purpose coatings) Consumer and Commercial Products (commercial and consumer solvents)					
POINT SOURCES:					
NO_x Budget Program					
NO_x Budget Program/NO_x SIP Call					

Table 4
New Jersey Statewide ROP Plan Use of Control Measures

Control Measure	1996 Actual	1999	2002 ROP	2005 ROP	2007 ROP
NON-ROAD SOURCES:[1]					
Spark Ignition Small Engine Standards (Federal Rule)*					
New Gasoline Spark Ignition Marine Engine Standards (Federal Rule)**					
Non-road Compression Ignition Engine Standards (Federal Rule)***					
Locomotive Emission Standards (Federal Rule)****					
New Compression Ignition Marine Engine Standards [for commercial marine vessels] (Federal Rule)*****					
ON-ROAD SOURCES:					
Tier 1 Vehicle Program (Federal Program)					
National Low Emission Vehicle Program (NLEV) (Federal Program)					
Heavy-Duty Diesel Vehicle (HDDV) Engine Standards (Federal Program)					
Reformulated Gasoline Program – Phase I (RFG I) (Federal Program)					
Reformulated Gasoline Program – Phase II (RFG II) (Federal Program)					
Basic Inspection and Maintenance Program (BIM) (State Program)					
Enhanced Inspection and Maintenance Program (EIM) (State Program)					
Tier 2 Vehicle Program/Low Sulfur Fuels (Federal Program)					
HDDV Defeat Device Settlement (Federal Program)					

Notes:

* Phase 1 standards start with model year 1997; Phase II standards phase in, depending on type of engine, from 2001-2007

* Outboard engine standards start with model year 1999 and phase in through 2006; Personal watercraft engine standards start with model year 2000 and phase in through 2006.

*** Tier 1, Phase 1 standards for engines >750hp begin 1/2000; Tier 1, Phase II engine standards phase in from 2000-2006; Tier 2 engine standards phase in from 2006-2008

**** Tier 0 standards begin in year 2000; Tier 1&2 standards begin in year 2005

***** Standards take effect starting between 2004-2007 depending on the size of the engine

1 The benefits from the use of reformulated gas in non-road engines was listed as a separate control measure in previous SIP documents. The benefits of this measure are accounted for in the NNEM, however, it is difficult to separate out the benefits of reformulated gas from the benefits of the engine controls. In this SIP, the benefits from the use of reformulated gas are a part of the benefits listed for each non-road engine control measure.

B. Growth of Inventories

1. Growth of 1996 Actual Emission Inventory

The projected emission inventories for VOC, NO_x and CO, during the ozone season, were calculated by first estimating growth in each source category, in each of the inventory sectors (point, area, non-road, on-road). As appropriate, the 1996 actual emission inventories were used as the base for applying factors to account for inventory growth. The USEPA guidance describes four typical indicators of growth activity for emissions inventories.[30] According to the USEPA, in priority order, these are:

- product output;
- value added;
- earnings; and
- employment.

Product output is a direct measure of the amount of product being produced. Value added is defined as the value of a product sold by a firm less the value of the goods purchased and used by the firm to produce the product, and is equal to the revenue which can be used for wages, rent, interest, and profits. Surrogate indicators of emissions activity such as population, fuel consumption, vehicle miles traveled (VMT) and lane miles (LM) painted, are also acceptable methods when appropriate for a particular category.

Annual growth rates were evaluated for each of the emission categories, in each of the four emission sectors (point, area, non-road, on-road). In three of the emission sectors (point, area, non-road) growth factors were calculated for a specific range of years and used in the emissions projection equations discussed in Section A of Appendix II. In two of the emission sectors (point and area) growth factors were calculated utilizing information from either the USEPA Economic Growth Analysis System (EGAS) version 3.0 computer program, state population projection data, the US Department of Energy (USDOE) projection data, the USEPA Landfill model, or other federal and state specific data. Non-road growth was projected utilizing EGAS 3.0, the USEPA National Non-Road Emissions Model and other federal and state specific data. On-road growth was projected using VMT, travel demand models and on-road models.

The EGAS computer program version 3.0 is an economic and activity forecast computer program developed by the USEPA to calculate growth factors. EGAS provides average annual growth factors for ozone non-attainment areas and for the remainder of the state. In the State's Phase I Ozone SIP[31], growth factors were calculated by the NJDEP for each category using data such as value added, earnings, travel demand models, vehicle miles traveled, population, lane miles and landing and take off operations. In this SIP, due to the availability of the USEPA EGAS 3.0 computer program, EGAS data was used for many of the categories in point and area sources and some of the categories in non-road sources. The program utilizes similar growth indicators and methodologies to calculate growth factors for the user as the indicators discussed above.

Growth factors and EGAS are discussed and presented in more detail in Appendix II.

2. Point Sources

The growth projections are categorized by source classification codes (SCCs) for each county, non-attainment area, and the entire State. SCC's are the USEPA's primary identifying emission element codes. For point sources they are made up of 8-digits which contain 4 levels of the description. The first level uses the first digit and provides the most general information on the category of the emissions. There are five major categories which split the major industries into groups. The categories are external combustion boilers, internal combustion sources, manufacturing processes, petroleum and solvent evaporation, and waste disposal. The second level of description is associated with the first 3-digits of the code and subdivides them into the above mentioned

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[30] U.S. Environmental Protection Agency. Procedures for Preparing Emissions Projections. EPA 450/4/91-019 (NTIS PB 92-108786). U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle park, NC. June 1991.

[31] The State of New Jersey, Department of Environmental Protection, State Implementation Plan (SIP) Revision for the Attainment and Maintenance of the Ozone National Ambient Air Quality Standards, Meeting the Requirements of the Alternative Ozone Attainment Demonstration Policy, Phase I Ozone SIP submittal, December 31, 1996.

industry groups. The third level of description includes the first six digits and identifies a specific industry or emission source category. The fourth level of description is associated with the full eight-digit code. The last 2 digits specify the particular emitting process.

There are two sets of factors that were used to determine growth over time in the point source sector. The first set of growth factors utilized EGAS. The second set came from the USDOE's Annual Energy Outlook Projections. The USDOE's growth factors were used for all point sources that were based on fuel consumption. The rest of the point sources used the EGAS growth factors.

The following tables show both the statewide and non-attainment NO_x inventory broken down by sources that receive NO_x allocations under New Jersey's OTC NO_x Memorandum of Understanding and NO_x budget cap programs and those that do not.. The budgeted allocation sources are shown so the benefits of the budget program could be displayed. In the absence of the NO_x budget program, NO_x point sources (allocated and non-allocated) would grow from 291 tons per day statewide in 1996 to about 388 tons per day in 2007 or about 8.8 tons per year of inventory growth. As shown in the table, the NO_x budget program reduces the NO_x emissions from 388 tons to 181 tons per day in 2007 or a 53% reduction in emissions. A more detailed look at the growth projection is located in Appendix II along with a summary table by SCC's.

Table 5
Point Sources Projected NO_x Emissions
New Jersey Statewide

	1996 Actual	**1999**	**2002**	**2005**	**2007**
NOx Allocation Sources **Grown** from 1996	172.39	180.16	193.44	227.26	260.89
NOx Allocation Sources **Budgeted**		113.33	113.33	53.60	53.60
NOx Non-Allocation Sources **Grown** from 1996	118.63	102.22	108.36	116.64	127.24
NOx Emissions without Budget Program (Grown Allocation sources + grown non-allocation sources)	291.02	282.38	301.80	343.90	388.13
NOx Emissions with Budget Program (Budgeted allocation sources + grown non-allocation sources)		215.55	221.66	170.24	180.84

Table 6
Point Sources Projected NO_x Emissions
New York Non-Attainment Area (New Jersey Portion)

	1996	1999	2002	2005	2007
NOx Allocation Sources **Grown**	97.32	97.41	102.92	128.89	158.27
NOx Allocation Sources **Budgeted**		40.85	40.85	25.16	25.16
NOx Non-Allocation Sources **Grown**	56.81	47.34	53.16	60.12	68.49
NOx Emissions without Budget Program (Grown Allocation sources + grown non-allocation sources)	154.13	144.75	156.08	189.01	226.76
NOx Emissions with Budget Program (Budgeted allocation sources + grown non-allocation sources)		88.19	94.01	85.28	93.65

Table 7
Point Sources Projected NO_x Emissions
Philadelphia Non-Attainment Area (New Jersey Portion)

	1996	1999	2002	2005	2007
NOx Allocation Sources **Grown**	42.42	45.62	50.66	55.85	59.60
NOx Allocation Sources **Budgeted**		36.97	36.97	22.19	22.19
NOx Non-Allocation Sources **Grown**	52.04	47.46	47.71	49.15	51.29
NOx Emissions without Budget Program (Grown Allocation sources + grown non-allocation sources)	94.46	93.08	98.37	105.00	110.89
NOx Emissions with Budget Program (Budgeted allocation sources + grown non-allocation sources)		84.43	84.68	71.34	73.48

3. Area Sources

Growth factors for area sources were obtained by utilizing the following sources: EGAS 3.0, state population projection data (obtained from the NJMPO's and NJDOT), the USDOE projection data, VMT, state specific line miles painted data, Asphalt Institute data, the USEPA Landfill model projection data or the NJDEP Bureau of Pesticide Operations data. Area source growth factors are discussed in more detail in Section C.1.a. of Appendix II.

Summary tables which show the growth factors and growth rate (in percent per year) for each SCC category (sorted by SCC number) and the indicator for those growth factors are included in Appendix II. The tables are grouped by the three areas of the State designated by EGAS. The three areas are the NJ counties in the Northern New Jersey/New York City/Long Island non-attainment area, the Philadelphia/Wilmington/Trenton non-attainment area and the remaining counties in New Jersey (Atlantic County, Cape May County and Warren County). A summary table which shows what percentage of the 1996 ozone season VOC emissions inventory is using a particular growth indicator is also included in Appendix II.

As shown in the tables in Appendix II, value added data is used as a growth indicator for the most SCC categories in the area source inventory, however, population is used as a growth indicator on the largest portion of the 1996 ozone season VOC controlled emissions inventory as shown below:

Growth Indicator	% of Area Source 1996 VOC Ozone Season Controlled Emissions
Population	50.4%
Value added	34.1%
Product output	8.0%
VMT	5.6%
Fuel Consumption	0.7%
Landfill model	0.7%
No growth	0.5%

As shown in Appendix II, the statewide overall growth rate for area sources, on average, from 1996 to 2007 is approximately 1.2 % per year. The statewide average growth rates from 1996 to 2007 vary within the individual SCC categories from approximately negative 2.4 % per year for landfills to 3 % per year for other transportation equipment surface coatings.

Negative growth is projected in categories such as land fills, residential, commercial and industrial distillate oil combustion, residential LPG, wood and kerosene combustion, cutback and emulsified asphalts, agricultural pesticides, new automobile surface coatings, appliance surface coatings and industrial coal combustion.

No growth is projected in categories such as incineration, leaking underground storage tank remediations, agricultural field burning, wildfires, managed burning, structural fires and cigarette smoking.

Positive growth from zero to 1 % per year is projected in categories such as architectural surface coatings, graphic arts, commercial and consumer solvents and dry cleaning.

One to two % growth per year is projected for categories such as the gasoline marketing categories and industrial treatment works.

Two to 3 % growth per year is projected for categories such as metal containers surface coatings, high-performance surface coatings, aviation gasoline, degreasing, paving and roofing asphalt, auto refinishing, marine vessel transit, loading and ballasting of petroleum products, and other transportation equipment surface coatings.

The area source projected emission inventories for VOC, NO_x and carbon monoxide, during the ozone season, including growth and controls, for years 1996, 1999, 2002, 2005 and 2007, are included in Attachments IIF, IIG and II-H of Appendix II, respectively. The inventories show projected controlled emissions as well as estimated uncontrolled emissions (in the absence of any controls after 1990) and estimated emissions that result when future

years controlled emissions grow in the absence of any new controls. The projected emissions and emission benefits are summarized in Tables 9, 10 and 11 in Section IV.C. of this report.

To illustrate the importance of growth, as shown in Table 9, if VOC area source emissions had been left uncontrolled after 1990, they would grow from approximately 332 tpd in 1996 (statewide uncontrolled ozone season emissions) to approximately 379 tpd in 2007. This is approximately 4.3 tpd per year growth in emissions statewide in the area sector without new controls after 1990. If no new controls had been applied after 1996, the controlled inventory would increase statewide from approximately 305 tpd in 1996 to approximately 347 tpd in 2007. This is approximately 3.8 tpd per year growth in emissions in the area sector without new controls after 1996.

As shown in Appendix II, the statewide average growth in VOC emissions from 1996 to 2007, if left uncontrolled, varies within the individual SCC categories from approximately negative 0.68 tpd for emulsified asphalt to 7 tpd for commercial and consumer solvents. The categories with the largest estimated decrease in VOC emissions from 1996 to 2007, assuming no controls after 1990, are:

Area Source Category	Estimated Decrease in VOC Emissions From 1996-2007 If Left Uncontrolled After 1990
Emulsified asphalt	0.68 tpd
Landfills	0.59 tpd
Agricultural pesticides	0.49 tpd
Cutback asphalt	0.43 tpd.

The categories with the largest estimated increase in VOC emissions from 1996 to 2007, assuming no controls after 1990, are:

Area Source Category	Estimated Increase in VOC Emissions From 1996-2007 If Left Uncontrolled After 1990
Commercial and consumer solvents	7.25 tpd
Architectural surface coatings	5.61 tpd
Auto-refinishing	4.81 tpd
High performance maintenance coatings	3.48 tpd
Other special purpose coatings	3.48 tpd
Other product coatings	2.85 tpd.

Area source growth factors are discussed in more detail in Section C.1.a. of Appendix II. Area source controlled emissions and reduction benefits are discussed in more detail in Section IV.C.2 below.

4. Non-Road Sources

Human population was used as the indicator to grow all non-road sources of emissions for the 15 percent and 24 percent ROP plans except the aircraft emissions for Newark Airport. FAA projected landing and take off activity was used to grow the Newark Airport emissions. However, the growth factors contained in the recently developed National Non-road Emissions Model (NNEM) were used in this SIP Revision. This model contains growth factors which are based on the historical trends in non-road equipment activity. Specifically, in developing this model, the USEPA analyzed historical engine population trends for 1989 through 1996 taken from the Power Systems Research Parts Link database. This analysis consisted of calculating the total market sector populations, segregated by fuel type, for each year from 1989 through 1996. From this information, the USEPA could project average annual growth factors for each market sector population and fuel type and incorporate this information into the model. The market sectors in this analysis were: airport service, construction, farm, industrial, lawn and garden, light commercial, logging, railway and recreational.[32] Further discussion of this topic can be found in Appendix II.

[32] USEPA, 1998, "Non-road Engine Growth Estimates, Report No. NR-008".

Portions of the non-road sector included in the projected non-road inventories were not accounted for in the NNEM. For those non-road sources, that is commercial marine vessels, locomotives and aircraft, the State utilized other methods of determining growth. Growth for commercial marine emissions is based on historical engine population data.[33] Growth for locomotive engines is based on fuel consumption.[34]

The most accurate method for estimating future aircraft emissions is to utilize the number and type of aircraft by carrier for each specific flight facility (i.e., airport) and the number of landing and takeoff cycles in which each aircraft is involved.[35] This level of detailed information is needed since each aircraft engine has a different emission factor associated with it. In addition, the most recent aircraft emission "model" available[36] requires this level of data input. While such data for current emission inventories, such as the 1996 Periodic Emission Inventory, is available for major flight facilities, the same data is not widely available for future years. Therefore, growth factors for aircraft emissions were based either on: 1) FAA projected number of operations (operation is defined as either a take-off or landing at a particular facility)[37], 2) EGAS model calculations, or 3) flight facility specific information.

In order to demonstrate the effect of growth, if no new controls were applied after 1996, the projected non-road sector VOC emissions would increase from approximately 204 tpd in 1996 to approximately 248 tpd by 2007 and the projected non-road sector NO_x emissions would increase from approximately 269 tpd in 1996 to approximately 352 tpd by 2007. This would amount to approximately 4.6 tpd of VOC and 7.5 tpd of NO_x emissions growth each year. (It should be noted that, unlike point and area sector control measures which are effective on a particular date, non-road sector control measures usually phase-in over a certain number of years. In addition, since the non-road sector is associated with engines which are used for many years, the turnover rate of engines must be taken into consideration when calculating emissions for this sector. In the growth of emissions example above it was assumed that the 1996 year of the spark ignition small engine and non-road compression ignition engine standards was implemented. Carrying these reductions benefits, approximately 6 tpd in 1996, forward to 2007 results in a net benefit of approximately 7 tpd.)

5. On-road Sources

According to the USEPA, the most realistic indicator of growth for any particular emission source sector is product output.[38] Since VMT represents product output for the highway on-road source sector, VMT was used in determining growth in the on-road highway source sector. To project VMT for future years, the USEPA recommends the use of a validated network-based travel demand model (TDM).[39] In New Jersey, each of the three Metropolitan Planning Organizations (MPOs) with jurisdiction in the State use a validated network-based TDM specifically designed for their area of interest. Figure 10 shows the counties covered by each MPOs, that is, North Jersey Transportation Planning Authority (NJTPA), the Delaware Valley Regional Planning Commission (DVRPC) and the South Jersey Transportation Planning Organization (SJTPO). As shown by the map, the three MPOs combined encompass all twenty-one (21) counties in New Jersey. Each specific TDM has been calibrated to match 1990 Highway Performance Monitoring System (HPMS) data.

Table 8 compares the VMT figures for 1996 and the various ROP target dates for the New York and Philadelphia non-attainment areas. These figures are broken down by the eight (8) vehicle categories established by the USEPA as part of its mobile model. These categories are based on fuel type and Gross Vehicle Weight Rating (GVWR) and defined as follows:

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[33] USEPA, 1999, "Final Regulatory Impact Analysis: Control of Emissions from Marine Diesel Engines", EPA 420-R-99-026, p.102

[34] USEPA, 1998, "Locomotive Emission Standards, Regulatory Support Document", p.10, 101

[35] The time spent in the landing and takeoff cycle accounts for the total average time an aircraft spends in the vicinity of an airport, from ground level to the mixing height (approximately 2000 feet); USEPA, 1997, *Regulatory Support Document: Control of Air Pollution from Aircraft and Aircraft Engines*, p.2

[36] Energy and Environmental Analysis, Inc., 1999, "Commercial Aircraft Exhaust Emissions Model v.1.2" .

[37] USDOT-FAA, 1997, "FAA Aviation Forecasts, Fiscal Years 1997-2008", FAA-APO-97-1.

[38] United States Environmental Protection Agency, Procedures for Preparing Emissions Projections, July 1991.

[39] Ibid.

Light-Duty Gasoline-Fueled Vehicles (LDGVs): vehicles fueled on gasoline which have a GVWR up to 6000 lb (passenger cars) .
Light-Duty Gasoline-Fueled Trucks 1 (LDGT1s): trucks fueled on gasoline which have a GVWR , up to 6000 lb (pick-ups, minivans, passenger vans, and sport-utility vehicles).
Light-Duty Gasoline-Fueled Trucks 2 (LDGT2s): trucks fueled on gasoline which have a GVWR of 6001-8500 lb (heavier versions of LDGT1s; the categories are modeled separately because numerically different emission standards are established under the Clean Air Act for LDGT1s and LDGT2s).
Heavy-Duty Gasoline-Fueled Vehicles (HDGVs): vehicles fueled on gasoline which have a GVWR of 8501 lb and higher and are equipped with heavy-duty gas engines
Light-Duty Diesel-Powered Vehicles (LDDVs): vehicles powered on diesel fuel which have a GVWR up to 6000 lb GVW (passenger cars).
Light-Duty Diesel-Powered Trucks (LDDTs): trucks powered on diesel fuel which have a GVWR up to 8500 lb GVWR (unlike gasoline-fueled LDTs, the same emission standards are applicable to all diesel LDTs up to 8500 lb GVWR).
Heavy-Duty Diesel-Powered Vehicles (HDDVs): vehicles powered on diesel fuel which have a GVWR of 8501 lb and higher and are equipped with heavy-duty diesel engines.
Motorcycles (MCs): gasoline powered, highway-certified motorcycles (off-road motorcycles such as "dirt bikes" are considered a non-road mobile source).

As illustrated in Table 8, VMT[40] has increased, and will increase over time. For example, in the New York non-attainment area, VMT for both LDGVs and LDGT1s increases by about 0.75 percent per year between 2002 and 2007. At 2002 vehicle emission levels, this growth rate would be equivalent to emission increases of 0.84 tons per day of VOC and 1.10 tons per NO_x each year for both vehicle classes. For all vehicle classes combined, the VMT growth is also 0.75 percent a year, which would be equivalent to emission increases of 1.02 tons per day of VOC and 1.72 tons per day of NO_x each year.

Table 8
Vehicle Miles Traveled in the New Jersey portion of the New York and Philadelphia Non-attainment Areas (in millions of miles per summer day)

Vehicle Class	1996		2002		2005		2007	
	NY	PHIL	NY	PHIL	NY	PHIL	NY	PHIL
LDGV	98.754	36.553	91.855	33.400	93.777	33.557	95.354	NA
LDGT1	12.378	3.823	24.879	9.040	25.400	9.083	25.821	NA
LDGT2	7.350	2.119	10.147	3.671	10.361	3.688	10.531	NA
HDGV	2.174	0.902	4.011	1.815	4.123	1.825	4.207	NA
LDDV	3.150	0.255	0.533	0.200	0.544	0.201	0.553	NA
LDDT	0.953	0.162	0.652	0.249	0.665	0.250	0.676	NA
HDDV	3.990	2.329	2.670	1.395	2.738	1.402	2.797	NA
MC	1.300	0.188	2.097	0.755	2.141	0.758	2.177	NA
Total	**130.046**	**46.332**	**136.843**	**50.525**	**139.750**	**50.765**	**142.107**	**NA**

The TDMs were developed by each MPO and, in general, work in a similar manner. Specifically, each TDM consists of the accepted four step modeling process with transportation networks that includes state and county highways with incidental minor arterials. The NJTPA and DVRPC models also include a transit network (major

[40] Table 8 utilizes VMT distributions derived from 1990 vehicle registration data.

bus and rail lines). The models use various demographic inputs, including but not limited to population, age distribution, employment and transit costs, to determine the demand for travel between two areas or zones. The models then use data associated with the highway network, including number of lanes, distance, speed limit and tools, to determine how many people want to travel from one area or zone to another along the highway and/or transit network included in the model. This "link-level" data is generated for each highway link in the network. The models then use the "link-level" data to determine the number of vehicles on each link in the network and, from this data, VMT is calculated.

The outputs from two of the three models are entered into a Post Processor for Air Quality (PPAQ) and are then applied to the USEPA's Mobile 5a-H emission factor model to develop emission factors for various speeds and vehicle distributions. The MOBILE model is a USEPA-developed computer program that estimates VOC, CO, and NO_x emission factors for gasoline-fueled and diesel-powered highway motor vehicles. The program uses the calculation procedures presented in "Compilation of Air Pollutant Emission Factors - Volume II: Highway Mobile Sources" (AP-42, Fourth Edition, September 1985;Supplement A to AP-42 Volume II, January 1991). There have been several versions of the mobile model developed and released by the USEPA for use by the states in estimating emissions from highway sources. Although a more current version of the model exists (i.e., MOBILE5b), the TDMs from New Jersey's MPOs are designed to work with version MOBILE5a-H.

MOBILE5a-H, like its predecessors, calculates emission factors for eight individual vehicle types in two regions (low- and high-altitude) of the country. The emission factor estimates depend on various conditions such as ambient temperatures, average travel speed, operating modes, fuel volatility, the age distribution of the vehicles, and mileage accrual rates by vehicle age. The model is designed so that the user can specify many of the variables that affect vehicle emissions. The model estimates emission factors for any calendar year between 1960 and 2020, inclusive. The 25 most recent model years are considered to be in operation in each calendar year. MOBILE5a-H differs from its immediate predecessor, MOBILE5a, in that it can estimate the emissions benefits associated with a technician training and certification program and a retest-based hybrid I/M program.

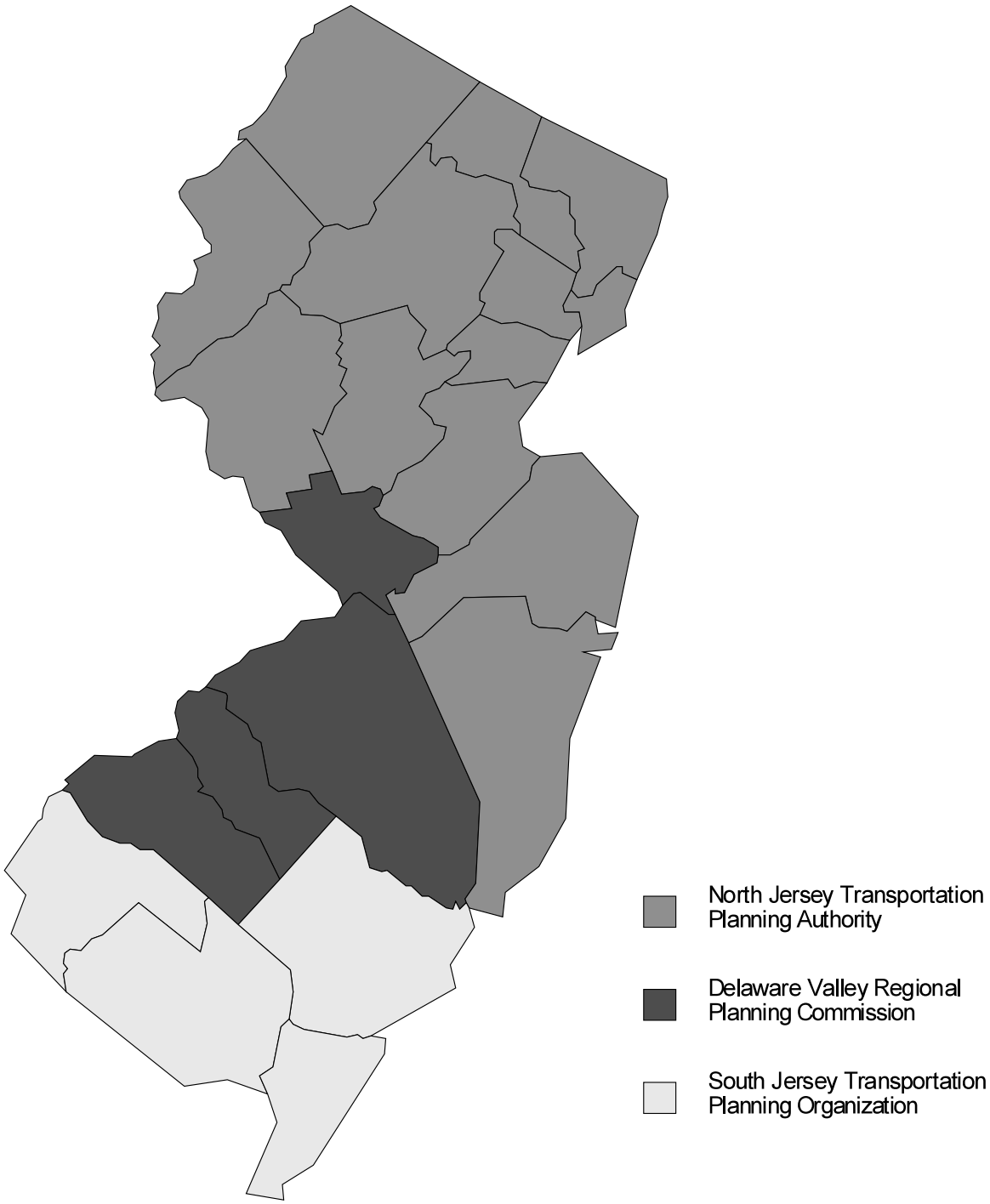
Once emission factors are generated for the appropriate year of evaluation, they are multiplied by the VMT from the TDMs and summed at the county level for inclusion in the projected inventories. Once the outputs from the Mobile runs are available, the data is transferred to a "Summary Spreadsheet" that presents the results of the pertinent model runs, the emission benefits of each control measure, and performs "off-model" calculations to determine the effects of: (1) the NO_x benefit from RFG Phase II, (2) the enhanced I/M program, (3) The Tier II Motor Vehicle Standard/Low Sulfur Gasoline Program, and (4) HDD defeat devices and new HDD engine standards. Refer to Section V. of Appendix II for a more detailed description of the TDMs and the MOBILE5a-H model and how they allow the State to estimate projected emissions in future years.

Previous analyses[41] of on-road emissions utilized older data regarding VMT allocations to vehicle class, and within each vehicle class, the age distribution of vehicles. More recent vehicle registration data has been received.[42] For the 2002, 2005, and 2007 projections, 1999 vehicle registration data was used to generate new TDM or "traffic files" with updated VMT distributions by vehicle class. These new distributions reflect an increase in the VMT by the LDGT1 vehicle class, more commonly referred to as SUVs, and a corresponding decrease in LDGV VMT. In addition, an increase in HDGV VMT is apparent from the new data. This data was also used to update the age distribution of vehicles that was input to the Mobile 5a-H model runs for 2002, 2005, and 2007.

[41] The State of New Jersey Department of Environmental Protection, State Implementation Plan (SIP) Revision for the Attainment and Maintenance of the One-Hour Ozone National Ambient Air Quality Standard, Update to Meeting the Requirements of the Alternative Ozone Attainment Demonstration Policy-Additional Emission Reduction Commitment and Transportation Conformity Budgets, April 26, 2000.

[42] Polk Data Report, October, 2000.

Figure 10
Metropolitan Planning Organizations in New Jersey



C. Application of Future Year Control Measures

1. Overview

Post-1996 control measures were applied to each emission sector as appropriate. The resulting emission benefits from each measure for each year of interest are shown in Tables 9, 10 and 11 for the entire State and the New Jersey portions of the New York and Philadelphia non-attainment areas, respectively. When all the benefits are summed and subtracted from uncontrolled emission levels, the result is the projected "controlled" inventory. Each control measure used and its salient results are discussed below. Further discussion and presentation of the benefits from control measures are provided in Appendix II.

Table 9: Projected Emissions and Control Measure Benefits Summary
New Jersey Statewide

	1996		2002		2005		2007	
	Inventory		Projected		Projected		Projected	
	VOC	NOx	VOC	NOx	VOC	NOx	VOC	NOx
	tpd	tpd	tpd	tpd	tpd	tpd	tpd	tpd
POINT SOURCES								
Point Source Emissions, if Uncontrolled [1]	1,552.73	698.19	1,606.02	729.65	1,658.34	818.04	1,711.13	915.89
Point Source Control Measures Benefits, From Uncontrolled								
Benefits -Pre-1996 Controls	1,379.54	407.22	1,422.60	427.83	1,465.98	473.97	1,511.60	527.55
Benefits-NOx Budget Program		0.00		80.14		173.66		207.29
Total Point Source Benefits, From Uncontrolled	1,379.54	407.22	1,422.60	507.97	1,465.98	647.63	1,511.60	734.84
Point Source Emissions Controlled	**173.20**	**290.97**	**183.42**	**221.68**	**192.36**	**170.41**	**199.53**	**181.05**
AREA SOURCES								
Area Source Emissions, if Uncontrolled (post-1990)	**332.25**	**39.66**	**357.26**	**39.66**	**371.82**	**39.89**	**378.74**	**40.38**
Area Source Control Measures Benefits, From Uncontrolled (post-1990)								
Benefits from NJ Control Measures (1990-1996)								
Marine Vessel Ballasting and Loading of Gasoline (Barge and Tanker)	6.42	NA	7.89	NA	8.69	NA	8.90	NA
Architectural Surface Coatings:								
Architectural Surface Coatings	6.72	NA	7.03	NA	7.18	NA	7.28	NA
Traffic Paints	2.61	NA	2.67	NA	2.70	NA	2.72	NA
High-Performance Maintenance Coatings	4.34	NA	4.98	NA	5.39	NA	5.56	NA
Other Special Purpose Coatings	0.14	NA	0.16	NA	0.18	NA	0.18	NA
Commercial/Consumer Solvents	6.60	NA	6.91	NA	7.06	NA	7.15	NA
Benefits from EPA Control Measure (1990-1996)								
Landfills	0.42	NA	NA	NA	NA	NA	NA	NA
Benefits from EPA Control Measure (after NJDEP Control Measures) (post 1996)								
Autorefinishing	NA	NA	2.99	NA	3.28	NA	3.38	NA
Architectural Surface Coatings:								
Traffic Paints	NA	NA	2.34	NA	2.37	NA	2.38	NA
Commercial/Consumer Solvents	NA	NA	2.00	NA	2.04	NA	2.07	NA
Landfills	NA	NA	0.68	NA	0.67	NA	0.65	NA
Total Area Source Benefits, From Uncontrolled (post 1990)	27.25	0.00	37.64	0.00	39.55	0.00	40.30	0.00
Area Source Emissions, Controlled	**305.00**	**39.66**	**319.62**	**39.66**	**332.26**	**39.89**	**338.45**	**40.38**

(1) includes provision for the use of 5 tons per day VOC and 5 tons per day NOx emissions from pre-1996 emissions offsets, apportioned based on the fractional inventory of each area in Tables 26 and 27

Table 9 (continued)

	1996		2002		2005		2007	
	Inventory		Projected		Projected		Projected	
	VOC	NOx	VOC	NOx	VOC	NOx	VOC	NOx
	tpd	tpd	tpd	tpd	tpd	tpd	tpd	tpd
ON-ROAD SOURCES *								
On-road Source Emissions,with 1990 Program	**430.04**	**460.72**	**395.17**	**487.13**	**400.68**	**490.46**		
Tier 1			37.57	57.59	54.59	71.95		
NLEV			3.30	6.37	4.20	9.30		
RFG I			109.60	1.24	107.94	3.87		
RFG II			0.00	19.92	0.00	19.18		
1996I/M			2.16	0.28	2.07	0.27		
Enhanced I/M			29.62	73.67	77.61	100.63		
Tier 2			0.00	0.00	4.77	25.70		
HDDV Defeat Device and New Engine Standards		-25.00	0.00	-18.19	0.00	-10.19		
Total On-road Source Benefits, From Uncontrolled	121.03	6.90	182.25	140.88	251.18	220.71		
On-road Source Emissions, Controlled	**309.01**	**453.82**	**212.92**	**346.25**	**149.50**	**269.75**		
NON-ROAD SOURCES *								
Non-Road Source Emissions, if Uncontrolled	**209.34**	**269.41**	**231.65**	**314.89**	**244.95**	**336.55**	**254.60**	**352.05**
Non-Road Source Control Measure Benefits, From Uncontrolled (neg. number means an increase in emissions)								
EPA Control Measures-Post 1996:								
Spark ignition, small engines	5.42	-0.44	58.64	-4.25	82.76	-3.41	100.04	-2.90
New gasoline spark ignition marine engines	0.00	0.00	3.02	0.00	6.05	-0.11	8.21	-0.16
Nonroad compression ignition engines	0.21	0.62	9.21	25.33	14.18	49.30	17.85	70.19
Locomotive & locomotive engines	0.00	0.00	0.00	0.93	0.01	0.98	0.01	1.01
Commercial marine diesel engines	0.00	0.00	0.00	0.84	0.01	2.13	0.03	3.29
Commercial aircraft gas turbine engines	NA	0.00	NA	0.00	NA	0.00	NA	0.00
Total Non-Road Source Benefits, From Uncontrolled	5.63	0.18	70.87	22.81	103.03	48.89	126.14	71.43
Non-Road Source Emissions, Controlled	**203.71**	**269.23**	**160.78**	**292.08**	**141.92**	**287.66**	**128.46**	**280.62**
TOTALS								
TOTAL EMISSIONS, Uncontrolled	**2,524.36**	**1,467.98**	**2,590.10**	**1,571.33**	**2,675.79**	**1,684.94**		
TOTAL BENEFITS, From Uncontrolled	1,533.45	414.30	1,713.36	671.66	1,859.74	917.23		
TOTAL EMISSIONS, Controlled	**990.92**	**1,053.68**	**876.74**	**899.67**	**816.04**	**767.71**		

*Negative number means an increase in emissions.

Table 10: Projected Emissions and Control Measure Benefits Summary
New York Non-attainment Area (New Jersey Portion)

	1996		2002		2005		2007	
	Inventory		Projected		Projected		Projected	
	VOC	NOx	VOC	NOx	VOC	NOx	VOC	NOx
	tpd	tpd	tpd	tpd	tpd	tpd	tpd	tpd
POINT SOURCES								
Point Source Emissions, if Uncontrolled	1,114.43	424.28	1,159.19	431.01	1,199.31	492.64	1,240.01	568.12
Point Source Control Measures Benefits, From Uncontrolled								
Benefits Pre-1996 Controls	973.56	270.15	1,010.18	273.93	1,043.03	303.64	1,077.88	341.37
Benefits-NOx Budget Program		0.00		62.07		103.73		133.11
Total Point Source Benefits, From Uncontrolled	973.56	270.15	1,010.18	336.00	1,043.03	407.37	1,077.88	474.48
Point Source Emissions Controlled	**140.87**	**154.13**	**149.01**	**94.01**	**156.27**	**85.27**	**162.13**	**93.64**
AREA SOURCES								
Area Source Emissions, if Uncontrolled (post-1990)	**235.97**	**29.58**	**253.59**	**29.58**	**263.99**	**29.77**	**268.93**	**30.14**
Area Source Control Measures Benefits, From Uncontrolled (post-1990)								
Benefits from NJ Control Measures (1990-1996)								
Marine Vessel Ballasting and Loading of Gasoline (Barge and Tanker)	5.67	NA	6.97	NA	7.69	NA	7.88	NA
Architectural Surface Coatings:								
Architectural Surface Coatings	4.93	NA	5.14	NA	5.25	NA	5.32	NA
Traffic Paints	1.64	NA	1.68	NA	1.71	NA	1.72	NA
High-Performance Maintenance Coatings	3.18	NA	3.66	NA	3.96	NA	4.08	NA
Other Special Purpose Coatings	0.10	NA	0.12	NA	0.13	NA	0.13	NA
Commercial/Consumer Solvents	4.84	NA	5.06	NA	5.16	NA	5.23	NA
Benefits from EPA Control Measure (1990-1996)								
Landfills	0.32	NA	NA	NA	NA	NA	NA	NA
Benefits from EPA Control Measure (after NJDEP Control Measures) (post 1996)								
Autorefinishing	NA	NA	2.33	NA	2.56	NA	2.65	NA
Architectural Surface Coatings:								
Traffic Paints	NA	NA	1.47	NA	1.49	NA	1.51	NA
Commercial/Consumer Solvents	NA	NA	1.46	NA	1.49	NA	1.52	NA
Landfills	NA	NA	0.55	NA	0.51	NA	0.49	NA
Total Area Source Benefits, From Uncontrolled (post 1990)	20.69	0.00	28.45	0.00	29.96	0.00	30.53	0.00
Area Source Emissions, Controlled	**215.28**	**29.58**	**225.15**	**29.58**	**234.03**	**29.77**	**238.40**	**30.14**

Table 10 (continued)

	1996 Inventory		2002 Projected		2005 Projected		2007 Projected	
	VOC tpd	NOx tpd	VOC tpd	NOx tpd	VOC tpd	NOx tpd	VOC tpd	NOx tpd
ON-ROAD SOURCES*								
On-road Source Emissions, with 1990 Program	**287.96**	**309.79**	**253.84**	**324.67**	**256.79**	**326.98**	**260.60**	**331.89**
Tier 1			24.48	37.99	35.48	47.56	43.65	53.53
NLEV			1.89	4.15	3.58	7.86	4.42	9.85
RFG I			71.13	0.89	68.86	0.89	67.06	0.89
RFG II			0.00	13.01	0.00	12.55	0.00	12.38
1996 I/M			1.40	0.18	1.30	0.17	1.38	0.18
Enhanced I/M			19.46	49.95	49.84	68.18	50.14	68.96
Tier 2			0.00	0.00	3.15	17.00	4.12	25.15
HDDV Defeat Device and New Engine Standards		-14.80	0.00	-10.78	0.00	-5.98	0.00	-4.17
Total On-road Source Benefits, From Uncontrolled	81.44	6.87	118.36	95.39	162.21	148.23	170.77	166.77
On-road Source Emissions, Controlled	**206.52**	**302.92**	**135.48**	**229.28**	**94.58**	**178.75**	**89.83**	**165.12**
NON-ROAD SOURCES*								
Non-Road Source Emissions, if Uncontrolled	**142.68**	**202.18**	**159.34**	**237.58**	**169.27**	**253.96**	**176.13**	**265.68**
Non-Road Source Control Measure Benefits, From Uncontrolled (neg. number means an increase in emissions)								
EPA Control Measures-Post 1996:								
Spark ignition, small engines	4.13	-0.30	43.57	-3.12	61.10	-2.51	73.67	-2.14
New gasoline spark ignition marine engines	0.00	0.00	2.25	0.00	4.47	-0.11	6.05	-0.12
Nonroad compression ignition engines	0.16	0.42	6.85	18.62	10.47	36.34	13.14	51.76
Locomotive & locomotive engines	0.00	0.00	0.00	0.79	0.00	0.83	0.01	0.86
Commercial marine diesel engines	0.00	0.00	0.00	0.65	0.01	1.66	0.03	2.59
Commercial aircraft gas turbine engines	NA	0.00	NA	0.00	NA	0.00	NA	0.00
Total Non-Road Source Benefits, From Uncontrolled	4.28	0.10	52.64	16.93	76.04	36.24	92.62	52.96
Non-Road Source Emissions, Controlled	**138.40**	**202.08**	**106.70**	**220.65**	**93.23**	**217.72**	**83.51**	**212.72**
TOTALS								
TOTAL EMISSIONS, Uncontrolled	**1,781.04**	**965.83**	**1,825.96**	**1,022.84**	**1,889.36**	**1,103.35**	**1,945.67**	**1,195.83**
TOTAL BENEFITS, From Uncontrolled	1,079.97	277.12	1,209.63	448.32	1,311.24	591.84	1,371.80	694.21
TOTAL EMISSIONS, Controlled	**701.07**	**688.71**	**616.34**	**573.52**	**578.11**	**511.51**	**573.87**	**501.62**

*Negative number means an increase in emissions.

Table 11: Projected Emissions and Control Measure Benefits Summary
Philadelphia Non-attainment Area (New Jersey Portion)

	1996		2002		2005		2007	
	Inventory		Projected		Projected		Projected	
	VOC	NOx	VOC	NOx	VOC	NOx	VOC	NOx
	tpd	tpd	tpd	tpd	tpd	tpd	tpd	tpd
POINT SOURCES								
Point Source Emissions, if Uncontrolled	338.90	207.44	347.26	224.61	356.85	246.44	366.78	268.33
Point Source Control Measures Benefits, From Uncontrolled								
Benefits -Pre-1996 Controls	310.18	112.97	316.84	126.23	325.02	141.44	333.63	157.44
Benefits Nox Budget Program		0.00		13.69		33.66		37.41
Total Point Source Benefits, From Uncontrolled	310.18	112.97	316.84	139.92	325.02	175.10	333.63	194.85
Point Source Emissions Controlled	**28.72**	**94.47**	**30.42**	**84.69**	**31.83**	**71.34**	**33.15**	**73.48**
AREA SOURCES								
Area Source Emissions, if Uncontrolled (post-1990)	**77.66**	**7.86**	**83.74**	**7.85**	**87.17**	**7.89**	**88.74**	**7.99**
Area Source Control Measures Benefits, From Uncontrolled (post-1990)								
Benefits from NJ Control Measures (1990-1996)								
Marine Vessel Ballasting and Loading of Gasoline (Barge and Tanker)	0.75	NA	0.91	NA	1.00	NA	1.03	NA
Architectural Surface Coatings:								
Architectural Surface Coatings	1.43	NA	1.49	NA	1.53	NA	1.55	NA
Traffic Paints	0.69	NA	0.71	NA	0.72	NA	0.72	NA
High-Performance Maintenance Coatings	0.92	NA	1.06	NA	1.14	NA	1.18	NA
Other Special Purpose Coatings	0.03	NA	0.03	NA	0.04	NA	0.04	NA
Commercial/Consumer Solvents	1.40	NA	1.47	NA	1.50	NA	1.52	NA
Benefits from EPA Control Measure (1990-1996)								
Landfills	0.08	NA	NA	NA	NA	NA	NA	NA
Benefits from EPA Control Measure (after NJDEP Control Measures) (post 1996)								
Autorefinishing	NA	NA	0.56	NA	0.62	NA	0.64	NA
Architectural Surface Coatings:								
Traffic Paints	NA	NA	0.62	NA	0.63	NA	0.63	NA
Commercial/Consumer Solvents	NA	NA	0.43	NA	0.43	NA	0.44	NA
Landfills	NA	NA	0.12	NA	0.14	NA	0.14	NA
Total Area Source Benefits, From Uncontrolled (post 1990)	5.30	0.00	7.40	0.00	7.74	0.00	7.89	0.00
Area Source Emissions, Controlled	**72.36**	**7.86**	**76.34**	**7.85**	**79.42**	**7.89**	**80.85**	**7.99**

Table 11 (continued)

	1996		2002		2005		2007	
	Inventory		Projected		Projected		Projected	
	VOC	NOx	VOC	NOx	VOC	NOx	VOC	NOx
	tpd	tpd	tpd	tpd	tpd	tpd	tpd	tpd
ON-ROAD SOURCES*								
On-road Source Emissions, with 1990 Program	**114.83**	**112.77**	**113.09**	**119.80**	**112.77**	**118.91**		
Tier 1			10.75	14.68	15.30	17.94		
NLEV			1.19	1.68	0.17	0.39		
RFG I			30.98	0.24	31.13	2.86		
RFG II			0.00	5.25	0.00	4.97		
1996 I/M			0.58	0.07	0.58	0.07		
Enhanced I/M			7.96	17.37	21.76	23.43		
Tier 2			0.00	0.00	1.19	6.39		
HDDV Defeat Device and New Engine Standards		-7.80	0.00	-5.63	0.00	-3.18		
Total On-road Source Benefits, From Uncontrolled	32.13	-0.17	51.46	33.66	70.13	52.87		
On-road Source Emissions, Controlled	**82.70**	**112.94**	**61.63**	**86.14**	**42.64**	**66.04**		
NON-ROAD SOURCES*								
Non-Road Source Emissions, if Uncontrolled	**43.05**	**52.21**	**47.05**	**59.85**	**49.59**	**64.00**	**51.41**	**66.98**
Non-Road Source Control Measure Benefits, From Uncontrolled (neg. number means an increase in emissions)								
EPA Control Measures-Post 1996:								
Spark ignition, small engines	1.03	-0.10	11.35	-0.87	16.03	-0.70	19.37	-0.59
New gasoline spark ignition marine engines	0.00	0.00	0.58	0.00	1.17	-0.02	1.59	-0.03
Nonroad compression ignition engines	0.04	0.13	1.78	5.21	2.75	10.10	3.46	14.37
Locomotive & locomotive engines	0.00	0.00	0.00	0.09	0.00	0.09	0.00	0.09
Commercial marine diesel engines	0.00	0.00	0.00	0.17	0.00	0.43	0.00	0.62
Commercial aircraft gas turbine engines	NA	0.00	NA	0.00	NA	0.00	NA	0.00
Total Non-Road Source Benefits, From Uncontrolled	1.09	0.00	13.74	4.55	19.97	9.88	24.42	14.45
Non-Road Source Emissions, Controlled	**41.96**	**52.21**	**33.31**	**55.30**	**29.62**	**54.12**	**26.99**	**52.53**
TOTALS								
TOTAL EMISSIONS, Uncontrolled	**574.44**	**380.28**	**591.14**	**412.11**	**606.38**	**437.24**		
TOTAL BENEFITS, From Uncontrolled	348.70	112.80	389.44	178.13	422.86	237.85		
TOTAL EMISSIONS, Controlled	**225.74**	**267.48**	**201.70**	**233.98**	**183.51**	**199.39**		

*Negative number means an increase in emissions.

2. Point Sources

This section describes the one control measure that was applied to the point source emission sector post-1996.

New Jersey NO_x Budget Program: Recent efforts to reduce the formation of ozone generated by contributions from the point sources have focused on reducing emissions of NO_x. Beginning in 1995, this effort relied on New Jersey's Oxides of Nitrogen Reasonably Available Control Technology (NO_x RACT) Program[40], which achieved significant reductions from major point sources throughout the State. However, despite these achievements, greater reductions were needed regionally to help reduce the formation of ozone in New Jersey.

This regional issue was first addressed by the Ozone Transport Commission (OTC) which established a NO_x Memorandum of Understanding for its members. Subsequently, the Ozone Transport Assessment Group (OTAG), was charged to address the issue of ozone transport over the Eastern United States. OTAG convened to study the impact of transport and form recommendations for possible solutions to address the problem. In part, as a result of the OTAG final recommendation report, the USEPA designed its NO_x Budget SIP call and, on October 27, 1998, promulgated this regional NO_x reduction measure.[41] The NO_x SIP Call set forth requirements to further limit emissions of NO_x from all New Jersey sources (not just major point sources) to a total of not more than 96,876 tons per 5 month ozone season by the year 2007.

Prior to the USEPA's promulgation of the NO_x SIP Call, on June 26, 1998, New Jersey adopted its own rules establishing a NO_x cap or NO_x Budget for 1999 and 2003 from major NO_x sources in New Jersey.[42] This rule is similar to the measure the USEPA included to determine its emission reduction calculations for the NO_x SIP Call. To further assure consistency of certain procedural aspects with the USEPA's NO_x SIP Call, the NJDEP adopted revisions to its NO_x Budget Program on July 31, 2000.[43] The USEPA has recently approved New Jersey SIP NO_x Cap SIP revision prepared in response to the USEPA NO_x SIP call.

For the purposes of this document, the NO_x budget refers to New Jersey NO_x Budget Program. The projected NO_x emission inventories for 2002, 2005, and 2007 are separated into two (2) groups. The point sources that do not fall in New Jersey's NO_x Budget Program are not allocated emission budgets but did have growth factors applied to them. The sources that fall under the NO_x Cap Budget Program are the allocation sources. These sources have been given allowances and therefore have budgeted emissions and are considered to be the "controlled" group of sources. Rule effectiveness and control efficiencies were used to calculate the 1996 emissions. Those emissions were either capped or grown depending on whether they were in the NO_x Budget Program. The NO_x Budget Program shows a significant reduction in emissions. The point source NO_x inventory shows a decrease of 24 percent statewide between 1996 and 2002 after the implementation of the NO_x Budget Program. An overall statewide decrease of 38 percent occurs between 1996 and 2007. Tables 9, 10, and 11 in Section C.1 illustrate the benefits of the NO_x Budget Program. Further detail on the estimation of point source inventories can be found in Appendix II, Section I.

3. Area Sources

The control measure implemented after 1996, which affected the area source sector, and was incorporated into the projected emissions inventory, is the following USEPA rule:

USEPA CFR Title 40, Chapter 1, Subchapter C, Part 59, National Volatile Organic Compound Emission Standards for Consumer and Commercial Products, Automobile Refinish Coatings, Architectural Coatings, effective date: 9/11/98.

The background of the USEPA rule is as follows:

"Under the Clean Air Act, EPA was required to 1) study emissions of VOCs from consumer and commercial products; 2) list those categories of products that account for at least 80 % of the total VOC emissions on a reactivity-adjusted basis in areas of the country that fail to meet the national air quality standards set for ground-level ozone; and 3) divide the list into four groups, and regulate one group every two years using best available controls, as defined by the Clean Air Act.

The EPA issued a study and report to Congress in March of 1995, Study of Volatile Organic Compound Emissions from Consumer and Commercial Products, which evaluated the contribution of VOC emissions from

consumer and commercial products on ground-level ozone levels, and established criteria for prioritizing and a schedule for regulating these products under the Clean Air Act. "[43]

"One volume of the study contains a broad inventory of VOC emissions from consumer and commercial products, including architectural coatings. The study found that consumer and commercial products, such as architectural and other surface coatings, personal care products, and household cleaning products, contribute about 3.3 million tons (approximately 28 %) annually of VOC emissions in areas that do not meet air quality standards for ground-level ozone. "[44]

"Consumer and commercial products, such as surface coatings, metal cleaning solvents, personal care products, and household cleaning products, contribute about 6 million tons (approximately 30 %) annually of manmade VOC emissions nationwide."[45]

Prior to the USEPA rule, New Jersey had already regulated similar product categories. The pre-1996 New Jersey rules, regarding consumer products, architectural coatings and autobody refinishing are discussed in detail in Appendix I, Section B1.b and Appendix II, Section III.

Whenever a rule or control measure is applied to an emission inventory, a control efficiency factor (CE) is incorporated into the emission estimation equations, which are discussed in Appendix I, Sections I.1 and I.3. As discussed in Appendix II, Section 1.a, the equation that was used to project emissions in a future year, incorporating growth and the application of new control measures is:

$$Emissions_{controlled} = Emissions_{uncontrolled\ or\ with\ no\ new\ controls} \times [1 - (CE \times RE \times RP)]$$

where: *CE = Incremental control efficiency factor*
RE = Rule Effectiveness Factor
RP = Rule Penetration Factor

In developing the 1996 emissions inventory, control efficiency factors for the NJDEP pre-1996 rules were applied to the 1996 uncontrolled emissions inventory in order to calculate the 1996 "actual" or controlled emissions inventory. The difference between the controlled and the uncontrolled emissions results in the emission reduction benefits. In a similar fashion, incremental control efficiency factors reflecting the USEPA post-1996 rule, relative to the existing NJDEP rules, were applied to the 1999 grown emissions inventory, and incremental emission reduction benefits were calculated. The 1999 grown emission inventory is the inventory that results from growth of the 1996 inventory in the absence of any new controls such as the USEPA rule.

The USEPA rule regulates the following categories in the area source sector: autobody refinishing coatings, architectural surface coatings, traffic paints, other product coatings, high performance coatings, other special purpose coatings, and commercial and consumer solvents.

The USEPA rule was compared to existing NJDEP rules, for the regulated categories, for similarity. It was determined that some of the NJDEP's VOC content limits are more stringent in the USEPA rule. In these cases, an incremental CE was calculated, which represents the difference in control efficiency between the USEPA rule and the NJDEP rules. This comparison is discussed in more detail in Appendix II.

The categories for which these post-1996 incremental CEs were calculated are: autobody refinishing, traffic paints and commercial and consumer solvents. The incremental CEs were applied to the grown 1999 inventory, to determine emission reduction benefits from the USEPA rule, relative to the existing NJDEP rules. These benefits grow in future years in direct relation to the growth factor for the respective emission categories.

The USEPA has also adopted the following rule: USEPA CFR Title 40, Chapter 1, Subchapter C, Part 60, Subparts Cc, Emission Guidelines and Compliance Times for Municipal Solid Waste Landfills and Subpart WWW, Standards of Performance for Municipal Solid Waste Landfills, March 12, 1996. Reduction benefits were calculated for landfills based on projected landfill closures and controlled emissions. The USEPA Landfill Air

[43] EPA Fact Sheet: Notice of Final Listing of Automobile Refinish Coatings, Consumer Products and Architectural Coatings for Regulation under the Clean Air Act (Section 183(e), 8/14/98

[44] EPA Fact Sheet: Final Air Regulation for Architectural Coatings, 8/14/98

[45] EPA Fact Sheet: Final Air Regulation for Consumer Products, 8/14/98

Emissions Estimation Model (Landfil2) was used to calculate projected VOC, NO_x and CO landfill emissions with and without future controls. The benefits were calculated as the difference between controlled and uncontrolled emissions. The VOC emission benefits calculated statewide in 2007 are 0.65 tpd.

A summary of the pre-1996 and post-1996 benefits for each of the NJDEP and USEPA control measures, for the years 1996, 2002, 2005 and 2007, is shown in Tables 9, 10 and 11 of Section IV.C.1 of this report. The projected emissions inventories for the years 1999, 2002, 2005, and 2007, for VOCs, NO_x and CO, by SCC, for each county, non-attainment area and statewide are included in Appendix II, Attachments IIF, IIG and II-H.

The top 15 categories with the largest estimated VOC emissions in 2007 are:

Area Source Category	**Estimated VOC Emissions in 2007**
Commercial and consumer solvents	84.26 tpd
Architectural surface coatings	65.12 tpd
Degreasing	18.89 tpd
Other special purpose coatings	15.62 tpd
Other product coatings	12.08 tpd
Gasoline refueling (stage II)	11.84 tpd
High performance maint. coatings	10.24 tpd
Bakeries	10.02 tpd
Graphic Arts (offset litho/letterpress)	9.69 tpd
Furniture and Fixtures surface coating	8.55 tpd
Auto refinishing (paint content)	8.37 tpd
Marine vessel ballasting crude oil	7.61 tpd
Auto refinishing (equip cleaning)	7.40 tpd
Emulsified ashpalt Application	5.79 tpd
Gasoline Tank Breathing	5.59 tpd

Commercial and consumer solvents and architectural surface coatings are 44 percent of the area source VOC inventory in 2007.

The statewide average growth in VOC emissions from 1996 to 2007, with existing controls, vary within the individual SCC categories from approximately negative 2.08 tpd for traffic paints to 5.05 tpd for architectural surface coatings. The categories with the largest estimated decrease in VOC emissions from 1996 to 2007, with existing controls, are:

Area Source Category	**Estimated Decrease in Controlled VOC Emissions from 1996 to 2007**
Traffic paints	2.08 tpd
Landfills	0.82 tpd
Emulsified asphalt	0.68 tpd
Agricultural pesticides	0.49 tpd
Auto refinishing (paint content)	0.44 tpd
Cutback asphalt	0.43 tpd.

The categories with the largest estimated increase in VOC emissions from 1996 to 2007, with existing controls, are:

Area Source Category	**Estimated Increase in Controlled VOC Emissions from 1996 to 2007**
Architectural surface coatings	5.05 tpd
Commercial and consumer solvents	4.62 tpd
Degreasing	4.17 tpd
Other special purpose coatings	3.44 tpd
Other product coatings	2.85 tpd
Furniture & fixtures coatings	2.31 tpd
High performance maint. coatings	2.26 tpd

Marine vessel ballasting crude oil	2.07 tpd
Auto refinishing (equip cleaning)	1.86 tpd
Gasoline refueling (stage II)	1.41 tpd
Metal containers surface coatings	1.15 tpd

As shown in Table 9, the estimated benefits in 2007, by category, in descending order, with existing controls implemented after 1990, are:

Area Source Category	**Estimated VOC Benefits in 2007**
Commercial and consumer solvents	9.23 tpd
Marine vessel loading gasoline	7.28 tpd
Architectural surface coatings	7.28 tpd
High performance maint. coatings	5.56 tpd
Traffic paints	5.11 tpd
Auto refinishing (paint content)	3.38 tpd
Marine vessel ballasting gasoline	1.62 tpd
Landfills	0.65 tpd
Other special purpose coatings	0.18 tpd

As shown in Table 9, statewide controlled VOC emissions are projected to increase from 305 tpd in 1996 to approximately 338 tpd in 2007. This is approximately 3 tpd per year growth in emissions statewide in the area sector without new controls after 1999. The emissions are increasing because the growth factors for the sector are greater than the controls.

For more details on post-1996 area source control measures , see Appendix II, Section C.1.b.

4. Non-Road Sources

This section describes the non-road control measures applied in this ROP SIP Revision.

Federal Spark Ignition Small Engine Regulations: In July 1995, the USEPA promulgated the first phase of its regulations to control emissions from new non-road spark ignition engines.[46] This regulation establishes VOC and carbon monoxide emission standards for all model year 1997[47] and newer non-road spark ignition engines that have a gross power output at or below 19 kilowatts. These engines are used principally in lawn and garden equipment, including, but not limited to, lawn mowers, leaf blowers, trimmers, chainsaws, and generators. The USEPA determined that the Phase 1 non-road spark ignition emission standards would reduce VOC emissions nationally by 13.1 percent in 1997, 26.9 percent in 2002, 30.5 percent in 2005 and 32.4 percent in 2007, and carbon monoxide emissions nationally by 2.7 percent in 1997, 5.5 percent in 2002, 6.3 percent in 2005 and 6.7 percent in 2007, relative to an uncontrolled situation. [48]

In March 1999, the USEPA promulgated Phase 2 regulations to control emissions from new non-road spark ignition engines.[49] This regulation established tighter VOC+NO_x standards for non-handheld equipment such as lawn mowers and commercial turf equipment. The new standards will be phased in between the years 2001 and 2007. The USEPA determined that this rule would reduce the combination of VOC and NO_x emissions nationally by 8.8 percent in 2002, 23.4 percent in 2005 and 32.3 percent in 2007, relative to the Phase 1 standards for non-handheld spark ignition engines.[50]

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[46] 60 Fed. Reg. 34581

[47] Ibid; Model year 1997 is defined as "The 1997 model year will run from January 2, 1996 to December 31, 1997."

[48] Ibid, Table 2

[49] 64 Fed Reg. 15207

[50] USEPA, 1999, "Final Regulatory Impact Analysis: Phase 2: Emission Standards for New Non-road Non-handheld Spark-Ignition Engines At or Below 19 Kilowatts", EPA 420-R-99-003; Table F-05

In March 2000, the USEPA promulgated additional Phase 2 regulations to control emissions from new non-road spark ignition engines.[51] This regulation established tighter VOC+ NO_x, and carbon monoxide standards for handheld equipment such as string trimmers (i.e., weedwhackers), leaf blowers and chainsaws. The new standards will be phased in between the years 2002 to 2007. The USEPA determined that this rule would reduce the combination of VOC and NO_x emissions nationally by 4.3 percent in 2002, 42.8 percent in 2005 and 66.0 percent in 2007, relative to the Phase 1 standards for handheld spark ignition engines. The USEPA did not provide estimated carbon monoxide emission reductions for this rule in its regulatory impact document, however, the USEPA Office of Transportation and Air Quality incorporated new emission factors in the NNEM to account for these reductions.[52]

Further discussion of these reductions can be found in Appendix II, Section IV.

Federal New Gasoline Spark Ignition Marine Engine Regulation: In August 1996, the USEPA promulgated regulations to control emissions from marine engines.[53] This regulation established VOC+NO_x standards for newly manufactured spark ignition gasoline engines for use in marine vessels such as personal watercraft and jet boats. These standards do not apply to stern-drive and inboard engines due to the inherently clean nature of those types of engine technology.[54] These standards phase in for model year 1999 thru 2006 for outboard engines and model year 2000 thru 2006 for personal watercraft engines. The USEPA determined that this rule will reduce VOC emissions nationally by 2.0 percent in 1999, 10.9 percent in 2002, 25.5 percent in 2005 and 36.5 percent in 2007 and increase NO_x emissions nationally by 3.8 percent in 1999, 11.0 percent in 2002, 20.6 percent in 2005 and 27.8 percent in 2007, relative to an uncontrolled situation.

Further discussion of these reductions can be found in Appendix II, Section IV.

Federal Non-road Compression Ignition Engine Regulations: In June 1994, the USEPA promulgated regulations to control VOC, NO_x and carbon monoxide emissions from diesel-powered compression ignition engines at or greater than 50 horsepower (hp) (i.e., bulldozers).[55] These Tier 1 standards phase in from 1996 to 2000. The USEPA determined that this rule would reduce NO_x emissions nationally by 9.5 percent in 1999, 16.9 percent in 2002, 23.1 percent in 2005 and 26.0 percent in 2007, relative to an uncontrolled situation. Due to emission measurement procedure uncertainty, the USEPA has yet to provide air emission benefit estimates attributable to the new VOC or carbon monoxide standards, however, the USEPA Office of Transportation and Air Quality incorporated new emission factors in the NNEM to account for these reductions.[56]

In October 1998, the USEPA promulgated additional regulations to control VOC, NO_x and carbon monoxide emissions from diesel-powered compression ignition engines for all engine sizes.[57] This rule includes Tier 1 standards for engines under 50 hp (i.e., lawn tractors), Tier 2 standards for all engine sizes and more stringent Tier 3 standards for engines rated over 50 hp. The new Tier 3 standards are expected to lead to control technologies similar to those that will be used by manufacturers of highway heavy-duty engines to comply with the 2004 highway engine standards.[58] The new Tier 1 standards will be phased in between the years 1999 and 2000, Tier 2 standards between 2001 and 2006 and Tier 3 between 2006 and 2008. The USEPA determined that this rule would reduce VOC emissions nationally by 4.9 percent in 2002, 15 percent in 2005 and 25.3 percent in 2007, and NO_x emissions nationally by 4.8 percent in 2002, 10.5 percent in 2005 and 19.9 percent in 2007, relative to the June 1994 standards. No dates on carbon monoxide emission reductions appear in the regulatory

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[51] 65 Fed. Reg. 24268

[52] USEPA, 2000, "Final Regulatory Impact Analysis: Phase 2 Final Rule: Emission Standards for New Non-road Handheld Spark-Ignition Engines At or Below 19 Kilowatts", EPA-420-R-004; Table F-05

[53] 61 Fed. Reg. 52087

[54] USEPA, 1996, "Environmental Fact Sheet: Emission Standards for the New Gasoline Marine Engines", EPA 420-F-96-012

[55] 61 Fed Reg. 52088

[56] USEPA, 1994, "Regulatory Impact Analysis and Regulatory Support Document: Control of Air Pollution; Determination of Significance for Non-road Sources and Emission Standards for New Non-road Compression-Ignition Engines at or Above 37 Kilowatts (50 Horsepower); Final", ANR-443.

[57] 63 Fed. Reg. 56968

[58] USEPA, 1998, "Regulatory Announcement: New Emission Standards for Non-road Diesel Engines", EPA 420-F-98-034

impact document for this rule, however, the USEPA Office of Transportation and Air Quality incorporated new emission factors in the NNEM to account for these reductions.[59]

Further discussion of these reductions can be found in Appendix II, Section IV.

Federal Compression Ignition Marine Engine Regulations (Commercial Marine Engines): In 1999, the USEPA promulgated regulations for commercial marine diesel engines over 37 kilowatts (kW), including engines with per cylinder displacement up to 30 liters.[60] This rule establishes VOC and NO_x emission standards starting in 2004 for new engines with per cylinder displacement up to 2.5 liters. This rule also establishes standards in 2007 for engines with per cylinder displacement between 2.5 and 30 liters.[61]

The engines covered by this rule are divided into two categories:

Category 1: rated power at or above 37 kW -- specific displacement of < 5 liters per cylinder
Category 2: rated power at or above 37 kW -- specific displacement 5>= x <30 liters per cylinder

In addition, the International Maritime Organization has adopted NO_x standards, referred to as MARPOL standards, for marine diesel engines rated above 130 kW. These standards became effective 1/1/2000.[62] These standards will effect engines in both Categories 1 & 2, as defined above. In addition, these standards add a third category of engines, those with per cylinder displacement greater than 30 liters.[63]

Category 1 engines are primarily found in fast ferries. Category 2 engines are primarily found in tug and tow boats. Category 3 engines are primarily found in tankers, container ships and large cruise boats.[64]

Reductions due to both the USEPA commercial marine diesel engine rule and the MARPOL standards are included as part of the non-road portion of the projected inventories. The MARPOL standards do not go into effect internationally until one year after they are ratified by at least 15 countries representing 50 percent of the gross tonnage of the world's merchant shipping. However, after the standards go into force internationally, countries may enforce it back to engines newly installed or converted on or after that date. Since the USEPA has notified ship manufacturers/owners affected by the MARPOL standards that they can be retroactively enforced and the USEPA included the MARPOL standard reductions in their rule background analysis, reductions due to the MARPOL standards can be considered for projected inventory evaluations.[65, 66] The USEPA-determined emission reductions estimated for implementation of these engine standards are outlined in Table 12.

Further discussion of these reductions can be found in Appendix II, Section IV.

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[59] USEPA, 1998, "Final Regulatory Impact Analysis: Control of Emissions from Non-road Diesel Engines", EPA 420-R-98-016, Tables 5-8 and 5-9.

[60] 64 Fed. Reg. 73300

[61] USEPA, 1999, "Technical Highlights: Organization of Gasoline and Diesel Marine Engine Emission Standards", p.3

[62] USEPA, 1999, "Frequently Asked Questions: MARPOL 73/78 Annex VI Marine Diesel Engine Requirements", EPA 420-F-99-038, p.2

[63] USEPA, 1999, "Final Regulatory Impact Analysis: Control of Emissions from Marine Diesel Engines", EPA 420-R-99-026, p.1, 6

[64] Personal communication with Lt. Commander D. Kuebler of the Sandy Hood Coast Guard Station, 5/2000

[65] USEPA, 1999, "Frequently Asked Questions: MARPOL 73/78 Annex VI Marine Diesel Engine Requirements", EPA 420-F-99-038, p.1

[66] USEPA, 1999, "Final Regulatory Impact Analysis: Control of Emissions from Marine Diesel Engines", EPA 420-R-99-026

Table 12
Emission Reductions from Federal
Commercial Marine Engine Regulation and MARPOL Standards[67]

	Category 1 Engines		Category 2 Engines	Category 3 Engines
	VOC (%)	NO_x (%)	NO_x (%)	NO_x (%)
2002		2.0	2.1	1.6
2005	3.0	3.0	3.1	2.5
2007	3.6	4.4	2.1	1.6

Federal Locomotive and Locomotive Engine Regulation: In 1998, the USEPA promulgated regulations establishing emission standards for locomotives and locomotive engines.[68] This rule marks the first attempt to regulate locomotive emissions and provides for emission reductions, primarily NO_x reductions, from locomotive engines beginning in year 2000. The standards apply to locomotives and locomotive engines originally manufactured in 1973 and later, at the time they are manufactured and/or re-manufactured. The USEPA determined percentage emission reductions for this rule are outlined in Table 13.

Further discussion of these reductions can be found in Appendix II, Section IV.

Table 13
Emission Reductions from Federal
Locomotive and Locomotive Engine Regulation[69]

	VOC (%)	NO_x (%)	Carbon Monoxide (%)
2002	1	11	0
2005	3	30	0
2007	10	37	0

Federal Aircraft Engine Regulation: In 1997, the USEPA promulgated new emission standards for NO_x and carbon monoxide for newly manufactured and newly certified commercial aircraft gas turbine engines with rated thrust greater than 26.7 kilo-newtons.[70] This rule excluded general aviation and military engines. This rule codified already existing voluntary NO_x and carbon monoxide emission standards established by the United Nations' International Civil Aviation Organization (ICAO) in 1986. In addition, this regulation incorporated a stricter NO_x standard which is identical to ICAO's 1993 amended NO_x standard.[71]

Prior to its promulgation, commercial aircraft engine emissions and fleet data collected by the USEPA indicted that, with two exceptions, all the engines which would be affected by the proposed federal rule were already in compliance. This was due in part to the fact that ICAO's voluntary standards had been in place since 1986 and aircraft engines, being international commodities, are designed to meet international standards. The USEPA's conversations with the manufacturers of the two non-complying engine types indicated that they were already

[67] USEPA, 1999, "Final Regulatory Impact Analysis: Control of Emissions from Marine Diesel Engines", EPA 420-R-99-026

[68] 63 Fed. Reg. 18977

[69] USEPA, 1998, "Locomotive Emission Standards, Regulatory Support Document"

[70] Aircraft emissions are not only associated with the type of engine but also the landing and takeoff cycle for a particular aircraft. The time spent in the landing and takeoff cycle accounts for the total average time an aircraft spends in the vicinity of an airport, from ground level to the mixing height (approximately 2000 feet); USEPA, 1997, *Regulatory Support Document: Control of Air Pollution from Aircraft and Aircraft Engines*, p.2

[71] USEPA, 1997, "Environmental Fact Sheet: Adopted Aircraft Engine Emission Standards", EPA 420-F-97-010

in the process of bringing those engines into compliance. As such, it was determined that promulgation of this regulation would have a minimal negative impact on the industry. However, the USEPA's analysis also showed that while promulgation of the rule had the benefit of establishing consistency between United States and international emission standards, there would be a negligible emission reduction benefit from its promulgation. As such, and lacking any further guidance from the USEPA, the NJDEP determined not to apply controls to aircraft emissions in its projected non-road inventory.[72]

Further discussion of these reductions can be found in Appendix II, Section IV.

5. On-road Sources

This section describes the on-road source control measures used in the ROP Plans.

Basic Inspection and Maintenance (I/M) Program: In 1974, New Jersey, under commitments made in its basic I/M SIP, began mandatory enforcement of its basic inspection and maintenance (I/M) program. The State's basic I/M SIP included an annual inspection program whereby all gasoline-fueled motor vehicles, unless specifically exempt through law or regulation, were subjected to an idle exhaust emission test. Although several subsequent revisions had been made to the basic I/M SIP over the life of the basic I/M program, the core elements of the program remained unchanged. Major changes in the State's basic I/M program over time included: 1) the addition of a visual inspection for the presence of a catalytic converter, 2) the addition of an inlet restrictor test to determine whether a vehicle's fuel inlet was sufficiently narrow to preclude use of a leaded gasoline nozzle, thereby preventing the use of leaded fuel, 3) modification of the program network design to allow for the participation of private inspection facilities, and 4) a change in the assumed compliance rate from 1990 to 1996 from 91 percent to 96 percent. This third major change expanded the inspection facility network to include non-state operated inspection facilities which could do both inspections and repairs. Although these private facilities were originally only allowed to perform reinspections, their responsibilities were soon augmented to included initial inspections as well.

New Jersey's basic I/M program was the first of its kind in the nation. However, even with the addition of the new design elements discussed above, the program could not keep up the advancing emission control technology of motor vehicles. The advent of computer controlled vehicle operating systems revealed that New Jersey's basic I/M program was detecting only the most egregious polluters. Therefore, to address these technology issues, and to meet the requirements of the Clean Air Act,[73] the State of New Jersey replaced its basic I/M program with an enhanced program at the end of 1999.

Prior to that time, in June of 1998, the State revised its basic I/M program to clarify the frequency of vehicle inspections during the transition period between the existing basic I/M program and full implementation of the enhanced I/M program.[74] Prior to 1998, the basic program required vehicles to be inspected every year, or annually. The enhanced program, however, would require vehicles to be inspected every two years, or biennially. During the transition, the State determined that vehicles should be inspected biennially, rather than annually, under the basic I/M program, to accommodate the decreased availability of centralized inspection lanes while they were being retrofitted for enhanced testing. To offset any increase in VOC emissions during the transition, the State added to the basic I/M program a test to check the functional operation of a vehicle's fuel cap. Malfunctioning fuel caps result in emissions of VOCs from evaporation from the vehicle's evaporative emission control system. The State offset any minimal increase in carbon monoxide emissions by using the emission reductions gained from vehicle fleet turnover not already taken credit for in the State's plans. The USEPA approved this action by the State on August 26, 1998.[75]

Enhanced I/M Program: On December 13, 1999, the State of New Jersey implemented its enhanced I/M program Statewide. The major components of this program are:

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[72] USEPA, 1997, "Regulatory Support Document: Control of Air Pollution from Aircraft and Aircraft Engines"

[73] 42 U.S.C. §§ 182(c)(3)and 184(b)(1)(A).

[74] The State of New Jersey Department of Environmental Protection, Revision to the State Implementation Plan (SIP) for the Inspection and Maintenance (I/M) Program for the State of New Jersey, June 5, 1998.

[75] 63 Fed. Reg. 45402 (August 26, 1998).

a. a hybrid inspection network of centralized test-only and decentralized test-and-repair facilities. The State claimed 80 percent credit for its decentralized inspection network (i.e., the decentralized inspection facilities are considered 80 percent as effective as the centralized inspection facilities). For modeling purposes, the network split is assumed to be 70 percent/30 percent (i.e., 70 percent of vehicles pass at the centralized network, while 30 percent pass at the decentralized network);
b. biennial inspection cycle (i.e., vehicles are inspected every two years);
c. ASM5015 exhaust emission test for all 1981 and newer dynamometer-testable vehicles (final cutpoints to be implemented by January 1, 2002);
d. 2500 RPM exhaust emission test for all 1981 and newer vehicles which are not amenable to dynamometer testing;
e. idle exhaust emission test for all pre-1981 vehicles;
f. gas cap pressurization testing on all vehicles with a sealed gas cap (typically 1970 and later model year vehicles); and a
g. 3 percent waiver limit for all ASM5015-tested vehicles which cannot pass inspection, provided the vehicle owner meets the monetary repair requirements and the vehicle can pass an idle test.

The above Enhanced I/M Program with initial cutpoints and purge testing is used in this SIP to characterize the 2002 I/M on-road emission scenario. For 2005 and 2007 the effects of full pressure testing and final cutpoints are included. For further detail on the I/M program components included in each projection year see Appendix II, Section V.

The State's enhanced I/M contractor, Parsons Infrastructure and Technology (PI&TG), experienced technical problems upon start-up. These problems resulted in unacceptably long wait times at many of the State's centralized inspection facilities. In recognition of these start-up difficulties, the USEPA has gave the State until August 1, 2000 to rectify any and all software and hardware problems within the system and to fully re-implement enhanced testing at all centralized facilities. By upgrading the lane software and lane configuration to optimize throughput, increasing hiring and training for lane inspectors, encouraging more motorists to patron the private inspection facilities and converting the seven one and two lane stations to an appointment-only system, PI&TG has resolved its initial start-up problems. All vehicles were being initially inspected under the enhanced program as of August 1, 1998.

Tier I Vehicles : Pursuant to 42 U.S.C. §7521, the USEPA promulgated regulations which revised the tailpipe/extended useful life standards of the Federal Motor Vehicle Control Program (FMVCP) for light duty vehicles and light duty trucks.[76] These standards, known as Tier I, were implemented in phases beginning with the 1994 model year. The Tier 1 standards encompassed pollutants previously regulated (that is, carbon monoxide, nitrogen oxides, and particulate matter), as well as the addition of hydrocarbons measured on a non-methane (NMHC) basis. The standards themselves are a relatively complex function of vehicle class, pollutant, useful life, engine cycle, and fuel. The Tier I rulemaking also established new intermediate and full useful life levels for light-duty vehicles and light-duty trucks, as well as new vehicle weight classes. The regulation effected petroleum and methanol-fueled motor vehicles.

National Low Emission Vehicle Program (NLEV): On November 22, 1995, the NJDEP adopted regulations requiring automobile manufacturers to produce and sell low emission vehicles in the State on New Jersey.[77] Specifically, the NJDEP rule required the sale of vehicles certified to the Ozone Transport Commission (OTC) Low Emission Vehicle (LEV) emission standards, unless 1) the USEPA determined that their national LEV (NLEV) program, then referred to as the 49-State LEV program, was an acceptable alternative to the OTC-LEV program; and, 2) the USEPA found that this national program was in effect. The USEPA promulgated its final regulations for the NLEV program on June 6, 1997[78] and subsequently revised those regulations on January 7, 1998.[79] On March 2, 1998, after having received notifications from all automobile manufacturers that they voluntarily opted into the NLEV program, the USEPA made its finding that the NLEV program was in effect.

[76] 56 Fed. Reg. §25724, June 5, 1991.
[77] 27 N.J.R. 5016(a), N.J.A.C. 7:27-26.
[78] 62 Fed. Reg. §31192, June 6, 1997.
[79] 63 Fed. Reg. § 926, January 7, 1998.

Following the USEPA's rulemakings, by letter dated January 28, 1998, New Jersey committed to the NLEV program, and subsequently took the necessary steps to insure the implementation of the NLEV program in New Jersey. As such, on February 3, 1999, the NJDEP revised its LEV regulations to recognize the USEPA's rulemaking and mirror its requirements for a LEV program in New Jersey.[80] The State submitted these regulations as a SIP revision to the USEPA on March 1, 1999.

The NLEV program required automobile manufacturers to meet more stringent new car standards starting with the 1999 model year in the OTC states (that is, Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and the District of Columbia) and starting with the 2001 model year in the remainder of the nation except for California. New Jersey committed to participate in the NLEV Program through the commencement of model year 2006, except as provided in 40 C.F.R. §86.1707. However, if, no later than December 15, 2000, the USEPA did not adopt standards as least as stringent as the NLEV standards for model years 2004, 2005 or 2006, the State's participation in NLEV would extend only until the model year 2004. As discussed in greater detail later, the USEPA promulgated its Tier II new motor vehicle standards commencing with model year 2004 on February 10, 2000. These standards are more stringent than the NLEV standards provided for in 40 C.F.R. Part 86, subpart R. As such, New Jersey's participation in the NLEV program will extend through the model year 2006.

Reformulated Gasoline (Phase II) (RFG II): 42 U.S.C. §7545(k)(1) and (10)(D) require the use of reformulated gasoline (RFG) in the nine (9) ozone non-attainment areas having a 1980 population of 250,000 or greater, and having the highest ozone design value during the period of 1987 to 1989. Eighteen (18) of New Jersey's twenty-one (21) counties are located within non-attainment areas which meet this criteria. On December 6, 1991, the State applied to the USEPA asking that the entire State be allowed to "opt-in" to the reformulated fuel requirement to make the State's retail gasoline supply more uniform throughout the State.[81] On March 26, 1992, the USEPA approved New Jersey's request.[82]

The federal RFG program was designed in two phases; Phase I was implemented on January 1, 1995 and Phase II was implemented on January 1, 2000. Phase II consists of more stringent percent reductions for oxides of nitrogen and air toxics. For the purposes of calculating benefits for Tables 9-12, the RFG II line includes the total benefits from the RFG program as a whole (i.e., the benefits are cumulative with the RFG I benefits). The RFG I NO_x benefit is derived from an off-model calculation.

Heavy-Duty Diesel Vehicle (HDDV) Engine Standards: On July 31, 2000, the USEPA issued a final rule for the first phase of its two-part strategy to significantly reduce harmful diesel emissions from heavy-duty trucks and buses. Prior to this rulemaking, in 1997, the USEPA issued a new NMHC+NO_x standard for heavy-duty diesel engines, starting with the 2004 model year, and committed to review the appropriateness of this standard in 1999. The July 2000 final rulemaking reaffirms those standards for diesel engines and finalizes new standards for heavy-duty gasoline engines. Specifically, this rule finalizes new diesel engine standards beginning in 2004 for all diesel vehicles over 8,500 pounds. Additional diesel standards and test procedures in this final rule will begin in 2007. Finally, this new rule requires heavy-duty gasoline engines to meet new, more stringent standards starting no later than the 2005 model year. According to the USEPA, these new standards require gasoline trucks to be 78 percent cleaner and diesel trucks to be more than 40 percent cleaner than current models. The second phase of the program will require cleaner diesel fuels and even cleaner engines, and will reduce air pollution from trucks and buses by another 90 percent. The USEPA expects to issue the final rule, to take effect in 2006-2007, for the second phase of the program by the end of 2000. The effect of new engine standards is derived from a USEPA spreadsheet model.

Specifically, the final rulemaking effects heavy-duty diesel engines as follows:

- The USEPA reaffirmed its combined standard for smog-causing oxides of nitrogen (NOx) and hydrocarbons (HC) of 2.4 grams per brake horsepower-hour (g/bhp-hr). The current standard for NOx is 4 g/bhp-hr and the HC standard is 1.3 g/bhp-hr. This standard represents a more than 40 percent reduction in emissions of NO_x, as well as reductions in HC, from diesel trucks and buses.

[80] 31 N.J.R. 648(a), N.J.A.C. 7:27-26.
[81] 42 U.S.C. §7545(k)(6); 57 Fed. Reg. 11077 (1992).
[82] 57 Fed. Reg. 11077 (1991).

- The rule adds new test procedures and compliance requirements to ensure that emission standards are met in actual use across a wide range of operating conditions. These requirements begin in the 2007 model year.
- The rule requires on-board diagnostic (OBD) systems for engines between 8,500 and 14,000 pounds to be phased-in, beginning in 2005. These systems will identify the failure of emissions control system components.

Heavy-Duty Diesel Vehicle (HDDV) Defeat Devices Settlement: On October 22, 1998, the Department of Justice and the USEPA announced a settlement with seven major diesel engine manufacturers to resolve claims that they illegally installed computer software on heavy-duty diesel engines which was designed to disengage the engine's emission control system during highway driving. The settlement, involving Caterpillar, Inc., Cummins Engine Company, Detroit Diesel Corporation, Mack Trucks, Inc., Navistar International Transportation Corporation, Renault Vehicles Industries, s.a., and Volvo Truck Corporation, included an $83.4 million total penalty, the largest civil penalty ever for violation of environmental law. According to the USEPA, this settlement is expected to prevent 75 million tons of NO_x emissions nationwide by the year 2025.

In addition to these penalties, the settlements, entered by the Court on July 1, 1999, require the manufacturers to develop and introduce cleaner new engines, rebuild older engines to cleaner levels, recall pickup trucks that have defeat devices installed and conduct new emissions testing to insure proper vehicle performance. The USEPA anticipates that these endeavors will cost the companies more than $850 million dollars. Under the agreements lodged with the U.S. District Court for the District of Columbia, each company had to significantly reduce emissions from new heavy duty diesel engines by the end of the 1998 and then meet levels beyond what is currently required by October 2002. The companies also will ensure that when older heavy duty diesel engines are rebuilt, their excess emissions will be reduced. Finally, the companies also will move up the date for meeting certain NO_x emission standards applicable to non-road engines such as construction equipment. In addition to reducing NO_x emissions from the heavy duty diesel engines, the companies will undertake a number of projects to lower NO_x emissions, including research and development projects to design low-emitting engines that use new technologies and cleaner fuels. Collectively, these projects are expected to cost $109.5 million dollars. The effects of the defeat devices are derived from a USEPA spreadsheet model.

Tier II Vehicle Standards/Low Sulfur Gasoline: On February 10, 2000, the USEPA promulgated rules for its comprehensive TierII/Low Sulfur Gasoline program.[83] These regulations are designed to treat a vehicle and its fuel as a system, thereby requiring multiple efforts to reduce highway source emissions. As such, in addition to requiring new tailpipe emissions standards for all passenger vehicles, sport utility vehicles (SUVs), minivans, vans and pick-up trucks, the USEPA simultaneously promulgated regulations to lower the sulfur standard in gasoline, which will ensure the effectiveness of low emission-control technologies in vehicles and reduce the vehicle's emissions.

Specifically, the new tailpipe standards are set at an average standard of 0.07 grams per mile for NO_x for all classes of passenger vehicles beginning in 2004. This includes all light-duty trucks (e.g., SUVs), which, until now have been held to a less stringent emission standard than light-duty passenger vehicles. Vehicles weighing less than 6000 pounds will be phased-in to this new standard between 2004 and 2007. For the heaviest light-duty trucks (between 6,000 and 8,500 pounds), the program provides a three step approach to reducing emissions. First, in 2004, the USEPA requires the implementation of standards not to exceed 0.6 grams per mile (gpm)--a more than 60 percent reduction from current standards. Second, to ensure further progress, these vehicles are required to achieve an interim standard of 0.2 gpm to be phased-in between 2004 and 2007, an 80 percent reduction from current standards. Third, half of these vehicles will meet the 0.07 standard in 2008, with those remaining complying in 2009. Vehicles weighing between 8,500 and 10,000 pounds will have the option to take advantage of additional flexibilities during the 2004 to 2008 interim period.

Simultaneous with the phase-in of these new vehicle standards, beginning in 2004, refiners and importers of gasoline will have the flexibility to manufacture gasoline with a range of sulfur levels as long as all of their production is capped at 300 parts per million (ppm) and their annual corporate average sulfur levels are 120 ppm. In 2005, the refinery average will be set at 30 ppm, with a corporate average of 90 ppm and a cap of 300 ppm. Both of the average standards can be met with use of credits generated by other refiners who reduce sulfur levels early. Finally, in 2006, refiners will meet a 30 ppm average sulfur level with a maximum cap of 80 ppm. Gasoline

[83] 65 Fed. Reg. 6698, February 10, 2000.

produced for sale in parts of the Western U.S. will be allowed to meet a 150 ppm refinery average and a 300 ppm cap through 2006 but will have to meet the 30 ppm average/80 ppm cap by 2007. Small refiners (those who employ no more than 1,500 employees and have a corporate crude oil capacity of no more than 155,000 barrels per day) will be able to comply with less stringent interim standards through 2007, at which time they must comply with the final sulfur standards. If necessary, small refiners that demonstrate a severe economic hardship can apply for an additional extension of up to two years.

As discussed in Appendix II, the effect of these standard is obtained from an off-model calculation.

D. Projected Inventories by Sector and Area Incorporating Growth and Controls

This section presents the controlled emission level results for each year of interest by emission sector and non-attainment area. The equations describing the various relationships between emissions, growth and control were incorporated into a spreadsheet which allowed the calculation of future year emissions and future year emission benefits. An example spreadsheet and further discussions of this methodology can be found in Appendix II, Section I.

1. Point Sources

Tables 14-16 summarize the 1996 actual point emission inventory and projected inventories by pollutant for years 2002, 2005, and 2007, presented by non-attainment area and statewide. As stated earlier, for the purposes of this SIP revision, the point source sector only encompasses major point sources. The detailed point source projected inventories by SCC for each county, non-attainment area and the entire state can be found in Appendix II, Section II.

An overall Statewide look of the point source inventory shows a 38 percent decrease in NO_x between the actual 1996 emissions and the projected 2007 emissions. The NO_x inventory is split into two different categories. With growth and controls, the allocation sources were projected with a 69 decrease in emissions. The non-allocation sources had a 7.3 percent increase from growth of that component of this sector.

Table 14
VOC 1996 Actual and Future Year Projected Inventories
Point Sources

Area-New Jersey Portion	VOC Controlled Emissions Ozone Season (TPD)			
	1996 Actual	2002	2005	2007
Atlantic City Area	0.43	0.42	0.43	0.44
New York Area	140.87	149.01	156.27	162.13
Philadelphia Area	28.73	30.42	31.83	33.15
Allen-Beth-Easton Area	3.14	3.56	3.87	3.99
Statewide	173.20	183.42	192.36	199.53

Table 15
NO_x 1996 Actual and Future Year Projected Inventories
Point Sources

Area-New Jersey Portion	NO_x Controlled Emissions Ozone Season (TPD)			
	1996 Actual	2002	2005	2007
Atlantic City Area	39.91	40.03	11.28	11.39
New York Area	154.13	94.01	85.28	93.65
Philadelphia Area	94.46	84.68	71.33	73.47
Allen-Beth-Easton Area	2.47	3.13	2.73	2.77
Statewide	290.97	221.85	170.62	181.28

Table 16
Summer Carbon Monoxide 1996 Actual and Future Year Projected Inventories
Point Sources

Area-New Jersey Portion	CO Controlled Emissions Ozone Season (TPD)			
	1996 Actual	2002	2005	2007
Atlantic City Area	1.42	1.27	1.31	1.34
New York Area	39.99	41.18	47.47	55.04
Philadelphia Area	23.60	23.68	25.04	26.42
Allen-Beth-Easton Area	13.43	13.19	13.26	13.39
Statewide	78.44	79.32	87.08	96.19

2. Area Sources

Tables 17-19 summarize the 1996 actual area emission inventories and projected inventories by pollutant for years 2002, 2005, and 2007, presented by non-attainment area, and statewide. As stated earlier, for the purposes of this SIP revision, the area source sector also encompasses the minor point sources. The detailed area source projected inventories by SCC for each county, non-attainment area and the entire state can be found in Appendix II, Section III.

As shown in Table 17, statewide controlled VOC emissions are projected to increase from 305 tpd in 1996 to approximately 338 tpd in 2007. This is approximately 3 tpd per year growth in emissions statewide in the area sector without new controls after 1999. Commercial and consumer solvents and architectural surface coatings are 44 percent of the area source VOC inventory in 2007.

Table 17
VOC 1996 Actual and Future Year Projected Inventories
Area Sources

Area-New Jersey Portion	VOC Controlled Emissions Ozone Season (TPD)			
	1996 Actual	2002	2005	2007
Atlantic City Area	13.02	13.60	14.11	14.39
New York Area	215.28	225.15	234.03	238.40
Philadelphia Area	72.36	76.34	79.42	80.85
Allen-Beth-Easton Area	4.34	4.53	4.71	4.81
Statewide	305.00	319.62	332.26	338.45

Table 18
NO_x 1996 Actual and Future Year Projected Inventories
Area Sources

Area-New Jersey Portion	NO_x Controlled Emissions Ozone Season (TPD)			
	1996 Actual	2002	2005	2007
Atlantic City Area	1.81	1.82	1.82	1.83
New York Area	29.58	29.58	29.77	30.14
Philadelphia Area	7.86	7.85	7.89	7.99
Allen-Beth-Easton Area	0.42	0.41	0.41	0.42
Statewide	39.66	39.66	39.89	40.38

Table 19
Summer Carbon Monoxide 1996 Actual and Future Year Projected Inventories
Area Sources

Area-New Jersey Portion	CO Controlled Emissions Ozone Season (TPD)			
	1996 Actual	2002	2005	2007
Atlantic City Area	1.45	1.46	1.47	1.47
New York Area	19.51	19.70	19.92	20.05
Philadelphia Area	5.59	5.64	5.70	5.73
Allen-Beth-Easton Area	0.33	0.34	0.34	0.34
Statewide	26.88	27.14	27.42	27.59

3. Non-road Sources

Projected inventories for non-road sources were calculated in two ways: emissions for non-road equipment were calculated using the non-road model and emissions for commercial marine vessels, locomotives and aircraft were calculated using the USEPA spreadsheet methodology described in Section IV.B.

Tables 20-22 summarize the 1996 actual non-road emission inventory and projected, controlled inventories by pollutant for years 2002, 2005 and 2007, presented by non-attainment area and statewide. As these tables demonstrate, there is a substantial reduction in VOC for this sector in 2007. While the federal spark ignition small engine and federal new gasoline spark ignition marine engine rules give substantial VOC reductions, NO_x emissions increase from these engine sources. Thus, NO_x emissions overall are expected to increase slightly by 2007, relative to the 1996 actual non-road emission inventory. Carbon monoxide reductions of approximately 13 percent are seen by 2007 due to the various promulgated federal rules associated with non-road sources. Detailed non-road projected inventories by SCC for each county, non-attainment area and the entire state can be found in Appendix II, Section IV.

Table 20
VOC 1996 Actual and Future Year Projected Inventories
Non-road Sources

Area-New Jersey Portion	VOC Controlled Emissions Ozone Season (TPD)			
	1996 Actual	2002	2005	2007
Atlantic City Area	20.29	18.17	16.67	15.70
New York Area	138.41	106.71	93.23	83.50
Philadelphia Area	41.99	33.32	29.64	27.00
Allen-Beth-Easton Area	3.04	2.56	2.38	2.25
Statewide	203.73	160.76	141.92	128.45

Table 21
NO_x 1996 Actual and Future Year Projected Inventories
Non-road Sources

Area-New Jersey Portion	NO_x Controlled Emissions Ozone Season (TPD)			
	1996Actual	2002	2005	2007
Atlantic City Area	11.46	12.44	12.23	11.92
New York Area	202.07	220.66	217.72	212.73
Philadelphia Area	52.18	55.28	54.11	52.53
Allen-Beth-Easton Area	3.53	3.67	3.56	3.42
Statewide	269.24	292.05	287.62	280.60

Table 22
Summer Carbon Monoxide 1996 Actual and Future Year Projected Inventories
Non-road Sources

Area-New Jersey Portion	CO Controlled Emissions Ozone Season (TPD)			
	1996Actual	2002	2005	2007
Atlantic City Area	187.79	185.53	182.01	181.42
New York Area	1508.52	1432.44	1331.14	1292.93
Philadelphia Area	415.45	392.81	366.96	357.05
Allen-Beth-Easton Area	40.52	39.50	38.32	38.03
Statewide	2152.25	2050.28	1918.43	1869.43

4. On-road Sources

Projected inventories for on-road sources were calculated using the transportation demand models specific to each MPO, in combination with the MOBILE5a-h emission factor model, and several "off-model" calculations.

Tables 23-25 summarize the 1996 actual on-road emission inventory and projected, controlled inventories by pollutant for the years 2002, 2005 and 2007, presented by non-attainment area and statewide. These estimates project continuing reductions in on-road emissions due to the offsetting of VMT growth by vehicle and fuel technological advancements. Detailed on-road projected inventories for each MPO, non-attainment area and the entire state can be found in Appendix II, Section V.

Table 23
VOC 1996 Actual and Future Year Projected Inventories
On-road Sources

Area-New Jersey Portion	VOC Controlled Emissions Ozone Season (TPD)			
	1996 Actual	2002	2005	2007
Atlantic City Area	13.38	11.13	8.74	
New York Area	206.52	135.48	94.59	89.82
Philadelphia Area	82.70	61.63	42.65	
Allen-Beth-Easton Area	6.41	4.65	3.52	3.37
Statewide	309.01	212.91	149.50	

Table 24
NO_x 1996 Actual and Future Year Projected Inventories
On-road Sources

Area-New Jersey Portion	NO_x Controlled Emissions Ozone Season (TPD)			
	1996 Actual	2002	2005	2007
Atlantic City Area	23.80	19.91	16.00	
New York Area	302.92	229.28	178.73	165.11
Philadelphia Area	112.94	86.14	66.03	
Allen-Beth-Easton Area	14.17	10.92	8.97	8.41
Statewide	453.82	346.25	269.75	

Table 25
Summer Carbon Monoxide 1996 Actual and Future Year Projected Inventories
On-road Sources

Area-New Jersey Portion	CO Controlled Emissions Ozone Season (TPD)			
	1996 Actual	2002	2005	2007
Atlantic City Area	86.07	75.77	70.11	
New York Area	1523.53	893.17	747.36	735.29
Philadelphia Area	516.88	371.17	311.68	
Allen-Beth-Easton Area	56.51	34.64	30.17	29.66
Statewide	2182.99	1374.76	1159.31	

E. Overall Emission Results/Conclusions

Tables 26-28 present a summary of the total emissions that result after growth factors and controls are applied. These results are presented graphically in Figures 11-20. Refer to Appendices I and II for a more detailed discussion of the 1996 actual and the 2002, 2005 and 2007 projected emission inventories. Please note, all emission estimates and benefits contained in this document are for the New Jersey portion of the relevant multi-state non-attainment area.

Table 26
VOC 1996 Actual and Future Year Projected Inventories
All Emission Sectors

Area-New Jersey Portion	VOC Controlled Emissions Ozone Season (TPD)			
	1996 Actual	2002	2005	2007
Atlantic City Area	47.12	44.12	39.95	
New York Area	701.08	616.35	578.11	573.86
Philadelphia Area	225.78	201.71	183.53	
Allen-Beth-Easton Area	16.93	15.30	14.48	14.43
Statewide	990.91	877.40	816.06	

Table 27
NO_x 1996 Actual and Future Year Projected Inventories
All Emission Sectors

Area-New Jersey Portion	NO_x Controlled Emissions Ozone Season (TPD)			
	1996 Actual	2002	2005	2007
Atlantic City Area	76.98	74.20	41.33	
New York Area	688.71	574.53	511.51	501.63
Philadelphia Area	267.44	233.96	199.38	
Allen-Beth-Easton Area	20.59	18.13	15.67	15.02
Statewide	1053.72	900.82	767.88	

Table 28
Summer Carbon Monoxide 1996 Actual and Future Year Projected Inventories
All Emission Sectors

Area-New Jersey Portion	CO Controlled Emissions Ozone Season (TPD)			
	1996 Actual	2002	2005	2007
Atlantic City Area	276.73	264.03	255.31	
New York Area	3091.61	2386.49	2145.89	2103.31
Philadelphia Area	961.52	793.30	709.38	
Allen-Beth-Easton Area	110.77	87.67	82.09	81.42
Statewide	4440.63	3531.49	3192.67	

Figure 11
New Jersey 1990 VOC Inventory by Sector
Statewide

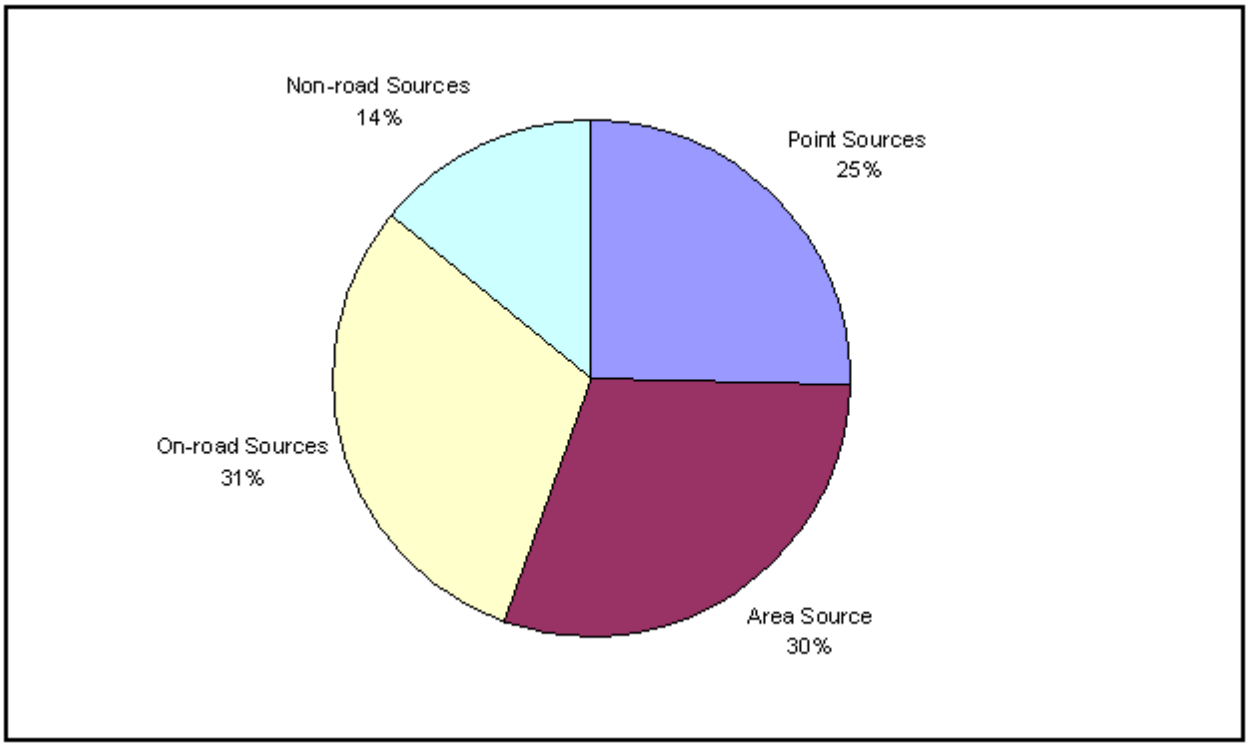


Figure 12
New Jersey 1996 VOC Inventory by Sector
Statewide

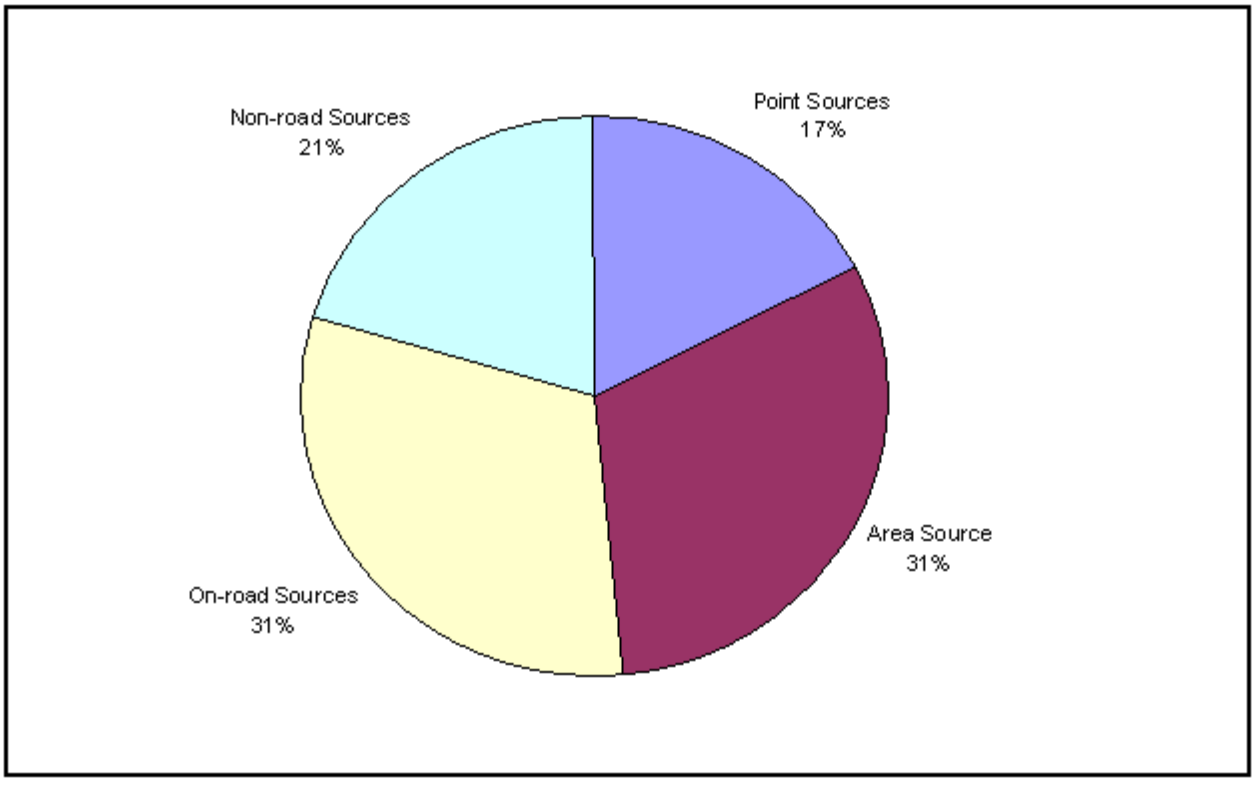


Figure 13
New Jersey Projected 2002 VOC Inventory by Sector
Statewide

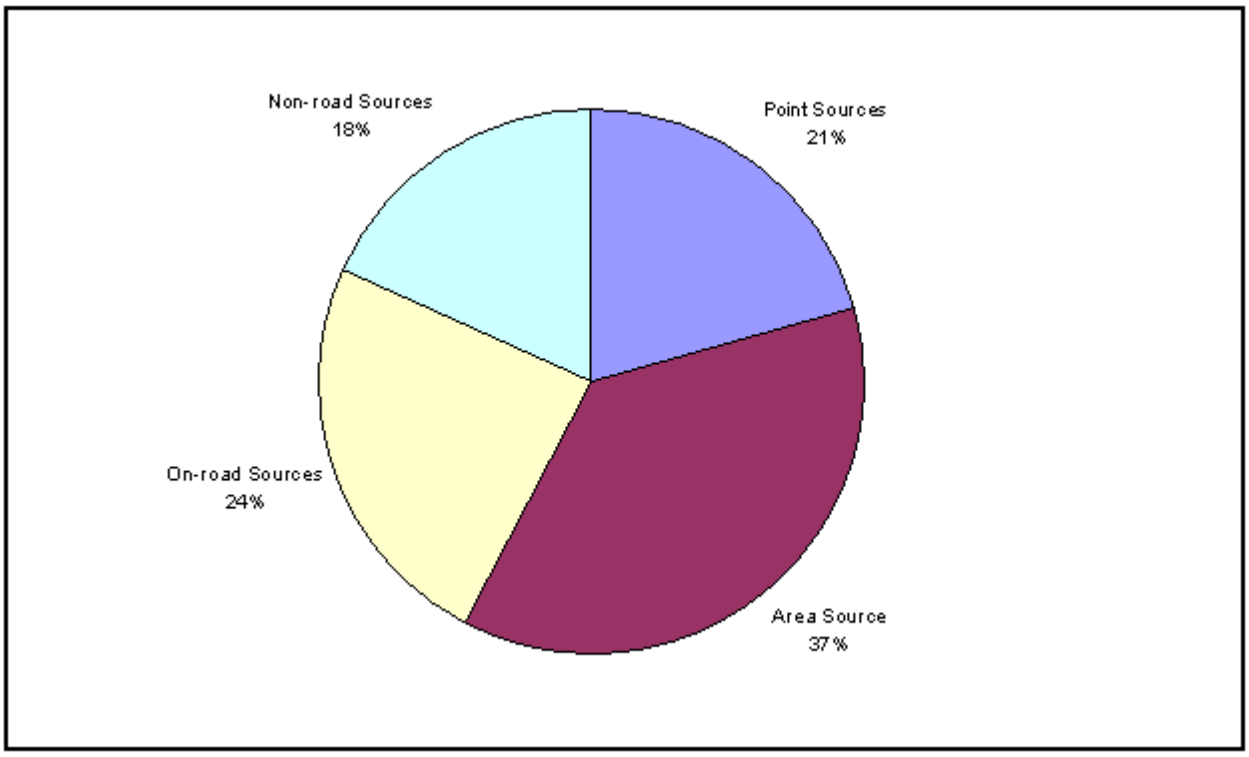


Figure 14
New Jersey Projected 2005 VOC Inventory by Sector
Statewide

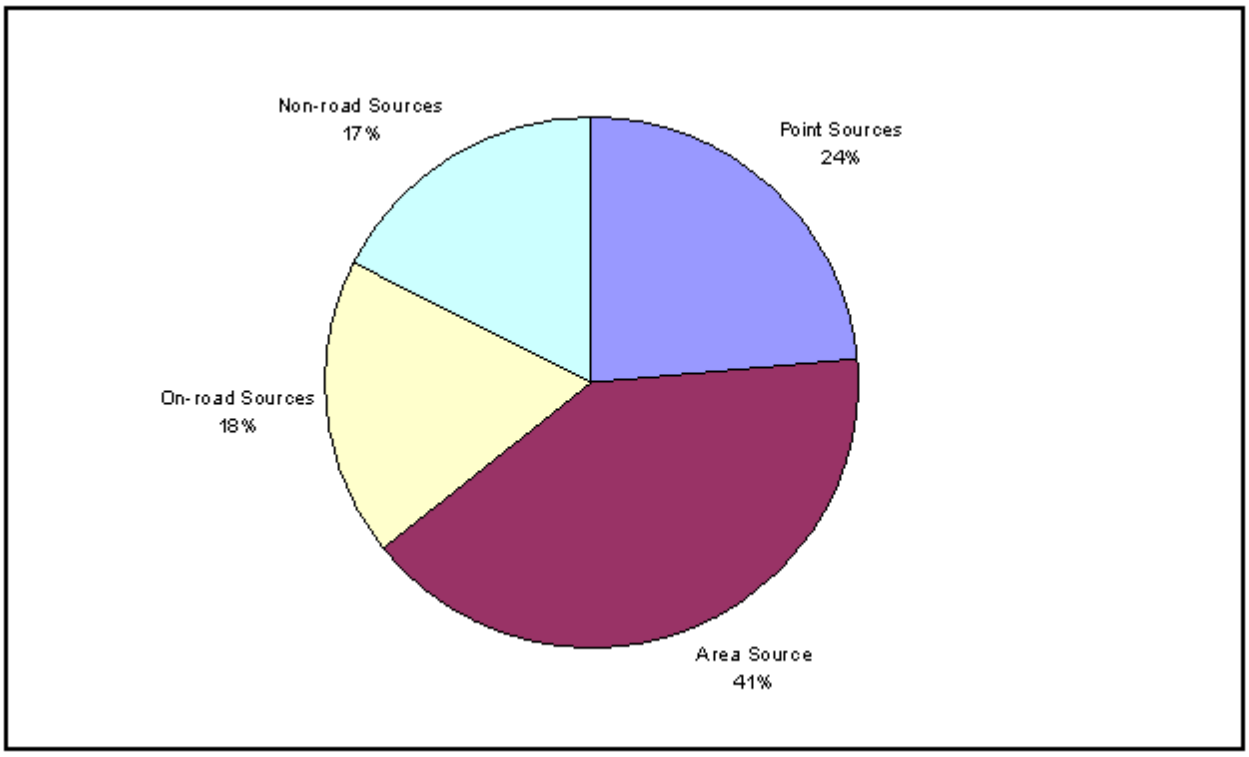


Figure 15
New Jersey 1990 NO_x Inventory by Sector
Statewide

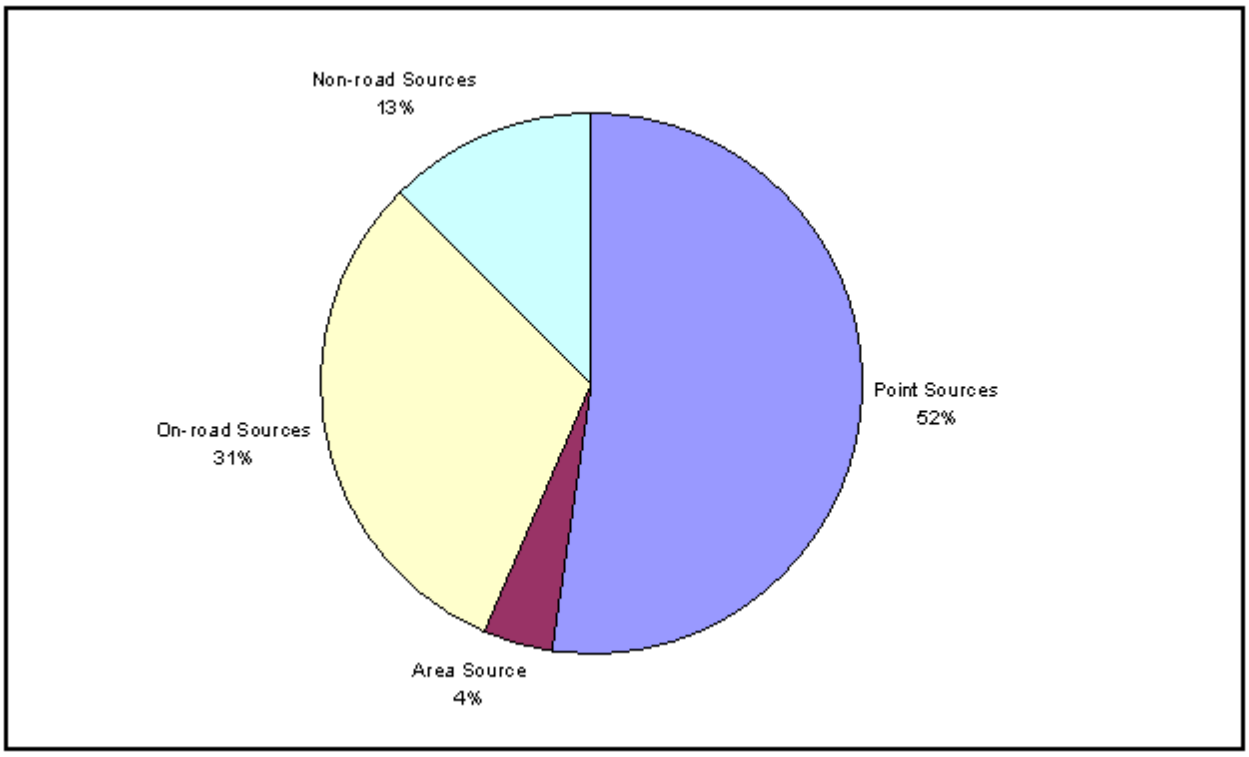


Figure 16
New Jersey 1996 NO_x Inventory by Sector
Statewide

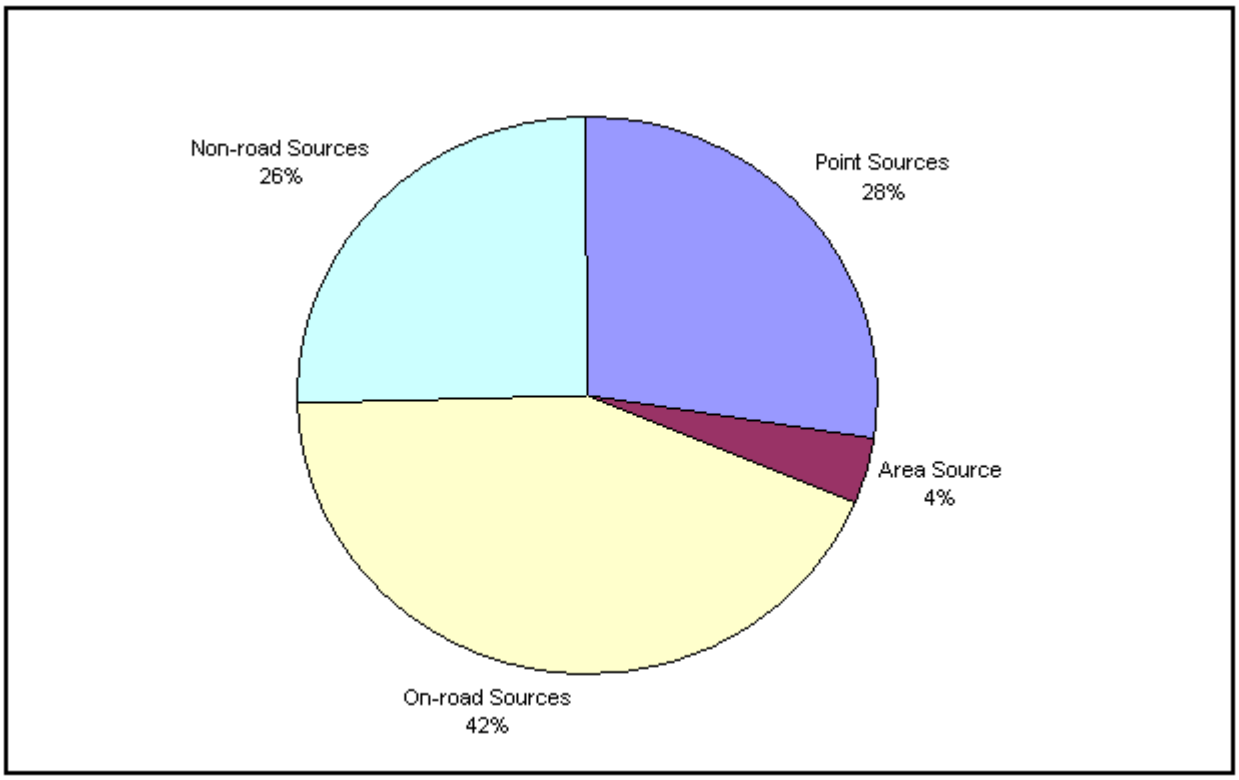


Figure 17
New Jersey Projected 2002 NO_x Inventory by Sector
Statewide

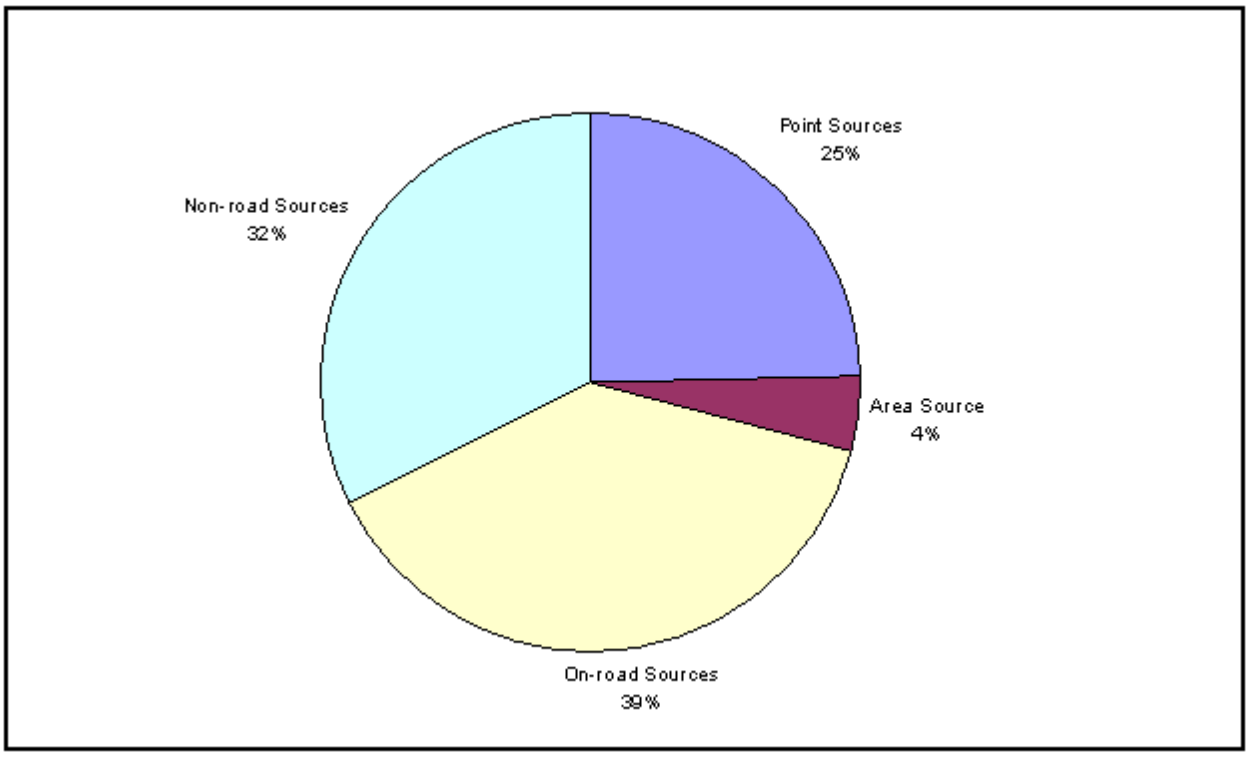


Figure 18
New Jersey Projected 2005 NO_x Inventory by Sector
Statewide

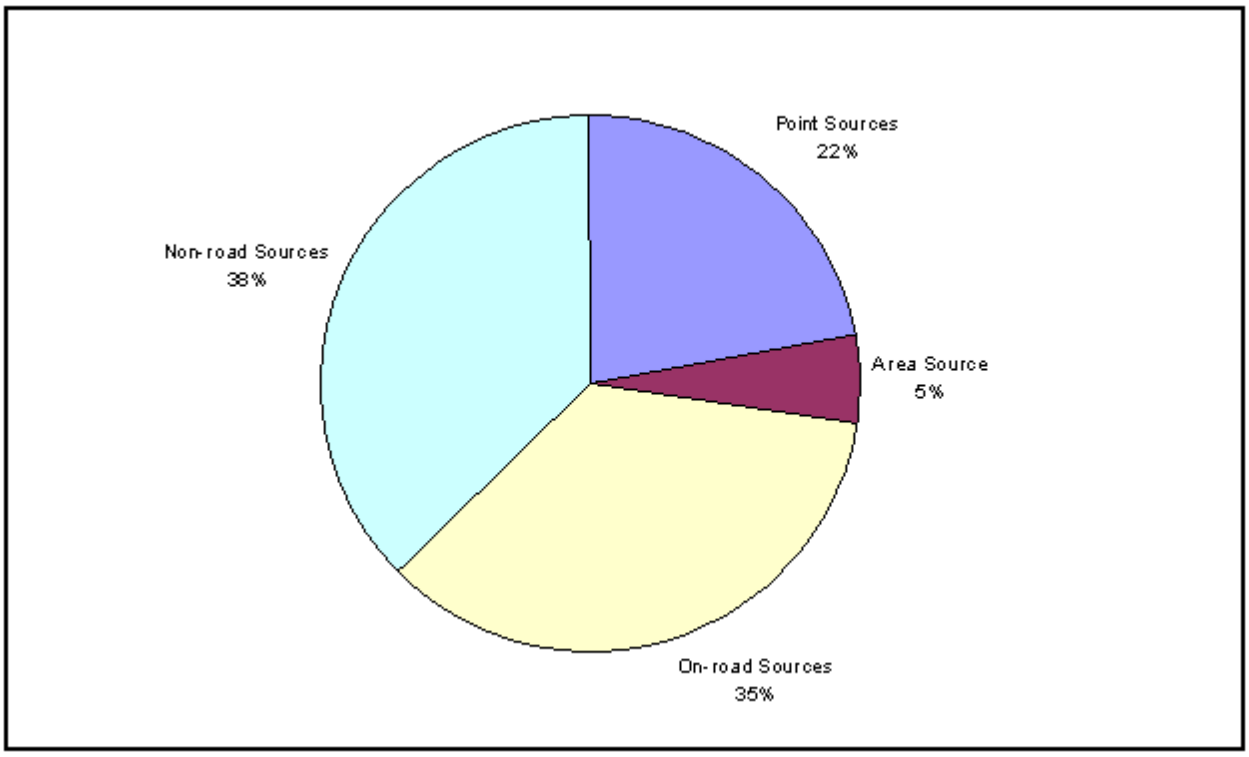


Figure 19
New Jersey Actual and Projected VOC Inventory by Sector
Statewide

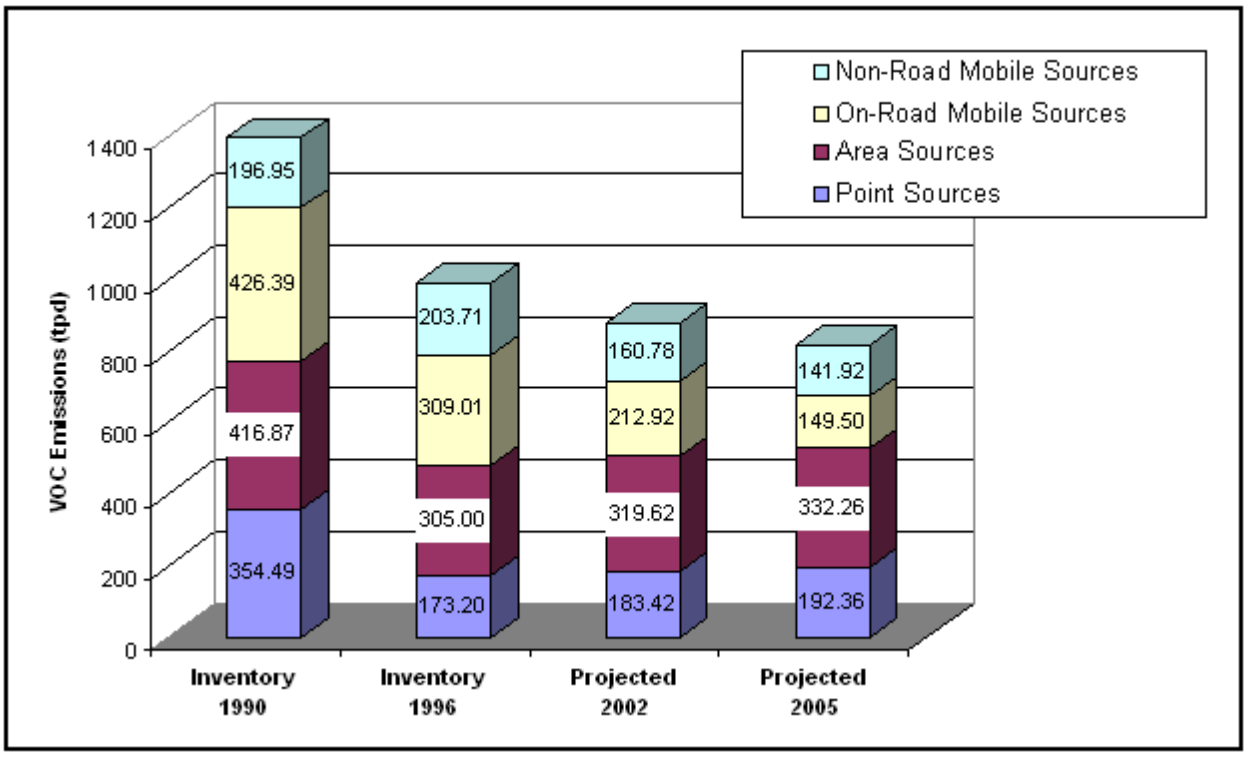
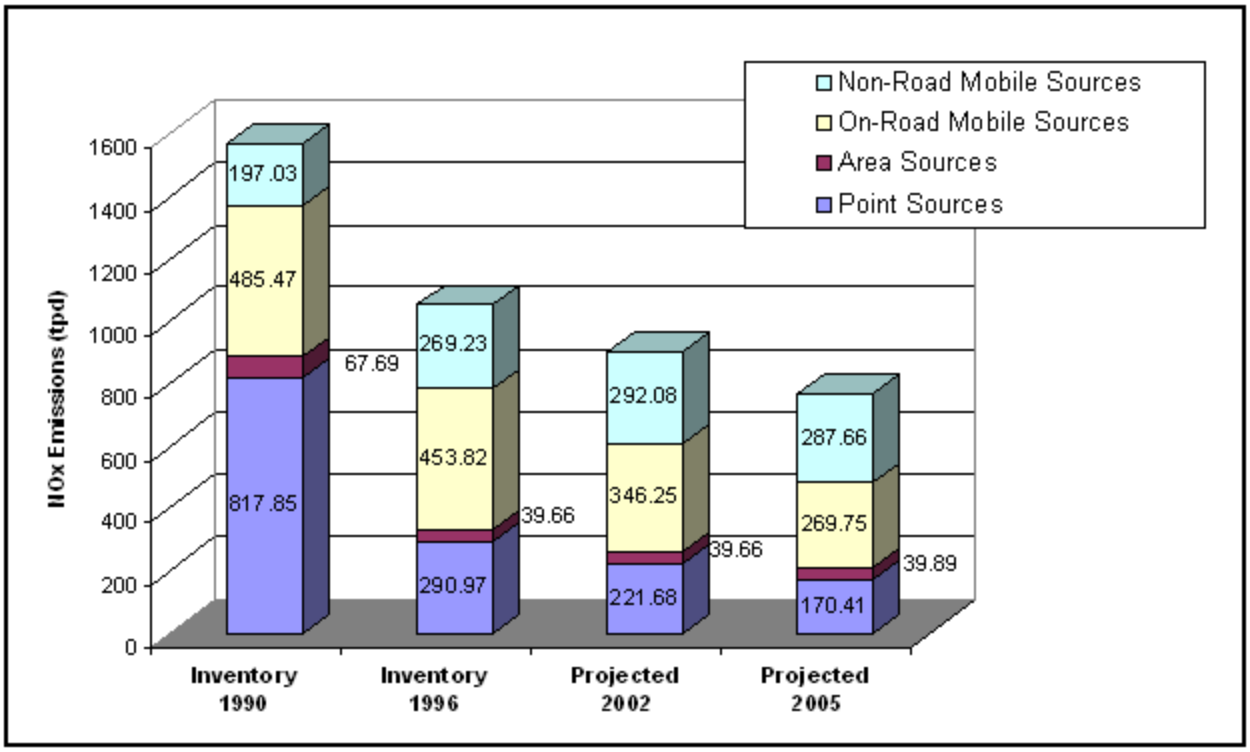


Figure 20
New Jersey Actual and Projected NO_x Inventory by Sector
Statewide



IV. Rate of Progress Results

A. Comparison of Projections to the ROP Test

Emission target and projected inventories are presented in Tables 29 and 30 for the New Jersey portions of the New York and Philadelphia non-attainment areas, respectively. The emission targets necessary to meet the ROP "test" were described in Section II. D. The emission projections are based on the control measures in the State's 1998 attainment demonstration plus the effects of RFG II NO_x, the Tier II Motor Vehicle Standard/Low Sulfur Gasoline Program, HDD defeat devices and new HDD engine standards. This section compares the projected (with controls) inventories with those emission targets to demonstrate compliance with the ROP requirements.

The projected VOC and NO_x inventories for 2002, 2005, and 2007 are presented by emission sector and totaled in Rows G through K of Table 29 and 30 below. The VOC and NO_x emission reductions from the 1990 Adjusted Baseline are presented in tons per ozone season day in Row L and as a percentage of the 1990 Adjusted Baseline Inventory in Row M.

The USEPA's policy[84] on ROP demonstrations allows the substitution of achieved NO_x emission reductions for VOC emission reductions for the purposes of demonstrating compliance with post-1996 ROP plans, assuming those NO_x reductions are beneficial in attaining of the NAAQS. New Jersey has made the determination that NO_x reductions are beneficial toward reaching attainment.[85] This substitution is made on a percent for percent basis, e.g., a one percent reduction in NO_x emissions (from the adjusted baseline) is equivalent to a one percent reduction in VOC emissions (from the adjusted baseline). Therefore, the percent reductions in VOC and NO_x from the 1990 Adjusted Baseline calculated in Row M are totaled in Row N, and compared to the percentage requirements in Row E to determine whether or not the the ROP requirements have been met.

This comparison indicates that ROP requirements are readily met for the years 2002, 2005, and 2007. For example, the combined percentage of available NO_x substitution (48.40%) and VOC (35.11%) emission reductions for the New York nonattainment area in 2007 is 83.51 percent as compared to a ROP reduction requirement of 48 percent. Therefore more than sufficient NO_x substitution and VOC emission reduction credit is available to meet the 48 percent target reduction.

Instead of comparing percentages, projected VOC inventories, adjusted for allowed NO_x substitution, can be compared directly to the VOC emission target in Row F. The available NO_x emisssion reductions are given in Row L and repeated in Row O. These available NO_x emission reductions can be converted to their VOC-equivalent emission reductions by using the following formula:

$$\textbf{Allowable } NO_x \textbf{ Substitution in VOC-equivalent tpd} = (NO_x \text{ Reduction from Adj. Base}) \times \frac{\text{(Adj. Base VOC)}}{\text{(Adj. Base } NO_x\text{)}}$$

where:

NO_x reduction from Adj. Base = the NO_x emission reduction from the 1990 Adjusted Baseline for the projection year in tpd (Row L)

Adj. Base VOC = the 1990 Adjusted Baseline VOC Emissions for the projection year (Row D), and

Adj. Base NO_x = the 1990 Adjusted Baseline NO_x Emissions for the projection year (Row D)

The available NO_x emission reductions and their allowable VOC-equivalents are presented in Row O. To determine the VOC-equivalent (including NO_x substitution) controlled emission levels, these allowable NO_x substitution reductions (in VOC-equivalent tons per day) are subtracted from the controlled VOC emission levels of Row K and presented in Row P. A comparison of the VOC-equivalent controlled emision levels in Row P for 2002, 2005, and 2007 with the target emission levels for those same years (in Row F) show that projected controlled emission levels are well below ROP targets.

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[84] NO_x Substitution Guidance. Office of Air Quality Planning and Standards, USEPA. December 1993.

[85] New Jersey Phase I Ozone SIP; Section III. E.

Row Q presents the difference between target levels and projected VOC-equivalent controlled emission levels. All of these values are positive and substantial indicating that more than sufficient VOC and allowable NO_x substitution emission reductions are available to meet ROP targets. Since emission reductions were based largely on the control measures needed for attaining the one-hour ozone standard, this demonstrates that for New Jersey, required emission reductions significantly exceed ROP reduction requirements. As discussed below, a portion of these excess reductions will be used for Contingency Measures as required by Sections 172(c)(9) and 182(c)(9) of the Clean Air Act.

Table 29
Comparison of Emission Targets to Emission Projections
New York Non-attainment Area (New Jersey Portion)

ROW		1990		1996		2002		2005		2007	
		Inventory		Actual		Projected		Projected		Projected	
		VOC	NOx	VOC	NOx	VOC	NOx	VOC	NOx	VOC	NOx
		tpd	tpd	tpd	tpd	tpd	tpd	tpd	tpd	tpd	tpd
A	1990 Base Year Emissions	1166.69	1012.35	1166.69	1012.35	1166.69	1012.35	1166.69	1012.35	1166.69	1012.35
B	1990 Baseline Emissions	957.03	1012.35	950.91	1012.35	950.91	1012.35	950.91	1012.35	950.91	1012.35
C	Pre-1990 Non-Creditable Reductions (FMVCP Program)	0.00	0.00	69.18	48.42	64.47	35.65	66.60	39.70	66.50	40.30
D	1990 Adjusted Baseline Emissions	957.03	1012.35	881.73	963.93	886.44	976.70	884.31	972.65	884.41	972.05
E	ROP % Reduction Required (from 1990 Adjusted Baseline)	**0.00**		**15.00**		**33.00**		**42.00**		**48.00**	
F	ROP Required VOC Emission Target Levels	**957.03**		**749.47**		**593.91**		**512.90**		**459.89**	
G	Controlled Point Emissions	238.03	485.90	140.87	154.13	149.01	94.00	156.27	85.26	162.13	93.63
H	Controlled Area Emissions	285.76	53.24	215.28	29.58	225.15	29.58	234.03	29.77	238.40	30.14
I	Controlled Non -road Emissions	136.58	140.81	138.40	202.08	106.70	220.65	93.23	217.72	83.51	212.72
J	Controlled On-Road Emissions	296.66	332.40	206.52	302.92	135.49	229.27	94.59	178.73	89.83	165.12
K	Controlled Total Emission Levels	**957.03**	**1012.35**	**701.07**	**688.71**	**616.35**	**573.50**	**578.12**	**511.48**	**573.87**	**501.61**
L	Emission Reduction from 1990 Adjusted Baseline	0.00	0.00	180.66	275.22	270.09	403.20	306.19	461.17	310.54	470.44
M	% Reduction From 1990 Adjusted Baseline	0.00	0.00	20.49	28.55	30.47	41.28	34.62	47.41	35.11	48.40
N	ROP % Reduction Achieved (%VOC +% Allowed Nox Reduction)	**0.00**		**20.49**		**71.75**		**82.04**		**83.51**	
O	NOX Substitution Available (and its VOC-Equivalent)		0.00		0.00	365.94	403.20	419.28	461.17	428.03	470.44
P	VOC- Equivalent Controlled Emission Levels	**957.03**		**701.07**		**250.41**		**158.84**		**145.84**	
Q	Difference Between VOC Targets and Equivalent Controlled Emissions	0.00		48.40		343.50		354.06		314.05	

Table 30
Comparison of Emission Targets to Emission Projections
Philadelphia Non-attainment Area (New Jersey Portion)

ROW		1990		1996		2002		2005	
		Inventory		Actual		Projected		Projected	
		VOC	NOx	VOC	NOx	VOC	NOx	VOC	NOx
		tpd	tpd	tpd	tpd	tpd	tpd	tpd	tpd
A	1990 Base Year Emissions	561.35	445.64	561.35	445.64	561.35	445.64	561.35	445.64
B	1990 Baseline Emissions	358.15	445.64	356.59	445.64	356.59	445.64	356.59	445.64
C	Pre-1990 Non-Creditable Reductions (FMVCP Program)	0.00	0.00	21.17	19.87	14.28	20.81	18.19	25.26
D	1990 Adjusted Baseline Emissions	358.15	445.64	335.42	425.77	342.31	424.83	338.40	420.38
E	ROP % Reduction Required (from 1990 Adjusted Baseline)	**0.00**		**15.00**		**33.00**		**42.00**	
F	ROP Required VOC Emission Target Levels	**358.15**		**285.11**		**229.35**		**196.27**	
G	Controlled Point Emissions	111.68	278.34	28.73	94.46	30.42	84.69	31.83	71.34
H	Controlled Area Emissions	97.27	11.40	72.36	7.86	76.34	7.85	79.42	7.89
I	Controlled Non-road Emissions	45.76	40.69	41.96	52.21	33.31	55.30	29.62	54.12
J	Controlled On-Road Emissions	103.45	115.21	82.70	112.94	61.63	86.15	42.65	66.03
K	Controlled Total Emission Levels	**358.16**	**445.64**	**225.75**	**267.47**	**201.70**	**233.99**	**183.52**	**199.38**
L	Emission reduction from 1990 Adjusted Baseline	0.00	0.00	109.67	158.30	140.61	190.84	154.88	221.00
M	% Reduction From 1990 Adjusted Baseline	0.00	0.00	32.70	37.18	41.08	44.92	45.77	52.57
N	ROP % Reductions Achieved (%VOC + % ALLOWED NOX reduction)	**0.00**		**32.70**		**86.00**		**98.34**	
O	NOX Substitution Allowed(and its VOC-Equivalent	**0.00**	0.00	**0.00**	0.00	153.77	190.84	177.90	221.00
P	VOC- Equivalent Controlled Emission Levels	**358.16**		**225.75**		**47.93**		**5.62**	
Q	Difference Between VOC Targets and Equivalent Controlled Emissions	0.00		59.36		181.42		190.65	

B. Contingency Measures

42 U.S.C. §7511a(c)(9) and 7502(c)(9)require states to include contingency plans in their SIP revisions. These measures are to be implemented with no further action from the state should and area fail to attain the ROP percentage reduction requirement. The USEPA requires that the continency measures account for one year's worth of rate-of-progress reductions, or 3% of the 1990 Adjusted Baseline VOC Emission Inventory for the particular projection year.[86] The USEPA also allows for the substitution of NO_x reductions for VOC reductions in the continency measure plans. However, the USEPA requires that at least 0.3% of the 3% reduction be VOC emission reductions.[87] Furthermore, the USEPA also allows the use of emission reductions from the early implementation of strategies to be used for contingency measure reduction.[88]

A comparison of the percentage VOC and NO_x emission reductions available (see Row M of Tables 29 and 30) to the ROP percentage required in Row E indicates that more than sufficient reductions are available to meet the 0.3 % and 2.7% required for contingency measures.

Using the VOC and NO_x data in Row D of Tables 29 and 30 the 0.3% VOC and 2.7% NO_x contingency requirements are shown below in Table 31. The measures used for contingency planning purposes are the New Jersey Consumer/Commercial Product rules and the New Jersey NO_x Budget Program. The emissions benefits available and used from these control measures are also shown in Table 31.

[86] 57 Fed. Reg. 13498 (April 16, 1992).

[87] Memorandum from Michael H. Shapiro to Region Air Directors entitled "Guidance on Issues Related to 15% Rate-of-Progress Plans", dated August 23, 1993.

[88] Memorandum from Gary T. Helms, Chief, Ozone/Carbon Monoxide Branch, entitle "Early Implementation of Contingency Measures for Ozone and Carbon Monoxide (CO) Nonattainment Areas", dated August 13, 1993.

Table 31
Contingency Measures Summary

	2002		2005		2007	
	VOC	**NO_x**	**VOC**	**NO_x**	**VOC**	**NO_x**
New Jersey Portion of New York Area						
3% VOC Contingency	26.59	N/A	26.53	N/A	26.53	N/A
Contingency Requirement (0.3% VOC, 2.7% NO_x)	0.27	26.37	0.26	26.26	0.26	26.25
Excess VOC Reduction Used from the NJ Commercial/Consumer Product Rules (Available)	0.27 (5.06)	N/A	0.26 (5.16)	N/A	0.26 (5.23)	N/A
Excess NO_x Reduction from the NJ NO_x Budget Program (Available)	N/A	26.37 (62.07)	N/A	26.26 (103.73)	N/A	26.25 (133.11)
New Jersey Portion of Philadelphia Area						
3% VOC Contingency	10.27	N/A	10.15	N/A	N/A	N/A
Contingency Requirement (0.3% VOC, 2.7% NO_X)	1.03	9.24	1.02	9.13	N/A	N/A
Excess Reductions Used from the NJ Commercial/Consumer Product Rules (Available)	1.03 (1.47)	N/A	1.02 (1.50)	N/A	N/A	N/A
Excess NO_x Reduction from the NJ NO_x Budget Program (Available)	N/A	9.24 (13.69)	N/A	9.13 (33.66)	N/A	N/A

V. Conformity

A. General Conformity – McGuire Air Force Base (AFB)

Since the promulgation of the USEPA's general conformity rule, several federal agencies have consulted the NJDEP regarding actions they were considering, and the emission budgets they must meet. In general, the projected emission increases and decreases resulting from these projects have been more than adequately covered by the emission growth projected in the SIP. One of the actions discussed with the NJDEP was the increase in activity at McGuire AFB due to the 1995 Base Realignment and Closure Act. In order to ensure that any increases in activity at McGuire AFB conform with the SIP and the general conformity rule, the emission budgets for McGuire AFB for 1990, 1996 and 1999, were established, in cooperation with the United States Air Force.[89] [90] In this document, the general conformity emissions budget for McGuire AFB is being extended to 2002 and 2005 (Table 32).

Table 32
Emission Budgets for McGuire Air Force Base

	VOC (Tons/Year)	NO_x (Tons/Year)
1990 Baseline	1,112	1,038
1996	1,186	1,107
1999	1,223	1,142
2002	1,405	875
2005	1,406	884

B. Transportation Conformity

This section updates the transportation conformity emission budgets previously established for the attainment years 2005 and 2007 [91] for the appropriate Metropolitan Planning Organizations (MPOs) in New Jersey. As discussed in Section IV.B.5, New Jersey's twenty-one counties fall into one of three MPOs. The geographic area covered by each MPO is illustrated by Figure 10 of that same section. Each MPO is responsible for the Transportation Plans and Transportation Improvement Programs (TIPs) for its designated area, and they each work in consultation with the NJDEP and NJDOT to meet established transportation emission budgets for their area. In line with the MPO structure, transportation conformity budgets are established for the entire MPO area, which, in all cases, does not coincide fully with the associated non-attainment area. For example, the NJTPA MPO includes the 13 northernmost counties in New Jersey; however, the New York non-attainment area includes only 12 of these counties (Warren county is part of the Allentown/Bethlehem/Easton non-attainment area). Figure 1 in Section II above illustrates the various 1-hour ozone non-attainment areas for New Jersey. Budgets for a non-attainment area can be created by adding or subtracting the onroad emissions from individual counties.

New Jersey has two remaining non-attainment areas, i.e., the New York and Philadelphia non-attainment areas, which must come into attainment by a date certain. As explained in Section II. B. above, these two areas have different classifications based on the severity of their ozone problem. Each classification has a

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[89] McGuire Air Force Base Conformity Determination. July, 1995.

[90] NJDEP, 1996, State Implementation Plan (SIP) Revision for the Attainment and Maintenance of the Ozone National Ambient Air Quality Standards, Phase I Ozone SIP Submittal, p. 123

[91] The State of New Jersey Department of Environmental Protection, State Implementation Plan (SIP) Revision for the Attainment and Maintenance of the One-Hour Ozone National Ambient Air Quality Standard, Update to Meeting the Requirements of the Alternative Ozone Attainment Demonstration Policy-Additional Emission Reduction Commitment and Transportation Conformity Budgets, April 26, 2000.

different attainment year requirement associated with it. As such, the applicable attainment year varies for each transportation planning area depending on the non-attainment area with which it is associated. Specifically, the attainment year for the Delaware Valley Regional Planning Commission (DVRPC) area and the South Jersey Transportation Planning Organization (SJTPO) area is 2005 and the attainment year for the North Jersey Transportation Planning Authority (NJTPA) area is 2007.

In its April 26, 2000 Attainment Demonstration SIP, the State established transportation conformity budgets for the attainment years relevant to each MPO. The control measures assumed in the development of the highway on-road emissions and transportation conformity budgets herein for 2002, 2005, and 2007 in this ROP SIP are listed in Table 4 in Section IV.A.3. In addition, the State has secured updated data[92] on vehicle age and VMT usage patterns in New Jersey and incorporated that data into its Mobile 5a-h modeling runs for 2002, 2005, and 2007. Finally, the emission estimates provided herein reflect the addition of an emissions penalty from the use of heavy-duty diesel engines with defeat devices that disengage the engine's emission control system during highway driving, as well as the benefits from new heavy duty diesel engine standards.

The highway on-road source control measures assumed in these budgets, with the exception of the Tier 2 Motor Vehicle Standard/Low Sulfur Gasoline Program, are consistent with those utilized in New Jersey's attainment demonstration for the one-hour ozone standard.[93] The USEPA's review of New Jersey's attainment demonstration concluded that additional emission reductions from the USEPA Tier 2 Motor Vehicle Standard/Low Sulfur Gasoline Program, as well as from other measures not yet defined, would be needed to more fully insure attainment in both the New York and Philadelphia non-attainment areas by the applicable attainment dates.[94] The emission reductions benefits anticipated from the implementation of the Tier 2 Motor Vehicle Standard/Low Sulfur Gasoline Program were calculated and incorporated in the 2005 and 2007 transportation conformity budgets.[95] New Jersey and the other states in the Ozone Transport Region (OTR) are currently researching various other control measures, involving on-road and other source sectors, which may be used to make up the emission shortfalls defined by the USEPA. Although some of the measures chosen for implementation may involve the highway on-road sector, no final decisions have been made yet concerning the use of these measures, and as such no additional on-road control measures were incorporated in these budgets.

The emission reduction benefits from the control measures listed in Table 4 were estimated using a combination of Mobile 5a-h model runs and off-model calculations. The approach used is described in detail in Appendix II: Section V. The on-road source emission projections resulting from the control measures in Table 4, the new vehicle age and use patterns, and the heavy-duty defeat devices are presented, by MPO, in Table 33. These emission projections are being established as the updated transportation conformity budgets.

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[92] Polk Data Report, October, 2000.

[93] New Jersey SIP Revision, Meeting the Requirements of the Alternative Ozone Attainment Demonstration Policy - Phase II Ozone Submittal, August 31, 1998.

[94] 64 Fed. Reg. 70380, December 16, 1999.

[95] The State of New Jersey Department of Environmental Protection, State Implementation Plan (SIP) Revision for the Attainment and Maintenance of the One-Hour Ozone National Ambient Air Quality Standard, Update to Meeting the Requirements of the Alternative Ozone Attainment Demonstration Policy-Additional Emission Reduction Commitment and Transportation Conformity Budgets, April 26, 2000.

Table 33
New Transportation Conformity Budgets by MPO

Transportation Planning Area	VOC Emissions (tons per day)			NO_x Emissions (tons per day)		
	2002	2005	2007	2002	2005	2007
North Jersey Transportation Planning Authority (NJTPA)	140.15	98.11	93.20*	240.19	187.70	175.51*
South Jersey Transportation Planning Organization (SJTPO)	17.49	13.36*	NA	33.02	26.42*	NA
Delaware Valley Regional Planning Commission (DVRPC)	55.28	38.03*	NA	73.05	55.62*	NA

* denotes the attainment year budget

Table 34 provides a comparison of the new transportation conformity budgets in Table 33 for the attainment years with the conformity budgets previously established by the State in its April 26, 2000 Attainment Demonstration SIP Revision.[96] The new estimates generally show an increase in both the VOC and NO_x emission budgets relative to the prior SIP budgets, except for the DVRPC 2005 NO_x budget which decreases. The increases are primarily due to the effect of heavy-duty diesel engine defeat devices and the newer vehicle age and VMT distributions. MPOs will be required to incorporate these effects into their transportation planning and improvement conformity estimates.

Table 34
Comparison of New Transportation Conformity Budgets to Prior Budgets for the Attainment Years

Transportation Planning Area	Attain-ment Year	VOC Emissions (tons per day)		NO_{x20} Emissions (tons per day)	
		Prior SIP Budgets	New Budgets	Prior SIP Budgets	New Budgets
North Jersey Transportation Planning Authority (NJTPA)	2007	78.25	93.20	171.96	175.51
South Jersey Transportation Planning Organization (SJTPO)	2005	10.23	13.36	24.88	26.42
Delaware Valley Regional Planning Commission (DVRPC)	2005	32.29	38.03	58.56	55.62

[96] Update to Meeting the Requirements of the Alternative Ozone Attainment Demonstration Policy - Additional Emission Reduction Commitment and Transportation Conformity Budgets.

Regarding transportation conformity budgets, it should be noted that in its proposed approval of New Jersey's One-Hour Ozone Demonstration[97], the USEPA required three efforts by New Jersey related to conformity budgets;

(1) to revise its transportation conformity budgets to reflect the Tier 2 Vehicle Standard/Low Sulfur Gasoline Program, which the State did in its April 26, 2000 SIP revision,

(2) to recalculate its transportation conformity budgets, if any of the new control measures required by October, 2001 pertain to motor vehicles, which the State has committed to do, and

(3) to revise its transportation conformity budgets again when the Mobile 6 model is available for SIP usage, which the State has also committed to do.

In committing to item (3), it was New Jersey's understanding that the major emission estimate issues involving onroad emissions would be consolidated into the Mobile 6 effort. Therefore, the transportation conformity budgets proposed at this time represent an intermediate step prior to the use of Mobile 6 to establish consistency between SIP and transportation conformity emission estimates. However, they reflect only certain emission estimation issues, such as a new vehicle VMT mix that reflects an increase in SUV use, that tend to increase emissions. It is the State's understanding that other issues that would tend to decrease emissions, such as longer catalyst operating lifetimes, will be incorporated into the Mobile 6 model. The net effect of all such changes may reduce the budgeted emissions in Table 33.

Finally, from an air quality perspective for purposes of insuring progress toward the 1-hour ozone standard and preparing for a new, stricter, 8-hour ozone standard, it should be noted that the State is attempting to preserve future air quality benefits from technological advances.

Toward that end, in its April 26, 2000 attainment demonstration SIP revision, the State proposed an enforceable transportation conformity policy under which the incremental emissions benefits (beyond that achieved in the attainment years) from the Tier II Motor Vehicle Standard/Low Sulfur Gasoline Program would be divided equally, with up to 50 percent of that benefit available for use for conformity determinations, and the remaining 50 percent set aside for future air quality needs. In proposing this policy, it was anticipated that adherence to the State's new land use policies and the State Development and Redevelopment Plan (SDRP) would reduce the rate of growth for vehicle miles traveled throughout New Jersey. Therefore, it was anticipated that the full benefit of the Tier II Motor Vehicle Standard/Low Sulfur Gasoline Program would not be needed to accommodate transportation growth. The USEPA has not yet taken action on this proposal.

[97] 64 Fed.Reg. 70380, December 16, 1999.

VI. Public Participation

The announcement on the proposed revision to New Jersey's Ozone State Implementation Plan (SIP), specifically the New Jersey 1996 Actual Emission Inventory and Rate of Progress (ROP) Plan for 2002, 2005, and 2007, appeared in approximately six (6) newspapers throughout the state on or before January 12, 2001. In addition, it appeared as a Miscellaneous Notice in the New Jersey Register on February 5, 2001. The proposed SIP was transmitted to the USEPA Region II Administrator on December 29, 2000. It was sent to the states within the Ozone Transport Region and other interested parties on or before January 12, 2001.

The Public Hearing on this proposed SIP Revision took place on February 16, 2001, at 10 A. M. in the Public Hearing Room at the New Jersey Department of Environmental Protection, at 401 E. State Street in Trenton, NJ. The Notice of Availability of the SIP Revisijon and Hearing Date and Location is provided in Attachment III to this document. In addition, the NJDEP held a workshop at the same building location, but the 7th floor Large Conference Room, on February 14, 2001, beginning at 1:00 PM, on the ROP SIP and new control measures under consideration.

The comment period closed on February 20, 2001.

Appendix III has been updated to include the legal notice, the State's response to comment document and verification that the advertisement did occur in compliance with 40 CFR 51.102.