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

8-Hour Ozone Attainment Demonstration
Proposal

June 15, 2007

Preface

New Jersey is proposing this document as a revision to its State Implementation Plan. This document proposes a plan for how the State will come into attainment with the health based 8-hour ozone National Ambient Air Quality Standards (NAAQS) by its attainment date of June 15, 2010. The proposed plan for attainment contained in this document conforms to the United States Environmental Protection Agency's (USEPA) guidance and rulemaking with respect to 8-hour ozone attainment.

Acknowledgements

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In particular, the NJDEP wishes to specially acknowledge the Maryland Department of the Environment for its assistance with the attainment demonstration. NJDEP would also like to acknowledge the many individuals within the New Jersey Department of Transportation, the North Jersey Transportation Planning Authority, the Delaware Valley Regional Planning Commission, the South Jersey Transportation Planning Organization, the United States Environmental Protection Agency Region II, the Connecticut Department of Environmental Protection, the New York State Department of Environmental Conservation, the Pennsylvania Department of Environmental Protection, the Delaware Department of Natural Resources and Environmental Control, the Virginia Department of Environmental Protection, the New Hampshire Department of Environmental Quality, the North Carolina Department of Environment and Natural Resources, the Georgia Department of Natural Resources, the University of Maryland, the Ozone Transport Commission, the Mid-Atlantic Region for Air Management Association, Mid-Atlantic/Northeast Visibility Union, the Ozone Research Center at the University of Medicine and Dentistry of New Jersey/Rutgers University, Northeast States for Coordinated Air Use Management, and the staff within the NJDEP for their assistance and guidance.

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Acronyms and Abbreviations

ACT	Alternative Control Techniques
AEL	Alternative Emission Limit
AIM	Architectural and Industrial Maintenance
APA	Administrative Procedures Act
APCA	Air Pollution Control Act
ATPZEV	Advanced Tech Partial Zero Emission Vehicle
ATV	All Terrain Vehicle
BACT	Best Available Control Technology
BART	Best Available Retrofit Technology
BMPs	Best Management Practices
BOTW	Beyond on the Way
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CAAAC	Clean Air Act Advisory Committee
CAIR	Clean Air Interstate Rule
CARB	California Air Resources Board
CASAC	Clean Air Scientific Advisory Committee
C.F.R.	Code of Federal Regulations
CM	Control Measures
CMAQ	Congestion Mitigation and Air Quality
CTGs	Control Technique Guidelines
DV	Design Value
DV_{AT}	Design Value Adjusted for Transport
DV_{B}	Observed Design Value
DV_{Balt}	Alternate Modeling Baseline Design Value
DV_{F}	Modeled Design Value
DV_{Falt}	Modeled Alternate Baseline Design Value
$DV_{Falt\text{-}r}$	Modeled Alternate Baseline Design Value and the Maximum Response RRF
DVMT	Daily Vehicle Miles Traveled
DVRPC	Delaware Valley Regional Planning Commission
EGAS	Economic Growth Analysis System
EGU	Electric Generating Unit
EMP	Energy Master Plan
FCC	Fluid Catalytic Cracking
FCCU	Fluid Catalytic Cracking Unit
FIP	Federal Implementation Plan
FMVCP	Federal Motor Vehicle Control Program
FNL	Federal Direct Final Rule
Fed. Reg.	Federal Register
FSEL	Facility-Specific Emission Limit
GHG	Greenhouse Gas
GMF	Glass Manufacturing Furnace
HAP	Hazardous Air Pollutant
HDDE	Heavy Duty Diesel Engine

HDDV	Heavy Duty Diesel Vehicle
HEDD	High Electrical Demand Day
hp	Horsepower
IAQR	Interstate Air Quality Rule
ICE	Internal Combustion Engine
ICI	Industrial/Commercial/Institutional
I/M	Inspection and Maintenance
LAER	Lowest Achievable Emission Rate
lbs	Pounds
LDAR	Leak Detection and Repair
LEV	Low Emission Vehicle
LNB	Low NO_x Burner
MACT	Maximum Available Control Technology
MANE-VU	Mid-Atlantic/Northeast Visibility Union
MARAMA	Mid-Atlantic Regional Air Management Association
MERR	Mobile Equipment Repair and Refinishing
MM5	Mesoscale Meteorological Model
MMBtu	Million British Thermal Units
MSW	Municipal Solid Waste
MW	Megawatt
MWRPO	Midwest Regional Planning Organization
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MPO	Metropolitan Planning Organization
MWC	Municipal Waste Combustor
MWRPO	Midwest Regional Planning Organization
MY	Model Year
NAA	Nonattainment Area
NAAQS	National Ambient Air Quality Standards
NEI	National Emissions Inventory
NESCAUM	Northeast States for Coordinated Air Use Management
NH_3	Ammonia
N.J.A.C.	New Jersey Administrative Code
NJDEP	New Jersey Department of Environmental Protection
NJDOT	New Jersey Department of Transportation
NJEMS	New Jersey Environmental Management System
NJLEV	New Jersey Low Emission Vehicle
NJTPA	North Jersey Transportation Planning Authority
NJR	New Jersey Register
N.J.S.A.	New Jersey Statutes Annotated
NLEV	National Low Emission Vehicle Program
NMHC	Non-methane Hydrocarbon
NMOG	Non-methane Organic Gases
NNSR	Nonattainment New Source Review
NO_x	Oxides of Nitrogen
NSPS	New Source Performance Standard
NSR	New Source Review
NTE	Not-To-Exceed

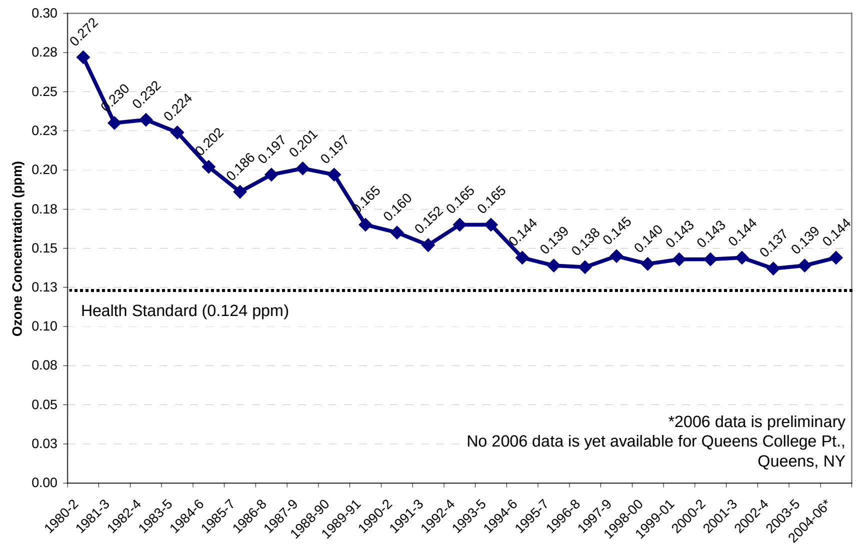
NYSDEC	New York State Department of Environmental Conservation
OBD	On-Board Diagnostics
ORVR	Onboard Refueling Vapor Recovery
OTAG	Ozone Transport Assessment Group
OTB	On the Books
OTC	Ozone Transport Commission
OTR	Ozone Transport Region
OTW	On the Way
PAMS	Photochemical Assessment Monitoring Station
PFC	Portable Fuel Container
$PM_{2.5}$	Fine Particulate Matter (particles with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers)
PM_{10}	Particles with an aerodynamic diameter less than or equal to a nominal 10 micrometers
POTW	Publicly Owned Treatment Works
PPAQ	Post Processor of Air Quality
ppb	Parts per billion
ppm	Parts per million
ppmvd	Parts per million by volume dry basis
PSD	Prevention of Significant Deterioration
PTE	Potential to Emit
PZEV	Partial Zero Emission Vehicle
QA/QC	Quality Assurance/Quality Control
RACM	Reasonably Available Control Measure
RACT	Reasonably Available Control Technology
RBLC	RACT/BACT/LAER Clearinghouse
RE	Rule Effectiveness
RFG	Reformulated Gasoline
RFP	Reasonable Further Progress
RGGI	Regional Greenhouse Gas Initiative
RICE	Reciprocating Internal Combustion Engine
ROP	Rate of Progress
RPO	Regional Planning Organization
RRF	Relative Reduction Factor
RRF	Resource Recovery Facility
SCC	Source Classification Code
SCR	Selective Catalytic Reduction
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SJTPO	South Jersey Transportation Planning Organization
SMOKE	Sparse Matrix Operator Kernel Emissions
SNCR	Selective Non-Catalytic Reduction
SO_2	Sulfur Dioxide
SO_x	Oxides of Sulfur
SOTA	State of the Art
SUV	Sport Utility Vehicle
TBD	To Be Determined
TCM	Transportation Control Measure

TDM	Travel Demand Model
TOC	Technical Oversight Committee
tpd	Tons per day
tpy	Tons per year
TSD	Technical Support Document
TTN	Technology Transfer Network
TRB	Transportation Research Board
USEPA	United States Environmental Protection Agency
USDOE	United States Department of Energy
USDOT	United States Department of Transportation
VISTAS	Visibility Improvement State and Tribal Association of the Southeast
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound
ZEV	Zero Emission Vehicle

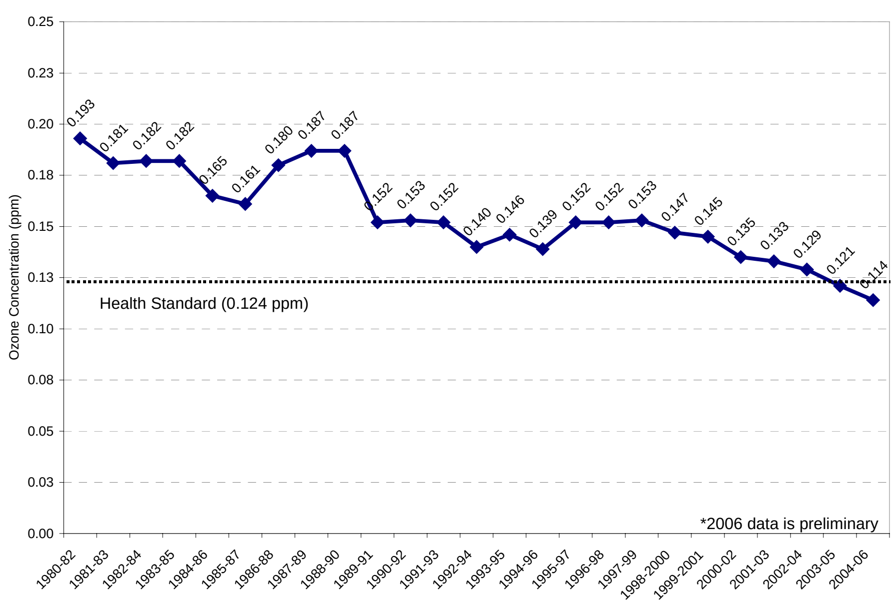
Executive Summary

Ozone continues to be New Jersey's most pervasive air quality problem. Although the ozone found in the earth's upper atmosphere (stratosphere) forms a protective layer from the sun's ultraviolet radiation, the ozone formed near the earth's surface (troposphere) is inhaled by or comes into contact with people, animals, crops and other vegetation, and can cause a variety of health and other effects. As shown by Figures ES.1 and ES.2, New Jersey and its multi-state nonattainment areas have made great strides over the years in reducing its ozone levels, as evident by the fact that much of New Jersey is now meeting the revoked 1-hour ozone health standard.

<u>Figure ES.1</u>: Design Values for the 1-Hour Ozone New York Nonattainment Area, 1982-2006



<u>Figure ES.2</u>: Design Values for the 1-Hour Ozone Philadelphia Nonattainment Area, 1982-2006



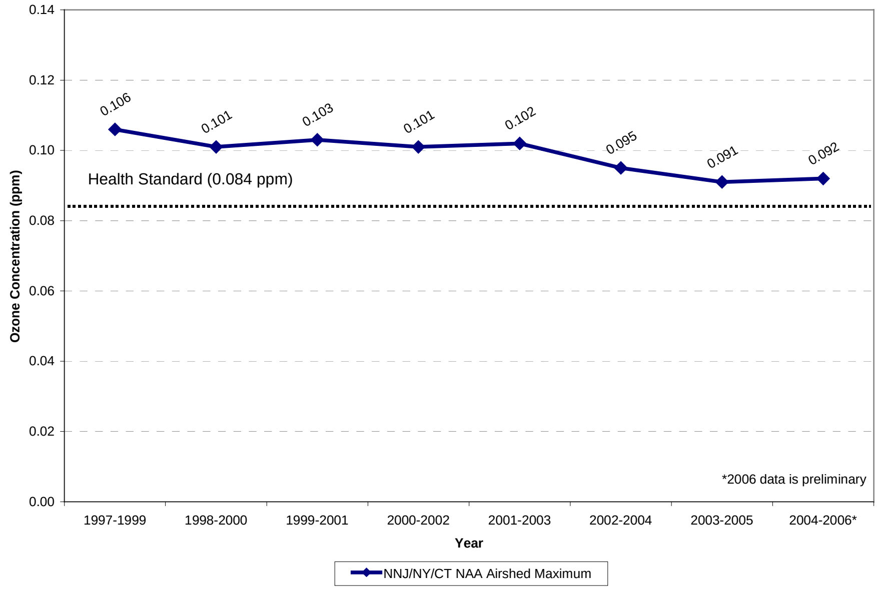
In 1997, the United States Environmental Protection Agency (USEPA) revised the national health standard for ozone, establishing an 8-hour ozone health standard that was more protective of human health and welfare. Figures ES.3 and ES.4 show that the entire State of New Jersey is designated as nonattainment for the 8-hour ozone standard. New Jersey is divided between two 8-hour multi-state nonattainment areas:

- the northern half of the State is associated with the New York City metropolitan area, NY and portions of Connecticut; and,

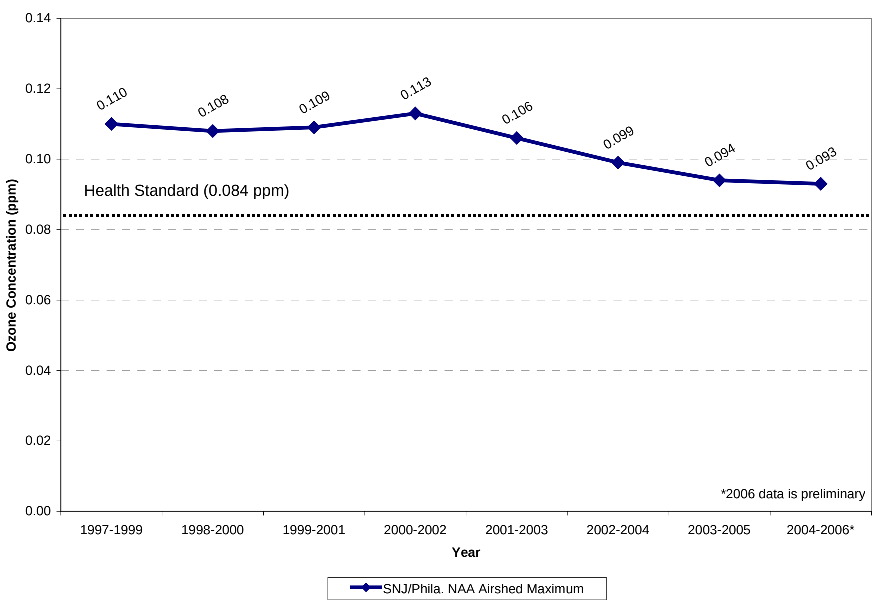
- the southern half of the State is associated with the Philadelphia metropolitan area, PA, all of Delaware and a portion of Maryland.

Figure ES.5 shows New Jersey's two 8-hour multi-state nonattainment areas. Both of New Jersey's associated 8-hour nonattainment areas are classified as moderate, giving them an attainment date of June 15, 2010 (and requiring that their attainment demonstrations be submitted to the USEPA by June 15, 2007). The core of this proposed SIP revision is New Jersey's demonstration that its two multi-state 8-hour ozone nonattainment areas will attain the 8-hour ozone National Ambient Air Quality Standard (NAAQS) by June 15, 2010. The remainder of the proposed SIP revision addresses the other mandatory SIP elements for 8-hour ozone (with the exception of a Reasonable Available Control Technology (RACT) analysis, which was proposed on February 2, 2007 and was submitted to the USEPA separately).

<u>Figure ES.3</u>: NNJ/NY/CT Nonattainment Area 8-Hour Ozone Design Values, 1999-2006

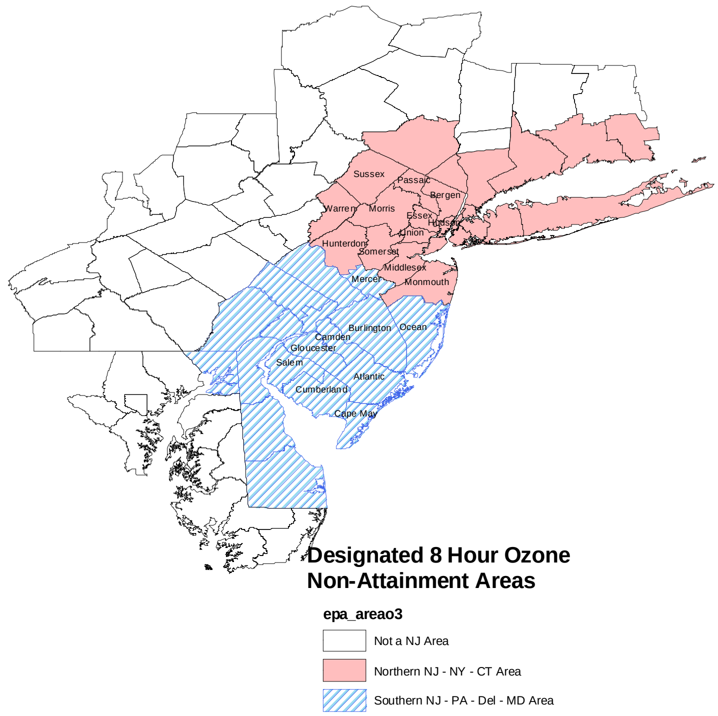


<u>Figure ES.4</u>: SNJ/Phila. Nonattainment Area 8-Hour Ozone Design Values, 1999-2006



Specifically, the primary components of the SIP revision proposal include:

Figure ES.5: New Jersey-Associated 8-hour Ozone Nonattainment Areas



Attainment Demonstration:

New Jersey presents a plausible demonstration that its two multi-state nonattainment areas will attain the 8-hour ozone health standard by June 15, 2010. New Jersey's attainment demonstration is primarily based on photochemical air quality simulation modeling that includes the implementation of numerous additional control measures prior to the summer of 2009. The demonstration also incorporates the latest scientific information from the University of Maryland that considers some of the uncertainties and biases when using atmospheric models. The 2009 modeled design values were adjusted to account for the fact that the photochemical modeling system used under predicts transport and ozone changes associated with emission reductions. Adjusting the modeling results for the transport benefit and accounting for some uncertainty in the modeling resulted in a range of future design values that demonstrate attainment of the 8-hour ozone standard. Beyond the "transport adjusted" future design values, New Jersey provides additional analytical evidence to further address any uncertainty in the regional photochemical air quality modeling, and to support its claim of attainment, including benefits from additional control measures not captured in the regional modeling. Table ES.1 presents the results for the two controlling monitors in the multi-state nonattainment areas associated with New Jersey. The results indicated that it is plausible for both areas to reach attainment by June 15, 2010.

New Jersey's attainment demonstration relies upon New Jersey and the rest of the Ozone Transport Commission states honoring their commitments to implement the "beyond on the way" control measures contained in the regional 2009 attainment modeling. Therefore, it is important that the USEPA, in reviewing the attainment demonstrations and all other SIP revisions from upwind states, take into consideration the impact on New Jersey's attainment obligations, and insure that other states are doing all that is necessary to help the multi-state nonattainment areas reach attainment as soon as practicable. This SIP proposal reaffirms New Jersey's plan for addressing its transport obligations under 42 U.S.C. § 7410(a)(2)(D)(i) (CAA 110(a)(2)(D)(i)), as outlined

Table ES.1: Demonstration of Attainment at the Controlling Monitors

Site Name - County, State	Site Number	Starting Point	Attainment Modeling Results			Supporting Analyses			
		2009 Modeled Results (DV_F) (ppb)	2009 Modeled Results Adjusted for Transport (DV_{AT}) (ppb)	**Upper and Lower Bound of 2009 DV_{AT} (ppb)**	2009 Modeled Results Adjusted for Transport and Taking Additional Quantifiable Measures Not Modeled into Account	2009 Modeled Results (DV_F) (ppb)	2009 Modeled Results using Alternate Baseline (DV_{Falt}) (ppb)	**2009 Modeled Results using Alternate Baseline and RRF (DV_{Falt-r}) (ppb)**	2009 Modeled Results using Alternate Baseline and RRF and Taking Additional Quantifiable Measures Not Modeled into Account
NNJ/NY/CT Nonattainment Area									
Stratford - FAIRFIELD CO, CT	90013007	90	85	**88 - 82**	88 - 80	90	87	**83**	83 - 81
SNJ/Phila. Nonattainment Area									
Colliers Mills - OCEAN CO, NJ	340290006	92	85	**88 - 81**	88 - 76	92	90	**86**	86 - 81

Note: There are additional non-quantifiable measures that will produce air quality benefits and further reduce these values.

previously in a letter from NJDEP Commissioner Jackson to USEPA Region 2 Regional Administrator Steinberg on December 22, 2005.

New Jersey commits in this proposed SIP to propose and adopt, in accordance with the New Jersey Administrative Procedures Act and the Air Pollution Control Act, all the control measures included in its attainment photochemical modeling. New Jersey further commits to propose and adopt, pursuant to the Administrative Procedures Act and the Air Pollution Control Act, a number of other control measures that were not included in the 2009 attainment modeling, but will result in emission reductions by 2009. New Jersey commits to propose all of these control measures, listed in Table ES.2, by no later than November 2007 and adopt by 2008, in accordance with the New Jersey Administrative Procedures Act (APA) (N.J.S.A. 52:14B-1 et. seq.) and the Air Pollution Control Act (APCA) (N.J.S.A. 26:2C-1 et. seq.).

Table ES.2: State Control Measure Commitments

OTB/OTW Measures
• All measures implemented; no further commitment is necessary
BOTW Measures
• Consumer Products 2009 Amendments
• Portable Fuel Container 2009 Amendments
• Adhesives and Sealants
• Asphalt Paving
• Certain Categories of ICI Boilers
Additional measures to reduce the uncertainty of plausible attainment, and/or provide contingency for attainment*
• Refinery Rules
• New USEPA Control Technique Guidelines (CTGs)
• Case by case VOC and NO_x Emission Limit Determinations
• High Electric Demand Day Program
• Petroleum Storage Tank Rule
• Diesel Idling Rule
• Diesel Inspection and Maintenance Program
• Municipal Waste Combustors Rule
• New Source Review

*** These measures were not included in the regional modeling for 2009.**

The implementation of all of these measures will serve not only to meet New Jersey's obligation that New Jersey's associated nonattainment areas meet their mandatory attainment date, but will insure that New Jersey is not negatively impacting any other area's ability to meet the NAAQS through transported emissions of ozone and its precursors.

New Jersey also commits, as part of this SIP revision, to implement a number of future control measures that will result in emission reductions post-2010. It is important that New Jersey and its neighboring states continue to reduce emissions post-2010, as these longer-term measures provide:

- the regulated community with certainty and more time to identify the necessary funding to install control equipment, modify their products or usage patterns, and/or take other actions to implement pollution prevention strategies; and,
- additional reductions, which would be relied upon should the state not attain by 2010.
- Additional public health protection, especially in view of health scientist and USEPA scientists' recommendation for a more protective ozone NAAQS.

Furthermore, making these additional reductions in air pollution is prudent in providing much needed improved air quality and public health protection as soon as possible and to provide more certainty that the NAAQS will be attained.

Reasonable Further Progress:

As required by 42 U.S.C. §7410(a)(1), this SIP proposal provides a demonstration that New Jersey will more than meet its Reasonable Further Progress (RFP) targets for both 2008 (RFP milestone) and 2009 (attainment) using the same control measures applied in the State's 2009 attainment demonstration. Meeting these milestones will provide incremental progress towards attainment, rather than achieving the majority of emission reductions just before the attainment date.

Reasonably Available Control Measures:

As required by 42 U.S.C. §7502(c)(1), this SIP proposal provides a Reasonably Available Control Measures (RACM) analysis for the ozone precursors of VOC and NO_x. Specifically, the USEPA requires states to implement any technologically and economically feasible measures identified by its RACM analysis that would advance the attainment date by one year. While New Jersey's RACM analysis did identify feasible measures, implementation of those measures would not advance the nonattainment areas' attainment date by one year, to June 15, 2009 (which would require demonstration of attainment by the summer of 2008). Several of the feasible measures identified as part of this analysis (including new requirements for adhesives and sealants, consumer products, aerosol coatings, and truck idling restrictions) are being proposed for implementation by either New Jersey or the federal government to ensure attainment, or better than attainment, for the protection of public health.

Contingency Plans:

Pursuant to 42 U.S.C. §§7502(c)(9) and 7511a(c)(9), New Jersey developed contingency plans that require corrective action in the event that New Jersey misses its 2008 Reasonable Further Progress milestone or fails to attain the NAAQS by the summer of 2009. Each of these plans must provide for an action plan to reduce VOC[1] emissions by 3 percent of the adjusted 2002 base year VOC emissions inventory. New Jersey relies on the "surplus" in emission reductions from New Jersey and Federal control measures implemented between 2002 and 2008, that go beyond the RFP target of 15 percent, to meet its 2008 contingency milestone. For the 2009 attainment contingency milestone, New Jersey relies on those additional measures that were not included in the attainment demonstration modeling, but will result in emission reductions in 2009 and beyond.

[1] The USEPA allows for NOx substitution, so long as 0.3 percent of the 3 percent requirement is met with VOC reductions.

Conformity:

The proposed SIP addresses both transportation and general conformity requirements for the 8-hour ozone NAAQS. With respect to transportation conformity, New Jersey proposes to establish on-road vehicle emission budgets for use by the Metropolitan Planning Organizations. Each of the three Metropolitan Planning Organizations associated with New Jersey[2] must meet these budgets in order to ensure that their plans and programs are in conformance with the SIP. With respect to general conformity, New Jersey proposes to establish emission budgets for use by McGuire Air Force Base and Lakehurst Naval Air Station to ensure that emissions from their operations also conform to the requirements of the SIP.

One-Hour Ozone:

As part of this SIP proposal, New Jersey includes a request that the USEPA make a finding that three (3) of New Jersey's four (4) associated 1-hour nonattainment areas are meeting the 1-hour standard.

Other Components of the proposed SIP:

- Background information and a conceptual discussion on the formation and transport of ozone in the Northeastern United States;
- One-Hour and 8-Hour trends data for New Jersey and its associated multi-state nonattainment areas;
- Detailed descriptions of all the control measures used throughout the proposed SIP;
- A reaffirmation of New Jersey's actions and commitments with respect to transported emissions, as required by CAA 110 (a)(2)(D)(i) (and commonly referred to as the transport SIP requirement);
- A discussion of the likelihood that the USEPA will establish a new, more stringent 8-hour ozone health standard, and New Jersey's current actions to address that future goal; and,
- A summary of all New Jersey's commitments and requests of the USEPA.

[2] The North Jersey Transportation Planning Authority (NJTPA), the South Jersey Transportation Planning Organization (SJTPO) and the Delaware Valley Regional Planning Commission (DVRPC).

1.0 OZONE SIP INTRODUCTION AND BACKGROUND

1.1 Purpose

On June 15, 2004, the United States Environmental Protection Agency (USEPA) finalized attainment/nonattainment designations for the 8-hour ozone National Ambient Air Quality Standards (NAAQS). The entire state of New Jersey is associated with two multi-state nonattainment areas (the Northern New Jersey/New York/Connecticut nonattainment area and the Southern New Jersey/Philadelphia nonattainment area). These designations triggered the Clean Air Act (CAA) requirement, Section 110(a)(1) (42 U.S.C. § 7410(a)(1)), that states submit attainment demonstrations for their nonattainment areas to the USEPA by no later than three years after the promulgation of a NAAQS. USEPA Guidance states that states must submit attainment demonstrations for their nonattainment areas to the USEPA by no later than three years from the effective date of designation.[1] This means that this 8-hour ozone attainment demonstration State Implementation Plan (SIP) is due to USEPA by June 15, 2007. The purpose of this proposed State Implementation Plan (SIP) revision is to meet that requirement by presenting New Jersey's plan for attaining the 8-hour ozone NAAQS by its attainment date of June 15, 2010.

1.2 Background

1.2.1 Clean Air Act

The federal Clean Air Act provides the USEPA with the authority to set primary and secondary standards for criteria air pollutants. The primary standard protects human health, and the secondary welfare standard is designed to protect against any potential environmental and/or property damage. These standards are known as the National Ambient Air Quality Standards, or NAAQS. The criteria pollutants covered by the NAAQS are ozone, sulfur dioxide (SO_2), particulate matter (PM_{10}) and fine particulate matter ($PM_{2.5}$), lead, oxides of nitrogen (NO_x), and carbon monoxide. The 1990 Clean Air Act Amendments furthered the mission to reducing air contaminants nationwide by addressing interstate movement of air pollution, emissions control measures, permits, enforcement, deadlines, and public participation to achieve and maintain those air quality standards.

When an area does not meet the NAAQS for one or more criteria pollutants, the area is subject to the formal rulemaking process by the USEPA, which designates the area as nonattainment for that pollutant. The Clean Air Act further classifies ozone, carbon monoxide, and some particulate matter nonattainment areas based on the magnitude of an area's air quality problem. Nonattainment classifications are used to specify what air

[1] USEPA. Guidance on the Use of Models and Other Related Analyses in Attainment Demonstrations for the 8-Hour Ozone NAAQS. United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Emissions, Monitoring, and Analysis Division, Air Quality Modeling Group, Research Triangle Park, NC, EPA-454/R-05-002, October 2005.

pollution reduction measures an area must adopt, and when the area must reach attainment. The technical details underlying these classifications are discussed in the Code of Federal Regulations, Part 81 (40 C.F.R. Part 81).

Section 179 (42 U.S.C. § 7509) of the Clean Air Act requires automatic sanctions when a state fails to submit a timely and approvable plan or fails to fully implement its commitments. First, the State would face serious economic development constraints. Specifically, the USEPA would order that any proposed new air pollution source in the state secure double the offset of the emissions it might produce before it can be permitted. Second, the state would be exposed to sanctions that could result in the loss of New Jersey's federal transportation funds. These sanctions must be applied unless the deficiency is corrected within 18 months after a finding of failure or disapproval. Additionally, Section 110(c) (42 U.S.C. § 7410) of the Clean Air Act requires that the USEPA impose a federal implementation plan (FIP) if a state fails to complete and submit a revised submission within 24 months of the failure to submit or implement a SIP.

1.3 Ozone National Ambient Air Quality Standards

1.3.1 1-Hour Ozone

In 1971, the USEPA established the NAAQS for ozone of 0.08 parts per million (ppm), measured as a 1-hour average concentration. In 1979, the NAAQS for ozone was revised to 0.12 parts per million (ppm). The 1-hour ozone standard remained 0.12 ppm until 1997 when the USEPA replaced the 1979 standard with an 8-hour standard set at 0.8 ppm[2,3](see Section 1.3.2). The entire State of New Jersey was designated by the USEPA as nonattainment for the 1-hour ozone NAAQS, and was split into four nonattainment areas. The New Jersey counties included in each of those 1-hour nonattainment areas, as well as their classifications under Subpart 2 of the Clean Air Act, is detailed in Table 1.1 in Section 1.3.2.

The Clean Air Act contains two sets of provisions – Subpart 1 and Subpart 2 – which address planning, attainment and control requirements for ozone nonattainment areas.[4] Subpart 1, referred to as "basic" nonattainment, contains general, less prescriptive, requirements for nonattainment areas for any pollutant – including ozone – governed by a NAAQS. Subpart 2 sets forth a classification scheme for ozone nonattainment areas and

[2] USEPA. History of Ground-level Ozone Standards. United States Environmental Protection Agency, http://epa.gov/oar/ozonepollution/history.html. Last updated March 6, 2007.
[3] On June 15, 2005 the 1-hour ozone standard was revoked for all areas except the 8-hour ozone nonattainment Early Action Compact Areas (EAC) areas (those do not yet have an effective date for their 8-hour designations). Source: USEPA. Green Book: 1-Hour Ozone Information. United States Environmental Protection agency, http://www.epa.gov/oar/oaqps/greenbk/oindex.html. Last updated April 9, 2007.
[4] A description of subpart 1 and subpart 2 are found in Title I, part D

provides more specific requirements for ozone nonattainment areas.[5] Under subpart 2, areas are classified based on their ozone design value.[6] Control requirements depend on the subpart 2 classification of the area. Areas with greater levels of ozone pollution are subject to more prescriptive requirements and are given longer to attain the standard. The requirements are designed to bring areas into attainment by their specified attainment dates. For 1-hour ozone, all of the New Jersey-associated nonattainment areas were classified under Subpart 2 of the Clean Air Act.

The State has been successful over the years in reducing ozone levels throughout New Jersey. One-hour ozone design values in New Jersey have declined substantially over time. The maximum 1-hour ozone average concentration recorded in New Jersey in 1988 was 0.218 ppm, compared to a maximum of 0.119 ppm in 2004.[7] In fact, of the 14 ozone monitoring sites that were operated during the 2004 ozone season in New Jersey, none recorded levels above the 1-hour standard of 0.12 ppm during the year. Most recently, all but one New Jersey monitor (at 0.125 ppm) met the 1-hour ozone standard in 2006.

Monitoring data for the 1-hour ozone nonattainment areas associated with Philadelphia and New York City demonstrate that the states within those nonattainment areas have made great progress in reducing ozone precursor levels through the implementation of control strategies, substantially reducing ozone concentrations and exceedances in the region under the 1-hour ozone NAAQS. New Jersey implemented all the measures required by the 1990 Clean Air Act Amendments to meet the 1-hour ozone standard, and has further implemented all the VOC and NO_x reduction strategies committed to under the USEPA's shortfall analysis.[8]

The USEPA revoked the 1-hour ozone standard for all areas except the 8-hour ozone nonattainment Early Action Compact Areas (EAC) areas (which did not include any New Jersey-associated nonattainment areas) on June 15, 2005.[9] This revocation occurred prior to the attainment dates for the two severe 1-hour ozone nonattainment area associated with Philadelphia (2005) and New York City (2007). For more information about the 1-hour ozone standard and revocation, see Chapter 11.

[5] For more information on the subpart 2 classification and requirements see "State Implementation Plans; General Preamble for the Implementation of Title I of the CAA Amendments of 1990; Proposed Rule." April 16, 1992 (57 Fed. Reg. 13498 at 13501 and 13510).
[6] A design value is the monitored reading used by the USEPA to determine an area's air quality status; e.g., for ozone, the fourth highest reading measured over the most recent three years is the design value.
[7] NJDEP. 2004 Ozone Summary, 2004 Air Quality Report. New Jersey Department of Environmental Protection, Bureau of Air Monitoring, 2005.
[8] NJDEP. Mid-Course Review for the New Jersey Portion of the Philadelphia-Southern New Jersey and New York Northern New Jersey 1-Hour Ozone Nonattainment Areas. New Jersey Department of Enivronmental Protection, Bureau of Air Quality Planning, January 2005.
[9] 40 C.F.R. Part 81, Subpart C.

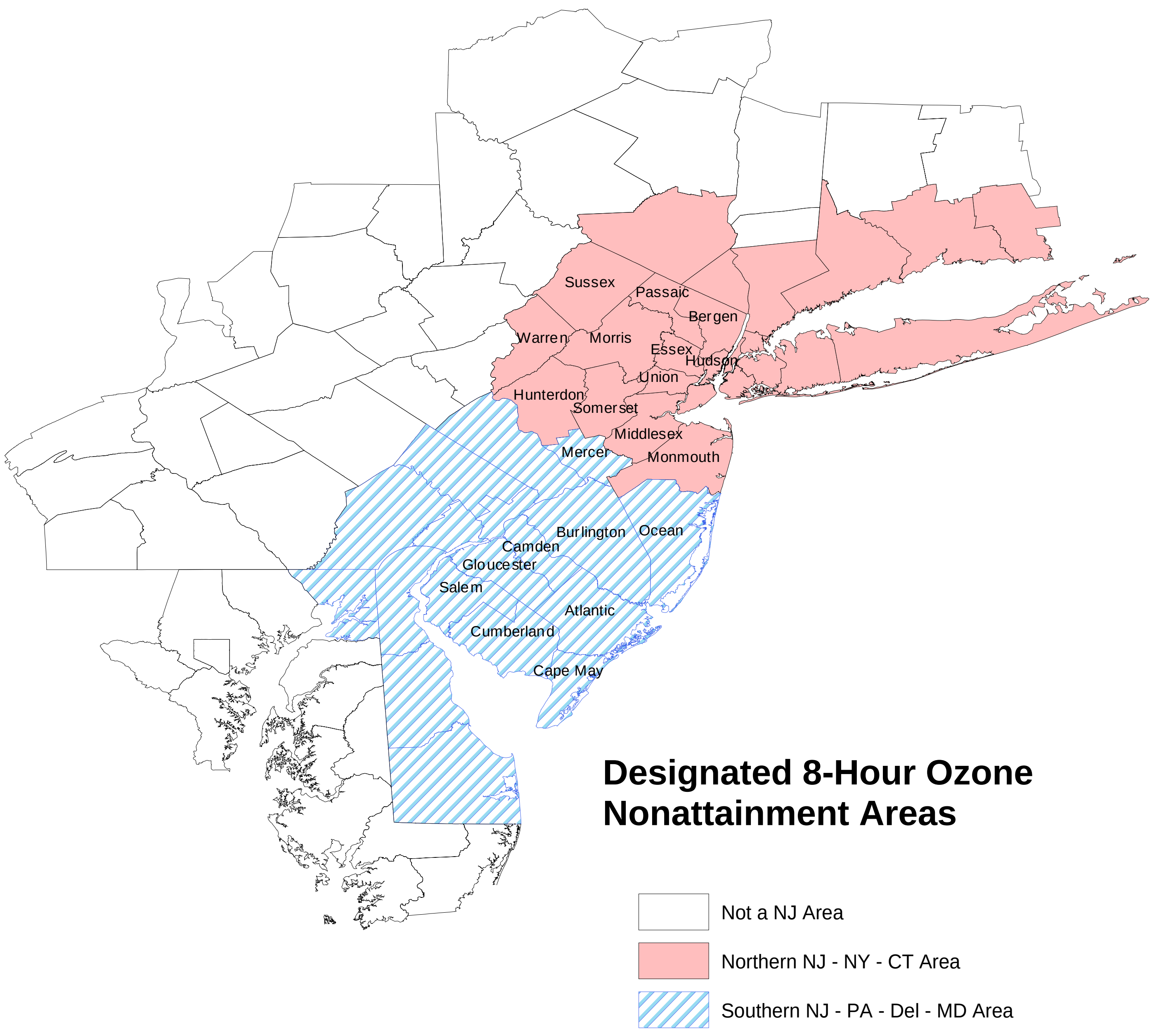
1.3.2 8-Hour Ozone

In 1997, the USEPA revised the NAAQS for ozone, setting it at 0.08 ppm averaged over an 8-hour time frame. The USEPA set the 8-hour ozone standard based on scientific evidence demonstrating that ozone causes adverse health effects at lower ozone concentrations, over longer periods of time, than the then-existing 1-hour ozone standard. The USEPA determined that the new 8-hour standard would be more protective of human health, protecting everyone at risk from ozone exposure, especially children and adults who are active outdoors, and individuals with pre-existing respiratory disease, such as asthma.[10]

In April 2004, the USEPA finalized its attainment/nonattainment designations for areas across the country with respect to the 8-hour ozone standard. These actions took effect on June 15, 2004. The New Jersey counties of Bergen, Essex, Hudson, Hunterdon, Middlesex, Morris, Monmouth, Passaic, Somerset, Sussex, Union and Warren are associated with the New York-Northern New Jersey-Long Island, NY-NJ-CT 8-hour nonattainment area (hereafter referred to as the Northern New Jersey/New York/Connecticut nonattainment area). The New Jersey counties of Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Ocean, Mercer and Salem were associated with the Philadelphia-Wilmington-Trenton, PA-NJ-DE-MD 8-hour nonattainment area (hereafter referred to as the Southern New Jersey/Philadelphia nonattainment area). Figure 1.1 shows the entire multi-state 8-hour ozone nonattainment areas associated with New Jersey.

[10] The USEPA is currently re-evaluating the ozone NAAQS to determine if they continue to be protective of human health and welfare. More information about this re-evaluation process can be found at http://www.epa.gov/ttn/naaqs/standards/ozone/s_o3_cr_sp.html.

Figure 1.1: New Jersey-Associated 8-hour Ozone Nonattainment Areas



Under the USEPA's Phase I 8-hour ozone implementation rule, published on April 30, 2004,[11] an area was classified under Subpart 2 based on its 8-hour design value if it had a 1-hour design value at or above 0.121 ppm (the lowest 1-hour design value in Table 1 of subpart 2).[12] Based on this criterion, both multi-state 8-hour ozone nonattainment areas associated with New Jersey were classified under Subpart 2 as moderate. Table 1.1 compares the New Jersey portion of the 8-hour nonattainment areas and their classifications under Subpart 2 to the New Jersey portion of the 1-hour nonattainment areas and their classifications under Subpart 2. For subsequent action on the Phase I 8-hour ozone implementation rule, see Chapter 11. The USEPA Phase II 8-hour ozone implementation rule, published on November 9, 2005, addressed the control obligations that apply to areas classified under Subpart 2.

[11] 69 Fed. Reg. 23951-24000 (April 30, 2004)

[12] For the 1-hour ozone NAAQS, design value is defined at 40 C.F.R. Part 51.900(c), which states that 1-hour ozone design value is the 1-hour ozone concentration calculated according to 40 CFR part 50, Appendix H and the interpretation methodology issued by the Administrator most recently before the date of the enactment of the CAA Amendments of 1990. For the 8-hour ozone NAAQS, design value is defined at 40 C.F.R. 51.900(d), which states that 8-hour ozone design value is the 8-hour ozone concentration calculated according to 40 CFR part 50, Appendix I.

Table 1.1: New Jersey-Associated Ozone Nonattainment Areas – Designations and Classifications[13]

Area Name	New Jersey 1-Hour County Designations	New Jersey 1-Hour Classifications	New Jersey 8-Hour County Designations	New Jersey 8-Hour Classifications
New York-N. New Jersey-Long Island, NY-NJ-CT	Bergen Essex Hudson Hunterdon Middlesex Morris Monmouth Ocean Passaic Somerset Sussex Union	Severe	Bergen Essex Hudson Hunterdon Middlesex Morris Monmouth Passaic Somerset Sussex Union Warren	Moderate
Philadelphia-Wilmington-Trenton, PA-NJ-DE-MD	Burlington Camden Cumberland Gloucester Mercer Salem	Severe	Atlantic Burlington Camden Cape May Cumberland Gloucester Ocean Mercer Salem	Moderate
Allentown-Bethlehem-Easton, PA-NJ	Warren	Marginal	*	*
Atlantic City, NJ	Atlantic Cape May	Moderate	**	**

* included in the Northern New Jersey/New York/Connecticut nonattainment area
**included in the Southern New Jersey/Philadelphia nonattainment area

1.4 Health Effects and Welfare Impacts

1.4.1 Ozone

Ozone continues to be New Jersey's most pervasive air quality problem. Although the ozone found in the earth's upper atmosphere (stratosphere) forms a protective layer from the sun's ultraviolet radiation, the ozone formed near the earth's surface (troposphere) is inhaled by or comes in contact with people, animals, crops and other vegetation, and can cause a variety of health and other effects. Ozone is a highly reactive gas. In the

[13] 69 Fed. Reg. 23921 (April 30, 2004).

troposphere, it is formed by complex chemical reactions involving oxides of nitrogen (NO_x) and volatile organic compounds (VOC) in the presence of sunlight.

Ozone causes health problems because it damages lung tissue, reduces lung function, and sensitizes the lungs to other irritants. Ozone has long been known to increase the incidence of asthma attacks in susceptible individuals. Ozone exposure also makes the lungs more vulnerable to lung diseases such as pneumonia and bronchitis. Ozone not only affects people with impaired respiratory systems, such as asthmatics, but healthy adults and children as well. Exposure to ozone for several hours at relatively low concentrations significantly reduces lung function and induces respiratory inflammation in normal, healthy people during exercise. This decrease in lung function is generally accompanied by symptoms such as chest pain, coughing, sneezing, and pulmonary congestion. Recent research in southern California strongly suggests that, in addition to exacerbating existing asthma, ozone also causes asthma in children.[14] Longer-term exposure to ozone can also lead to scarring of the lung tissue and permanent reductions in lung capacity.[15] Long-term exposure to ozone can eventually lead to premature death.[16]

Besides its impact on human health, ozone also has environmental impacts. Specifically, ozone interferes with the ability of plants to produce and store food, which makes them more susceptible to disease, insects, other pollutants, and harsh weather. Ozone damages the leaves of trees and other plants, ruining the appearance of cities, national parks, and recreation areas. Ozone reduces crop and forest yields and increases plant vulnerability to disease, pests, and harsh weather. This impacts annual crop production throughout the United States, resulting in significant losses, and injures native vegetation and ecosystems. Ozone also damages certain man-made materials, such as textile, fibers, dyes, and paints, requiring more frequent upkeep and repair.[17]

1.4.2 Ozone Precursor – Oxides of Nitrogen (NO_x)

As stated in Section 1.4, VOCs and NO_x are both precursors to the formation of ozone. Ground level ozone is formed when NO_x and VOCs chemically react in the presence of sunlight. Oxides of nitrogen consist of a mixture of gases comprised mostly of nitric oxide (NO) and nitrogen dioxide (NO_2). These gases are emitted from the exhaust of motor vehicles, the burning of coal, oil or natural gas, and during industrial processes such as welding, electroplating and dynamite blasting. Although most NO_x is emitted as NO, it is readily converted to NO_2 in the atmosphere. NO_2 is a reddish-brown, highly

[14] MARAMA. Appendix A: Health Effects of Air Pollutants, A Guide to Mid-Atlantic Regional Air Quality Report. Mid-Atlantic Regional Air Management Association (MARAMA), October 2005, p. 89.
[15] NJDEP. Proposed Reasonably Available Control Technology (RACT) for the 8-Hour Ozone National Ambient Air Quality Standard (NAAQS) and other Associated State Implementation Plan (SIP) Revisions for the Fine Particulate Matter NAAQS, Regional Haze, and the Clean Air Act Requirements on Transport of Air Pollution. New Jersey Department of Environmental Protection, February 2, 2007.
[16] USEPA. Air Quality Criteria for Ozone and Related Photochemical Oxidants, Volume I of III. United States Environmental Protection Agency, February 2006.
[17] USEPA. Ground-level Ozone – Health and Environment. United States Environmental Protection Agency, http://www.epa.gov/air/ozonepollution/health.html. Last updated November 20, 2006.

reactive gas that is formed in the air through the oxidation of NO.[18] In the troposphere, near the Earth's surface, NO_2, not molecular oxygen, provides the primary source of the oxygen atoms required for ozone formation.

In addition to contributing to the formation of ozone, NO_x is also harmful if directly inhaled. Long-term exposure to elevated levels of NO_x causes damage to the mechanisms that protect the human respiratory tract and can increase a person's susceptibility to, and the severity of, respiratory infections and asthma.[19] Long-term exposure to high levels of NO_x can cause chronic lung disease and may also affect sensory perception. Other health effects of exposure to NO_x include shortness of breath and chest pains.

1.4.3 Ozone Precursor – Volatile Organic Compounds (VOC)

Volatile Organic Compounds (VOCs) are chemicals or mixtures of chemicals that evaporate easily at room temperature. The term *organic* in VOCs indicates that the compounds contain carbon and *volatile* indicates that these compounds react more readily in the atmosphere compared to other compounds.[20] They include compounds known as hydrocarbons, which only contain carbon and hydrogen, and carbonyls, which contain a carbon atom double-bonded to an oxygen atom. VOCs can be found in both indoor and outdoor environments. Some VOCs are more harmful than others. Sources of VOCs include vehicle and industrial exhaust; the evaporation of gasoline; and a variety of consumer products from paints, solvents, adhesives to carpeting, deodorants, cosmetics, cooking, hair products, and cleaning fluids; as well as biogenic (naturally occurring) emissions.

In addition to contributing to the formation of ozone, VOCs are harmful if directly inhaled, dependent upon concentration. Long-term exposure to low concentrations of some VOCs include elevation of serum enzyme levels, mild cellular changes, and changes in lipid metabolism. At higher concentrations, breathing VOCs may cause irritation of the respiratory tract.[21] Acute effects include eye irritation/watering, nose irritation, throat irritation, headaches, nausea/vomiting, dizziness and asthma exacerbation. Chronic effects include cancer, liver damage, kidney damage and central nervous system damage.[22] In addition, several VOCs are also hazardous air pollutants

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[18] NJDEP. 2005 Nitrogen Dioxide Summary, 2005 Air Quality Monitoring Report. New Jersey Department of Environmental Protection, Bureau of Air Monitoring, 2006.

[19] Queensland Government EPA. Nitrogen Oxides. Queensland Government Environmental Protection Agency, Queensland Parks and Wildlife Service, December 31, 2006, http://www.epa.qld.gov.au/environmental_management/air/air_quality_monitoring/air_pollutants/nitrogen_oxides/, accessed January 2, 2007.

[20] The United States Environmental Protection Agency's regulatory definition of *volatile organic compounds* can be found at 40 C.F.R. 51.100(s).

[21] CDPHE. Volatile Organic Compounds Health Effects Fact Sheet. Colorado Department of Public Health and Environment, November 2000, http://www.cdphe.state.co.us/hm/schlage/vocfactsheet.pdf.

[22] MDH. Volatile Organic Compounds – VOCs Fact Sheet. Minnesota Department of Health., http://www.health.state.mn.us/divs/eh/indoorair/voc/, September 2005.

(HAPs).[23] HAPs are substances that cause serious health effects, including cancer, birth defects, nervous system problems and death due to massive accidental releases.[24]

1.4.4 Ozone Related Benefits from Global Warming Initiatives

New Jersey has aggressively taken the lead in doing its part to combat global warming through innovative policies to reduce its carbon footprint and is aggressively pushing for mandatory federal action to combat global climate change.

On February 13, 2007, Governor John S. Corzine signed an Executive Order to adopt proactive and ambitious goals for the reduction of greenhouse gas emissions in New Jersey. The order calls for reducing greenhouse gas emissions to 1990 levels by 2020, approximately a 20 percent reduction, followed by a further reduction of emissions to 80 percent below 2006 levels by 2050. Greenhouse gases include carbon dioxide (CO_2), methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons and fully fluoridated compounds.[25]

New Jersey is playing a leadership role in the Regional Greenhouse Gas Initiative (RGGI), a ten-state cooperative effort to implement a regional mandatory cap-and-trade program in the Northeast and Mid-Atlantic addressing CO_2 emissions from power plants. The first mandatory market-based program to reduce carbon emissions in the U.S., the program will cap regional power plant CO_2 emissions at approximately current levels from 2009 through 2014 and reduce emissions 10% below the initial cap by 2018. A memorandum of understanding was signed on December 20, 2005, outlining the framework of the program. In August 2006, a model regulation was released outlining in detail the cap-and-trade program. Participating RGGI states, including New Jersey, are currently in the process of proceeding with rulemaking to adopt the model regulation in 2007 and 2008.

Other New Jersey initiatives include standards for new automobiles and light trucks, the implementation of renewable portfolio standards, and an Energy Master Plan. On October 3, 2006, Governor Corzine announced the commencement the year-long interagency planning process that will culminate in the energy master plan, a long-term energy vision for the state that plans for the state's energy needs through 2020.[26] The Energy Master Plan will require 20 percent of the electricity used in the State to come from Class One renewable energy sources by the Year 2020 and will reduce future electricity consumption by 20 percent from projected 2020 consumption levels. The plan

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[23] Substances listed in 1990 Clean Air Act Title I, Sec. 112(b)).
[24] USEPA. The Plain English Guide to the Clean Air Act. United States Environmental Protection Agency, Air and Radiation (ANR-443), EPA 400-K-93-001, April 1993.
[25] State of New Jersey Office of the Governor. *Governor Calls for Sweeping Reduction of Greenhouse Gas Emissions in New Jersey*. Available at http://www.nj.gov/governor/news/news/approved/20070213a.html. February 13, 2007.
[26] State of New Jersey Office of the Governor. *Governor Corzine Announces Initial Phase of Energy Master Plan*. Available at http://www.nj.gov/governor/news/news/approved/20061003.html. October 3, 2006.

also calls for the adoption of comprehensive appliance and equipment energy efficiency standards. [27]

These measures will not only reduce greenhouse gas emissions, but will also have supplemental benefits of reducing VOC and NO_x emissions, as well as other air contaminants.

1.5 Summary of this SIP Proposal

The remainder of this proposed SIP revision includes the following:

- A discussion of the nature of the ozone air quality problem in the Northeast
- A summary of the trends in New Jersey's air quality
- A discussion of control measures
- A demonstration of attainment for the year 2010 for both 8-hour nonattainment areas associated with New Jersey
- A Reasonable Further Progress (RFP) analysis
- A Reasonably Available Control Measures (RACM) analysis
- A discussion of contingency measures
- A discussion of the State's obligations in Section 110 of the Clean Air Act
- Transportation and General conformity budgets
- Addressing 1-hour ozone in New Jersey
- Consideration of a new 8-hour ozone health standard
- New Jersey specific declarations and commitments

[27] op. cit., note 25

2.0 NATURE OF THE OZONE AIR QUALITY PROBLEM IN THE NORTHEAST – THE CONCEPTUAL MODEL

In its Phase II ozone implementation rule,[1] the USEPA required states to include in their SIPs a conceptual description of the pollution problem in their nonattainment areas. This section outlines the basics of the ozone problem in the Northeastern United States. As discussed in greater detail in Appendix A, the ozone problem throughout this region is a product of both locally generated emissions, and those emissions released upwind of an area and transported over time to the area of concern. By understanding how ozone is formed and transported throughout the area, state air agencies have a foundation for how to effectively address the problem in the allotted timeframe.

The Ozone Transport Region (OTR) of the eastern United States covers a large area that is home to over 62 million people living in Connecticut, Delaware, the District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and northern Virginia. Each summer, the people who live within the Ozone Transport Region are subject to episodes of poor air quality resulting from ozone pollution that affects much of the region. During severe ozone events, the scale of the problem can extend beyond the Ozone Transport Region's borders and include over 200,000 square miles across the eastern United States. Contributing to the problem are local sources of air pollution as well as air pollution transported hundreds of miles from distant sources in and outside the Ozone Transport Region.

Since the late 1970s, a wealth of information has been collected concerning the regional nature of the Ozone Transport Region's ground-level ozone air quality problem. Scientific studies have uncovered a rich complexity in the interaction of meteorology and topography with ozone formation and transport. The evolution of severe ozone episodes in the eastern United States often begins with the movement of a large high pressure area from the Midwest to the middle or southern Atlantic states, where it assimilates into and becomes an extension of the Atlantic (Bermuda) high pressure system. During its movement east, the air mass accumulates air pollutants emitted by large coal-fired power plants and other sources located outside the Ozone Transport Region. As the air mass passes over the eastern United States, sources within the Ozone Transport Region contribute to the air pollution burden. These expansive weather systems favor the formation of ozone by creating a vast area of clear skies and high temperatures. These two prerequisites for abundant ozone formation are further compounded by a circulation pattern favorable for pollution transport over large distances. In the worst cases, the high pressure systems stall over the eastern United States for days, creating ozone episodes of strong intensity and long duration.

One transport mechanism that has fairly recently come to light and can play a key role in moving pollution long distances is the nocturnal low level jet stream. The jet is a regional scale phenomenon of higher wind speeds that often forms during ozone events a few hundred meters above the ground just above the stable nocturnal boundary layer. It can convey air pollution several hundreds of miles overnight from the southwest to the

[1] 70 Fed. Reg., 71612-71705 (November 29, 2005).

northeast, directly in line with the major population centers of the Northeast Corridor stretching from Washington, D.C. to Boston, Massachusetts. The nocturnal low level jet extends the entire length of the corridor from Virginia to Maine, and has been observed as far south as Georgia. It can thus be a transport mechanism for bringing ozone and other air pollutants into the Ozone Transport Region from outside the region, as well as move locally formed air pollution from one part of the Ozone Transport Region to another. Other transport mechanisms occur over smaller scales. These include land, sea, mountain, and valley breezes that can selectively affect relatively local areas. They play a vital role in drawing ozone-laden air into some areas, such as coastal Maine, that are far removed from major emission source regions.

With the knowledge of the different transport scales into and within the Ozone Transport Region, a conceptual picture of bad ozone days emerges. After sunset, the ground cools faster than the air above it, creating a nocturnal temperature inversion.[2] This stable boundary layer extends from the ground to only a few hundred meters in altitude. Above this layer, a nocturnal low level jet can form with higher velocity winds relative to the surrounding air. It forms from the fairly abrupt removal of frictional forces induced by the ground that would otherwise slow the wind. Absent this friction, winds at this height are free to accelerate, forming the nocturnal low level jet. Ozone above the stable nocturnal inversion layer is likewise cut off from the ground, and thus it is not subject to removal on surfaces or chemical destruction from low level emissions. Ozone in high concentrations can be entrained in the nocturnal low level jet and transported several hundred kilometers downwind overnight. The next morning as the sun heats the Earth's surface, the nocturnal boundary layer begins to break up, and the ozone transported overnight mixes down to the surface where concentrations rise rapidly, partly from mixing and partly from ozone generated locally. By the afternoon, abundant sunshine combined with warm temperatures promotes additional photochemical production of ozone from local emissions. As a result, ozone concentrations reach their maximum levels through the combined effects of local and transported pollution. Ozone moving over water is, like ozone aloft, isolated from destructive forces. When ozone gets transported into coastal regions by bay, lake, and sea breezes arising from afternoon temperature contrasts between the land and water, it can arrive highly concentrated.

During severe ozone episodes associated with high pressure systems, these multiple transport features are embedded within a large ozone reservoir arriving from source regions to the south and west of the Ozone Transport Region. Thus a severe ozone episode can contain elements of long range air pollution transport from outside the Ozone Transport Region, regional scale transport within the Ozone Transport Region from channeled flows in nocturnal low level jets, and local transport along coastal shores due to bay, lake, and sea breezes.

From this conceptual description of ozone formation and transport into and within the Ozone Transport Region, air quality planners need to develop an understanding of what it will take to remove high ozone concentrations from the air in the Ozone Transport Region. Weather is always changing, so every ozone episode is unique in its specific

[2] A temperature inversion is an increase in measured air temperature with height.

details. The relative influences of the transport pathways and local emissions vary by hour and day during the course of an ozone episode and between episodes. The smaller scale weather patterns that affect pollution accumulation and its transport underscore the importance of local (in-state) controls for emissions of oxides of nitrogen (NO_x) and volatile organic compounds (VOCs), the main precursors of ozone formation in the atmosphere. Larger synoptic scale weather patterns, and pollution patterns associated with them, support the need for NO_x controls across the broader eastern United States. Studies and characterizations of nocturnal low level jets also support the need for local and regional controls on NO_x and VOC sources as locally generated and transported pollution can both be entrained in nocturnal low level jets formed during nighttime hours. The presence of land, sea, mountain, and valley breezes indicate that there are unique aspects of pollution accumulation and transport that are area-specific and will warrant policy responses at the local and regional levels beyond a one-size-fits-all approach. The mix of emission controls is also important. Regional ozone formation is primarily due to NO_x, but VOCs are also important because they influence how efficiently ozone is produced by NO_x, particularly within urban centers. While reductions in anthropogenic VOCs will typically have less of an impact on the long-range transport of ozone, they can be effective in reducing ozone in urban areas where ozone production may be limited by the availability of VOCs. Therefore, a combination of localized VOC reductions in urban centers with additional NO_x reductions across a larger region will help to reduce ozone and precursors in nonattainment areas as well as downwind transport across the entire region.

The recognition that ozone in the eastern United States is a regional problem requiring a regional solution marks one of the greatest advances in air quality management in the United States. During the 1990s, air quality planners began developing and implementing coordinated regional and local control strategies for NO_x and VOC emissions that went beyond the previous emphasis on urban-only measures. These measures have resulted in significant improvements in air quality across the Ozone Transport Region. Measured NO_x emissions and ambient concentrations have dropped between 1997 and 2005, and the frequency and magnitude of ozone exceedances have declined within the Ozone Transport Region. To maintain the current momentum for improving air quality so that the Ozone Transport Region states can meet their 8-hour ozone attainment deadlines, there continues to be a need for more regional NO_x reductions coupled with appropriate local NO_x and VOC controls.

3.0 AIR QUALITY TRENDS SUMMARY

The New Jersey Department of Environmental Protection (NJDEP) analyzed various data for trends in ozone values. The trends analyzed include 8-hour ozone design values, monitor exceedances, ozone precursor concentrations, and meteorology. Eight-hour average ozone concentrations have been calculated since 1986, prior to the 8-hour ozone standard implementation in 1997 in New Jersey and before designations were made in 2004. Data for 8-hour ozone before 1997 are used for analysis purposes only and do not represent official reporting for the 8-hour ozone National Ambient Air Quality Standard (NAAQS).

In addition to trends in 8-hour ozone data, 1-hour ozone data were also analyzed. Trends for 1-hour ozone data include design values and monitor exceedances for New Jersey and both the New York and Philadelphia nonattainment areas. The following discussion is a summary of the key conclusions from these analyses. For more detailed information on the air quality trends in New Jersey, please refer to Appendix B.

3.1 1-Hour Ozone

3.1.1 1-Hour Ozone Design Values and Exceedances

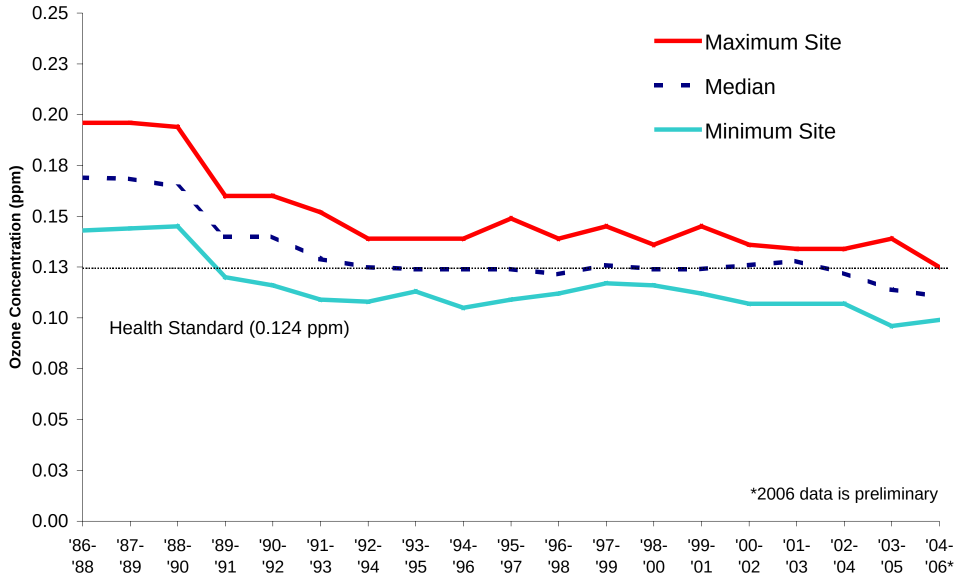
In order to determine compliance for an area under the NAAQS for ozone, a design value is calculated based upon ambient air monitoring data and compared to the federal standard. An area is considered to be attaining the 1-hour average ozone standard if the average number of times the standard is exceeded at any one monitoring station over a three-year period is 1 or less (after correcting for missing data) (40 C.F.R. 50, Appendix H). Thus, it is the fourth highest daily maximum 1-hour concentration that occurs over a three-year period that determines if an area is in attainment. If the fourth highest value is above 0.12 parts per million (ppm) then the average number of exceedances is greater than 1. The fourth highest value is also known as the design value. One-hour ozone design values in nonattainment areas associated with New Jersey have declined substantially over time, as displayed in Figure 3.1. As discussed in Chapter 1, the maximum 1-hour ozone average concentration (not shown) recorded in New Jersey in 1988 was 0.218 ppm compared to a maximum of 0.119 ppm in 2004.[1] In fact, of the 14 ozone monitoring sites that were operating during the 2004 ozone season in New Jersey, none recorded levels above the 1-hour ozone standard of 0.12 ppm during the year. Most recently, all but one New Jersey monitor (at 0.125 ppm) met the 1-hour ozone standard in 2006.

One-hour ozone design values in the 1-hour ozone New York and Philadelphia nonattainment areas from 1991-2006 have declined approximately 29 percent and 20 percent, respectively, when compared to average design values from 1982-1990 (pre-

[1] NJDEP. 2004 Ozone Summary, 2004 Air Quality Report. New Jersey Department of Environmental Protection, Bureau of Air Monitoring, 2005.

1990 Clean Air Act Amendments).[2,3] Figures 3.2 and 3.3 display the improving trend of 1-hour ozone design values for the 24 county 1-hour ozone New York nonattainment area and the 14 county 1-hour ozone Philadelphia nonattainment area, respectively.

<u>Figure 3.1</u>: New Jersey 1-Hour Ozone Design Values, 1988-2006
(Based on 4th Highest 1-Hour Average Concentration)



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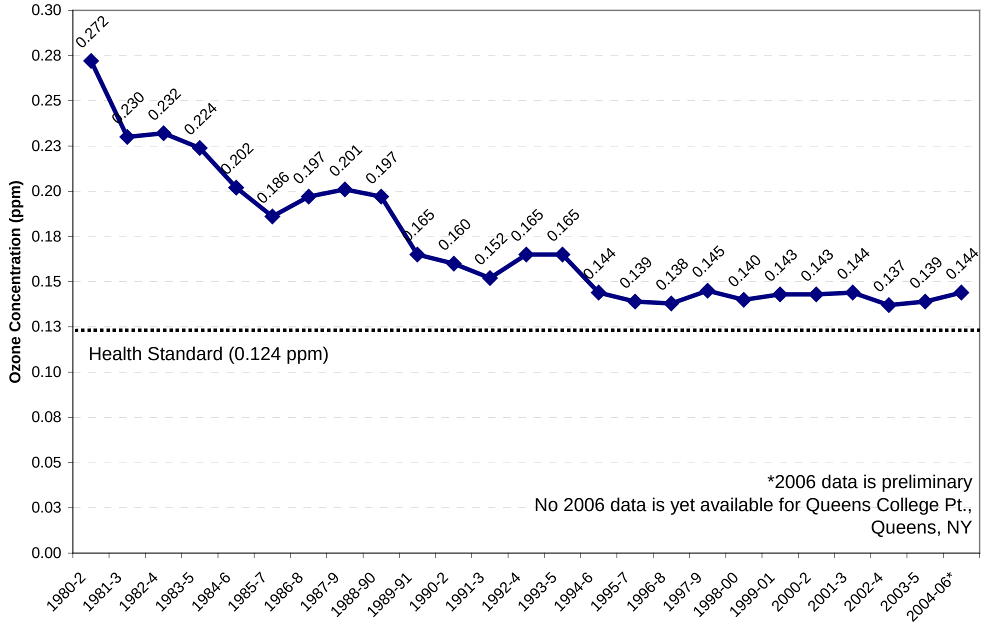
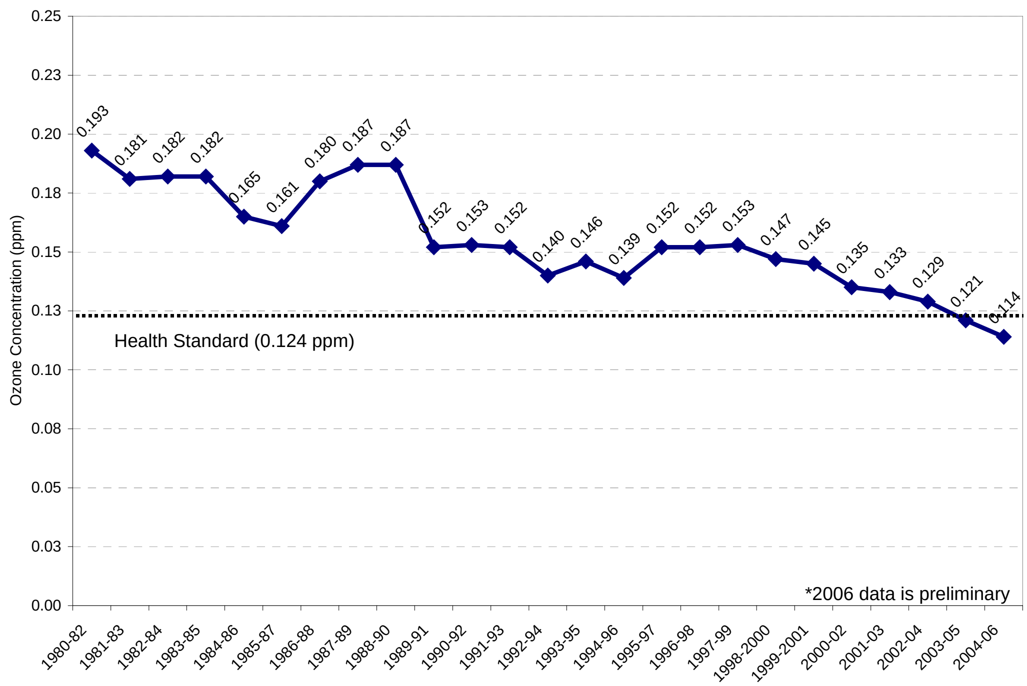
[2] NJDEP. Mid-Course Review for the New Jersey Portion of the Philadelphia-Southern New Jersey and New York-Northern New Jersey 1-Hour Ozone Nonattainment Areas. New Jersey Department of Environmental Protection, Bureau of Air Quality Planning, January 2005.

[3] USEPA. AirData: Access to Air Pollution Data, 2006. United States Environmental Protection Agency, http://www.epa.gov/air/data/, accessed December 7, 2006.

<u>Figure 3.2</u>: Design Values for the 1-Hour Ozone New York Nonattainment Area, 1982-2006

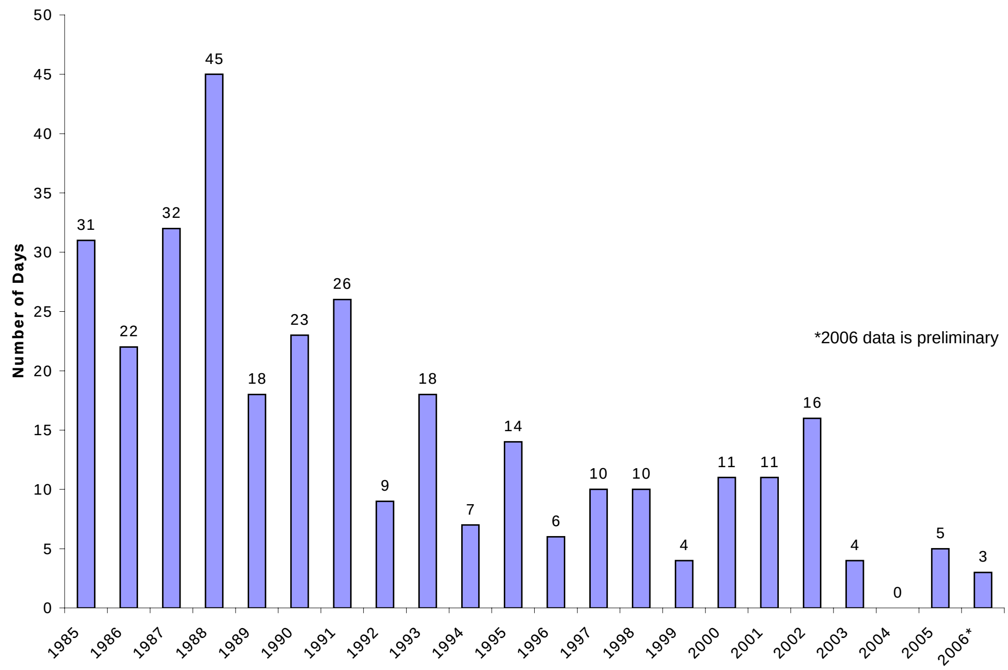


<u>Figure 3.3:</u> Design Values for the 1-Hour Ozone Philadelphia Nonattainment Area, 1982-2006



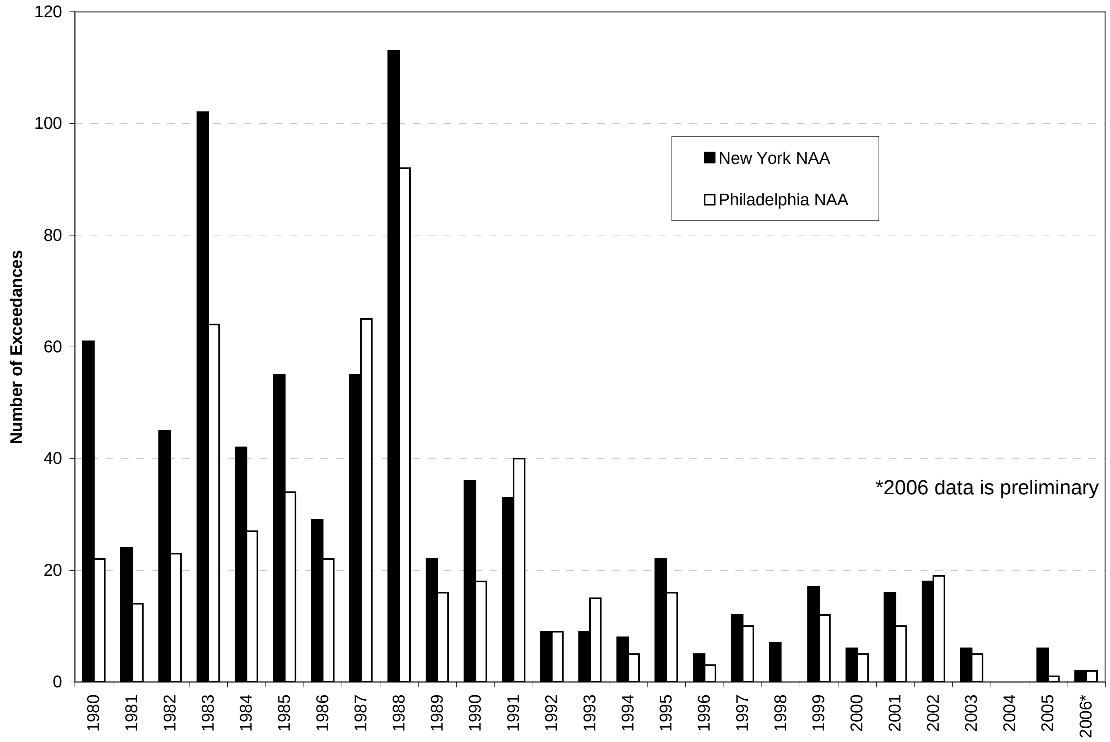
Monitored exceedances of the 1-hour ozone standard occur whenever a 1-hour ozone concentration is greater than or equal to 0.125 ppm. The declining total number of days on which monitors exceeded the 1-hour ozone standard for New Jersey's monitors between 1985 and 2006 is shown in Figure 3.4. In the New Jersey portions of both the New York and Philadelphia 1-hour ozone nonattainment areas, there have also been dramatic decreases in the total number of monitor exceedances, as shown in Figure 3.5.

Figure 3.4: Number of Days on which the 1-Hour Ozone Standard was Exceeded in New Jersey,[4] 1985-2006



[4] As used here, monitor exceedances refer to the total number of days the ozone health standard was exceeded.

<u>Figure 3.5</u>: Monitored Exceedances in the New Jersey Portion of 1-Hour Ozone New York and Philadelphia Nonattainment Areas,[5] 1980-2006



The data presented for the 1-hour ozone Philadelphia and New York nonattainment areas demonstrate that the states within those nonattainment areas have made great progress in reducing ozone precursor levels through the implementation of control strategies, thereby reducing ozone concentrations and exceedances in the region under the 1-hour ozone NAAQS. However, further reductions in ozone precursors, not only from local sources but also from sources upwind of New Jersey, are needed in order to attain the 8-hour ozone NAAQS.

3.1.2 Other New Jersey-Associated 1-Hour Ozone Nonattainment Areas

As discussed in Chapter 11, in addition to the Philadelphia and New York nonattainment areas, the Atlantic City and Allentown-Bethlehem-Easton, PA-NJ nonattainment areas were originally designated as moderate. Both of these areas have ambient air quality levels that meet the 1-hour ozone NAAQS. For additional details on these nonattainment areas, refer to Chapter 11.

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[5] As used here, monitor exceedances refer to the sum across the network of each monitor's individual number of exceedance days in a given year.

3.2 8-Hour Ozone

In the entire 8-hour ozone Northern New Jersey/New York/Connecticut nonattainment area, there are currently 21 monitors for ozone. Seven of these monitors operate in the 12 county New Jersey portion of Northern New Jersey/New York/Connecticut nonattainment area. In the entire 8-hour ozone Southern New Jersey/Philadelphia nonattainment area, there are currently 22 ozone monitors. Seven of these monitors operate in the nine county New Jersey portion of the 8-hour ozone Southern New Jersey/Philadelphia nonattainment area. Figure 3.6 is a map of ozone monitoring site locations in New Jersey.

Figure 3.6: 2006 New Jersey Ozone Monitoring Network

3.2.1 8-Hour Ozone Design Values

A design value under the 8-hour ozone NAAQS is defined as the average of the fourth highest daily maximum 8-hour ozone concentration that is recorded each year for three years for a given monitoring site (40 C.F.R. 50, Appendix I). Median 8-hour ozone design values in New Jersey have declined approximately 28 percent, as shown in Figure 3.7. Figures 3.8 and 3.9 show that the average 8-hour ozone design values in the 8-hour ozone Northern New Jersey/New York/Connecticut nonattainment area and Southern New Jersey/Philadelphia nonattainment area from 1999-2006 have declined approximately 14 percent and 16 percent, respectively.[6] The design value for a nonattainment area is the maximum monitor design value for all monitors for each 3-year

[6] Data for other states in the nonattainment areas were obtained from USEPA's Air Quality System (AQS) and might not reflect states' corrected data, T. Downs, personal communication, November 3, 2006.

period. The 8-hour ozone Northern New Jersey/New York/Connecticut nonattainment area's current monitor with the highest design value is Danbury, Fairfield County, Connecticut. The 8-hour Southern New Jersey/Philadelphia nonattainment area's current monitor with the highest design value is Colliers Mills, Ocean County, New Jersey.

Figure 3.7: New Jersey 8-Hour Ozone Design Values, 1988-2006
(Based on 3-Year Average of 4th Highest Daily 8-Hour Concentration)

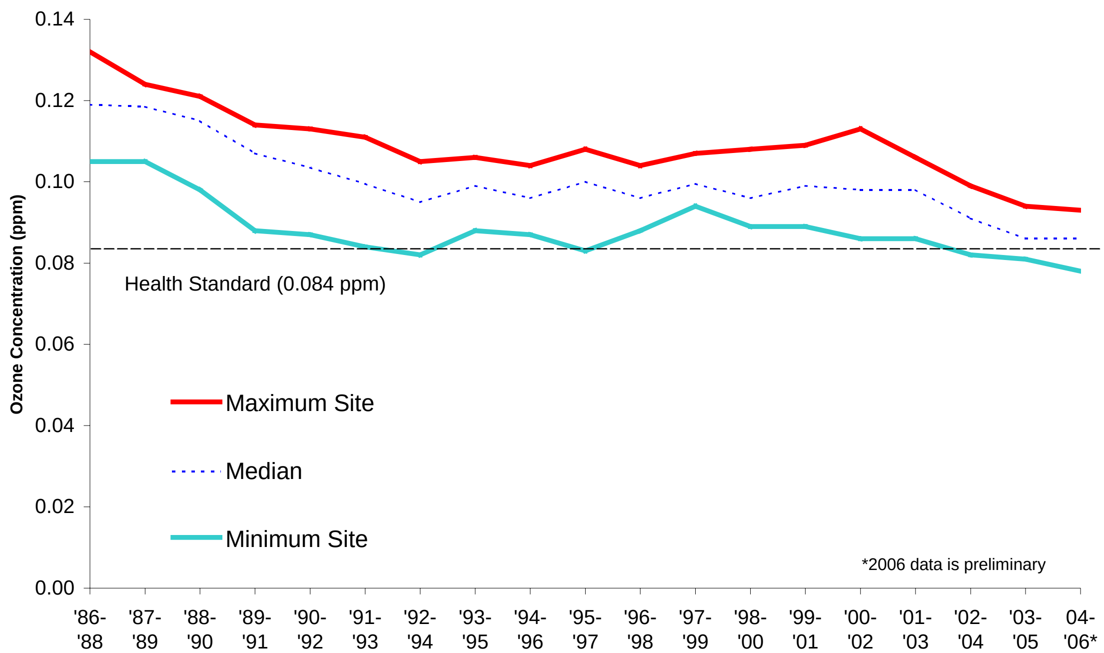


Figure 3.8: **NNJ/NY/CT Nonattainment Area 8-Hour Ozone Design Values 1999-2006**

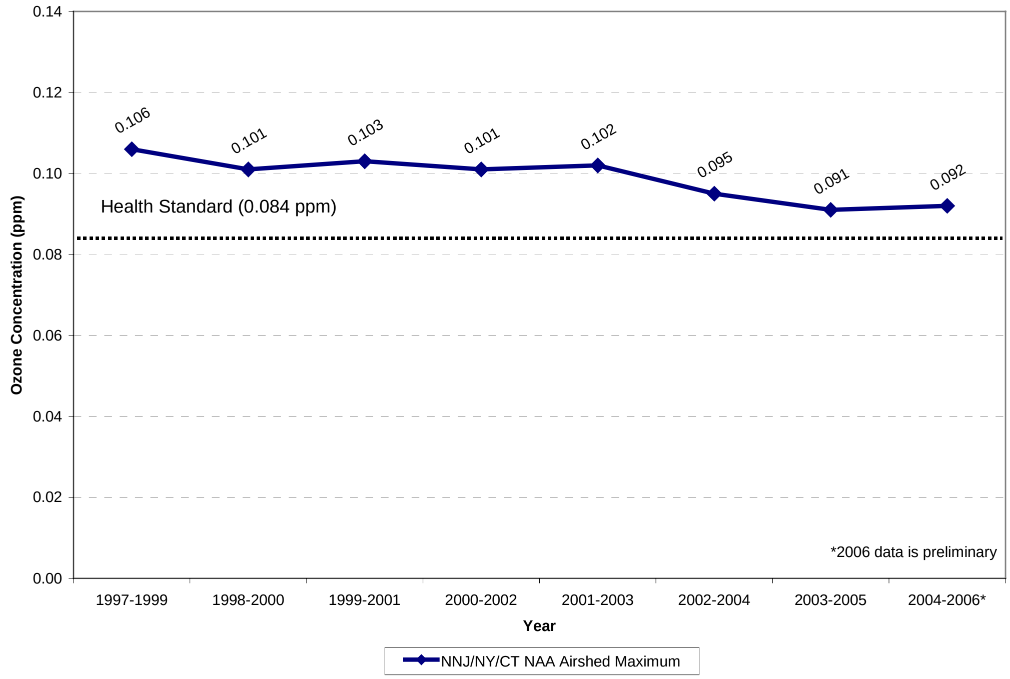
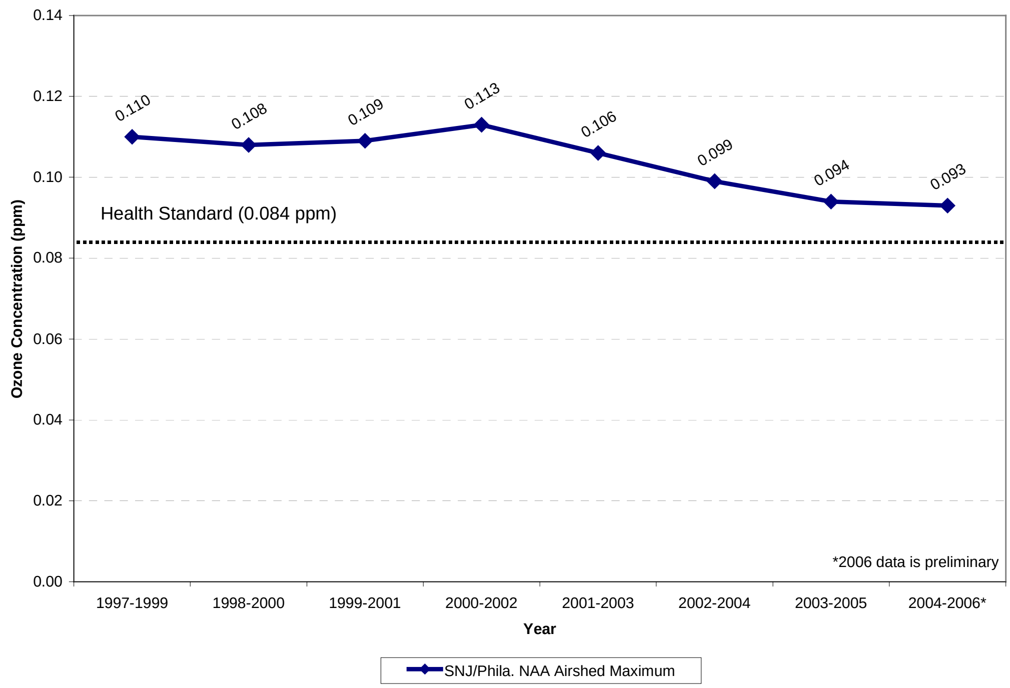


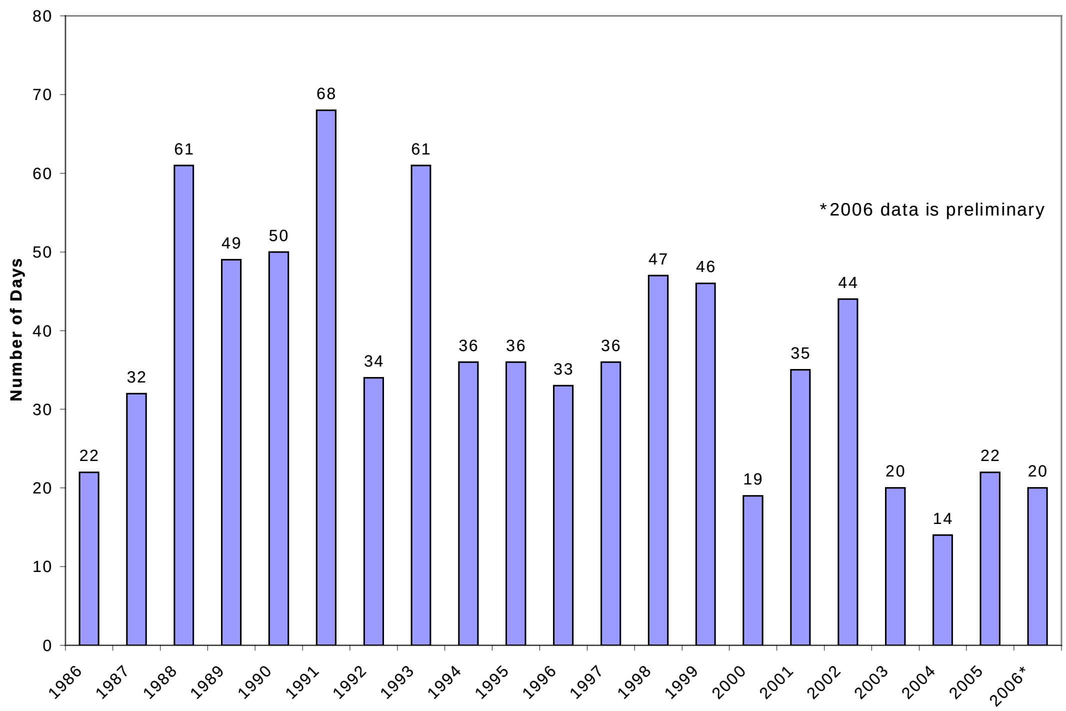
Figure 3.9: **SNJ/Phila. Nonattainment Area 8-Hour Ozone Design Values 1999-2006**



3.2.2 8-Hour Ozone Monitor Exceedances

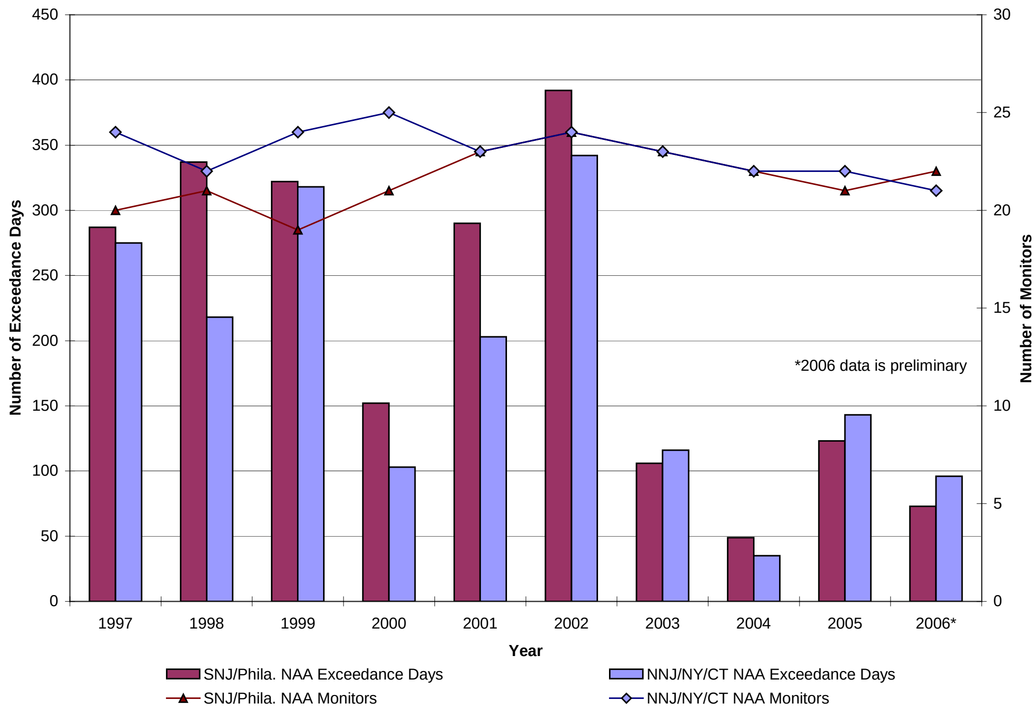
Monitored exceedances (i.e., number of days that exceeded the health-based standard) occur whenever an 8-hour ozone concentration is greater than or equal to 0.085 ppm. Figures 3.10 and 3.11 demonstrate that the total number of monitored exceedances of the 8-hour ozone standard has decreased slightly for New Jersey and significantly for both nonattainment areas.

<u>Figure 3.10</u>: Number of Days on which the 8-Hour Ozone Standard was Exceeded in New Jersey,[7] 1985-2006



[7] As used here, monitor exceedances refer to the total number of days the ozone health standard was exceeded.

<u>Figure 3.11</u>: Monitored Exceedances in the 8-Hour Ozone NNJ/NY/CT Nonattainment Area and SNJ/Phila. Nonattainment Area,[8,9] 1997-2006



3.2.3 New Jersey Monitor Trends

In addition to the design value and exceedance trends discussed for 8-hour ozone, the NJDEP analyzed 8-hour ozone monitor trends for the New Jersey portions of the Northern New Jersey/New York/Connecticut nonattainment area and Southern New Jersey/Philadelphia nonattainment area.[10]

The following are key points of the monitor trends in the New Jersey portion of the Northern New Jersey/New York/Connecticut nonattainment area for data collected from 1986-2006:

- Design values have fallen 7-32 percent.
- There have been significant reductions in the number of total 8-hour ozone exceedance days.
- Eight-hour ozone exceedance days at individual monitors decreased up to 75 percent.
- Peak 8-hour ozone concentrations have generally decreased by 11-33 percent.

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[8] As used here, monitor exceedances refer to the sum across the network of each monitor's individual number of exceedance days in a given year.

[9] As used here, monitor exceedances refer to the total number of days the ozone health standard was exceeded.

[10] ibid.

The following are key points of the monitor trends in the New Jersey portion of the Southern New Jersey/Philadelphia nonattainment area for data collected from 1986-2006:

- Design values have fallen 19-36 percent.
- There have been significant reductions in the number of total 8-hour ozone exceedance days.
- Eight-hour ozone exceedance days at individual monitors decreased up to 89 percent.
- Peak 8-hour ozone concentrations have decreased by 12-30 percent.

Based upon the data available for New Jersey and both nonattainment areas, the general trend for 8-hour ozone is improving. However, attainment of the 8-hour ozone NAAQS has not yet been reached.

3.3 Ozone Precursor Concentrations

As discussed in Chapter 1, ozone is formed when oxides of nitrogen (NO_x) and volatile organic compounds (VOCs) react in the presence of sunlight. This section outlines the monitoring trends for these specific ozone precursors, lending additional support to the State's claim that ozone levels have been, and continue to be, reduced throughout New Jersey.

3.3.1 Volatile Organic Compounds (VOCs)

In 1993, federal revisions to air monitoring regulations required states to enhance monitoring for ozone and its precursors.[11] Because of those new regulations, New Jersey now gathers data at three locations for ambient concentrations of VOCs, including several carbonyls, through the Photochemical Assessment Monitoring Station (PAMS) program as part of New Jersey's Manual Monitoring Network.[12,13] The VOC and carbonyl measurements are only taken during the peak part of the ozone season, from June 1 to August 31 each year (the official ozone season in New Jersey runs from April 1 to October 31).[14] Figure 3.12 shows that VOC trends for the PAMS sites in the New York City metropolitan area are similar to those for the Philadelphia area in Figure 3.13. Overall, the levels of total non-methane organic carbon (TNMOC) at the PAMS monitors have decreased, with some monitors showing a more significant decrease than others.

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[11] 58 Fed. Reg. 8452 (February 12, 1993).
[12] NJDEP. 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 for November 15, 1993. New Jersey Department of Environmental Protection, September 14, 1993, p. 83.
[13] NJDEP. 2003 Photochemical Assessment Monitoring Stations (PAMS), 2003 Air Quality Report. New Jersey Department of Environmental Protection, Bureau of Air Monitoring, 2004.
[14] op. cit., note 1

<u>Figure 3.12</u>: Total Non-methane Organic Carbon (TNMOC), Seasonal Average 1995-2005, New York Metropolitan Area

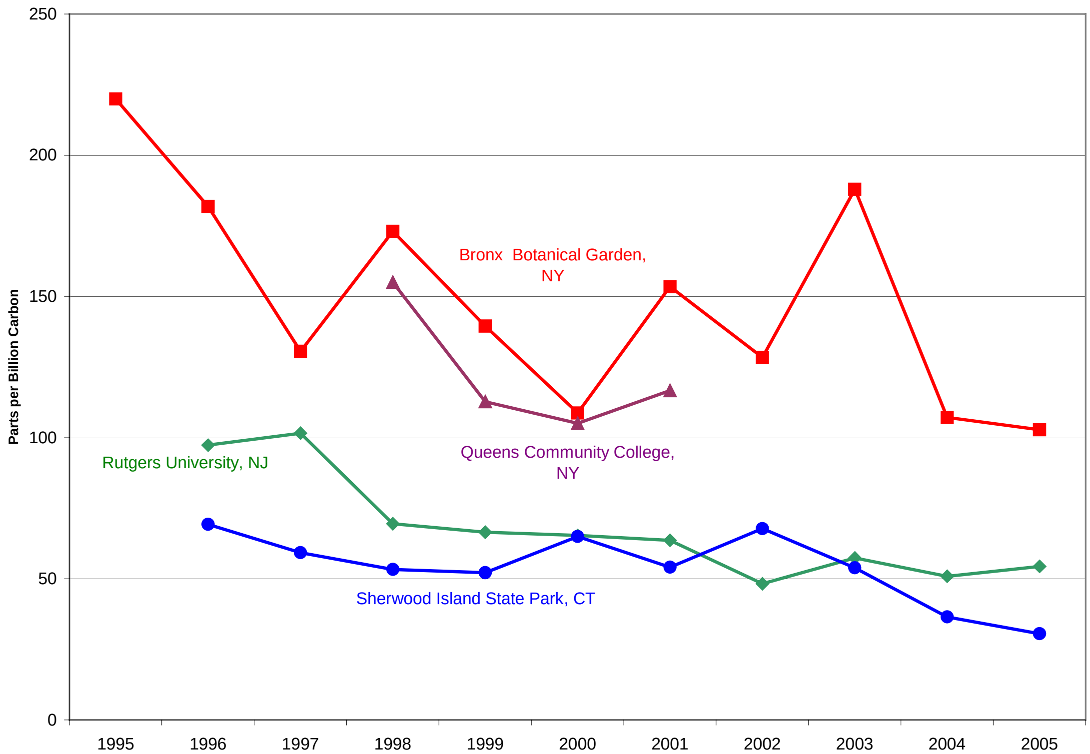
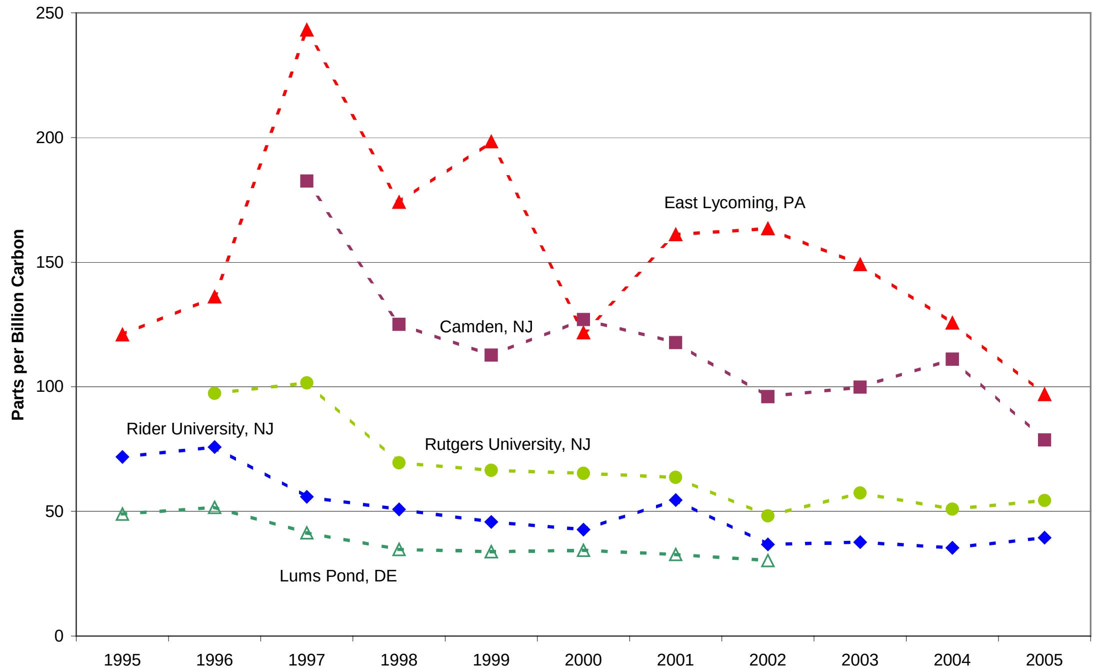


Figure 3.13: Total Non-methane Organic Carbon (TNMOC), Seasonal Average 1995-2005, Philadelphia Metropolitan Area[15]

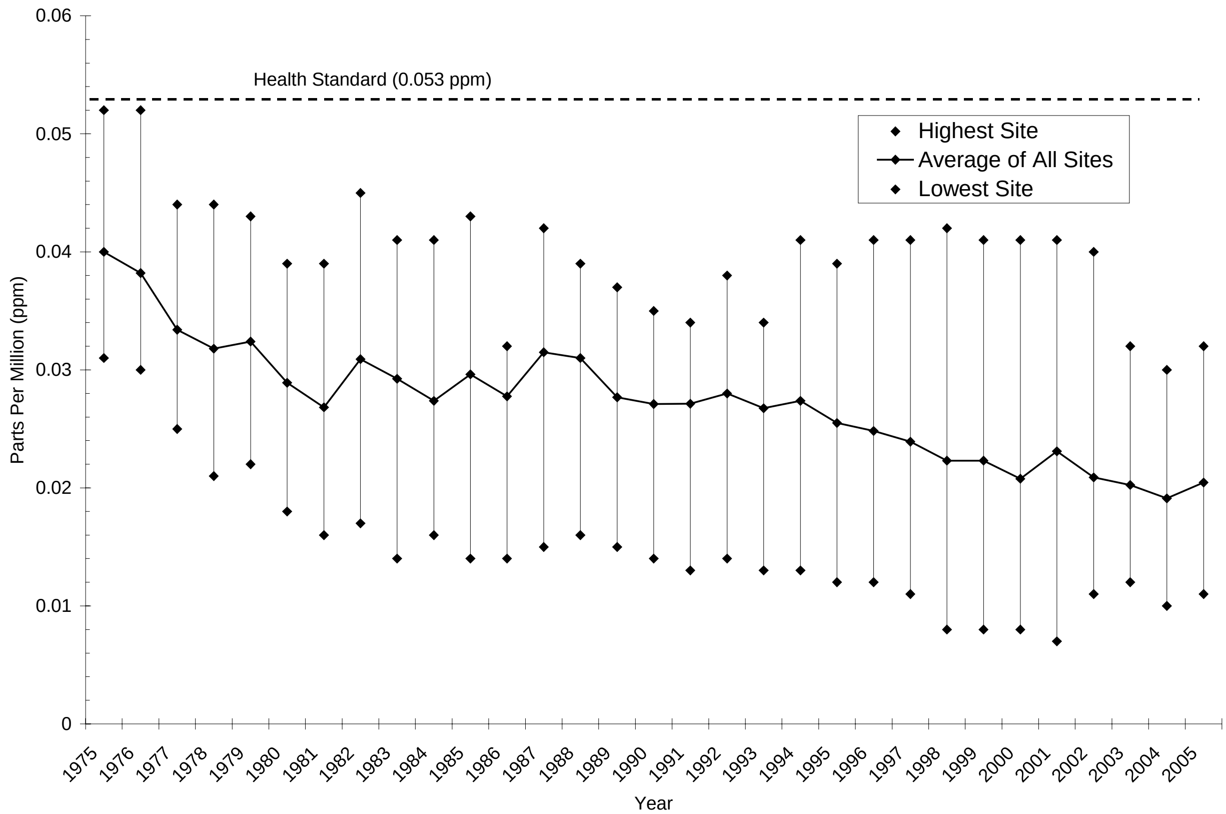


[15] The Rutgers University monitor is both a Type 1 and Type 4 PAMS monitor for New York City and Philadelphia, respectively. For more information on the structure of the PAMS network, please see Appendix B.

3.3.2 Nitrogen Dioxide[16]

Currently, New Jersey monitors NO_2 and NO levels at nine locations in the Continuous Air Monitoring Network, separate from the PAMS measurements of NO_x, NO_2, and NO.[17,18,19] As Figure 3.14 shows, NO_2 levels have decreased in New Jersey from 1975-2005. The NO_2 NAAQS is 0.053 ppm and the last exceedance occurred in 1974.

Figure 3.14: New Jersey Nitrogen Dioxide Air Quality, 1975-2005, 12-Month (Calendar Year) Average

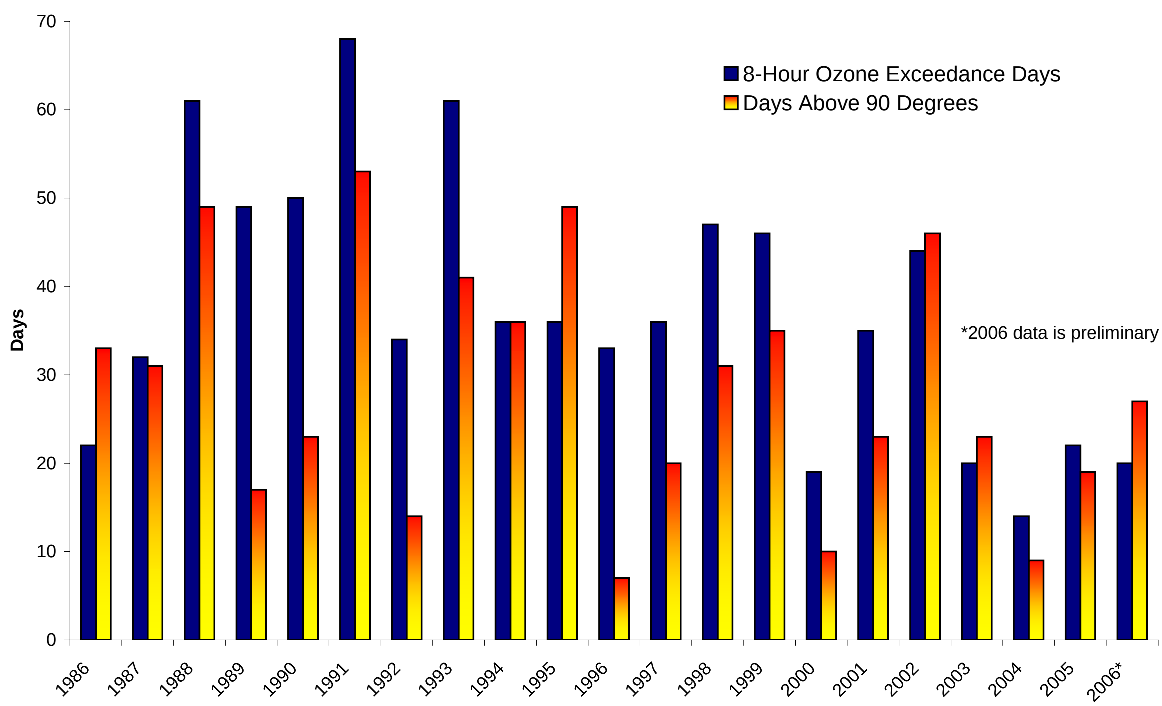


[16] Please see Appendix B, Section 1.4.2 for information on the relationship between NO, NO_2, and NO_x.
[17] NJDEP. 2005 Nitrogen Dioxide Summary, 2005 Air Quality Monitoring Report. New Jersey Department of Environmental Protection, Bureau of Air Monitoring, 2006.
[18] NJDEP. 2004 Network Summary, 2004 Air Quality Report. New Jersey Department of Environmental Protection, Bureau of Air Monitoring, 2005.
[19] op. cit., note 13

3.4 Meteorological Trends

Ozone formation is influenced by many factors including weather conditions, transport, and growth in emissions, in addition to changes brought about by air quality control strategies. Of these factors, weather has a significant effect on year to year variations in ozone levels. As previously stated, ozone is not emitted directly to the atmosphere, but is formed by photochemical reactions between VOCs and NO_x in the presence of sunlight. The hot days of summer are particularly conducive to ozone formation, and as such ozone levels are of general concern during the months of May through September. Hot summers usually produce long periods of elevated ozone concentrations, while ozone production is usually limited during cool and wet summers, which may be in part responsible for the low levels of ozone during 2004.[20,21] In Figure 3.15, most of the years shown have more days when the 8-hour ozone NAAQS was exceeded than "hot" days. This indicates that there are other factors besides meteorology that contribute to decreasing ozone levels in New Jersey.

<u>Figure 3.15</u>: New Jersey 8-Hour Ozone "Unhealthy" Days vs. "Hot Days"



[20] op. cit., note 1

[21] USEPA. Evaluating Ozone Control Programs in the Eastern United States: Focus on the NO_x Budget Trading Program, 2004. United States Environmental Protection Agency, Office of Air and Radiation, Office of Air Quality Planning and Standards, Office of Atmospheric Programs, Washington, D.C., EPA454-K-05-001, August 2005.

4.0 CONTROL MEASURES

This section discusses the control measures implemented, or expected to be implemented in New Jersey, in the Ozone Transport Region (OTR), or nationally. This section explains the terminology related to control measures used throughout Chapters 5 and 6; provides a summary of how the control measures were identified; and gives a brief synopsis of each control measure considered in Chapters 5 and 6. A summary of the control measures is shown in Table 4.1. The benefits from the implementation of these measures, and the benefit calculations, are discussed in the State's attainment demonstration in Chapter 5 and in the Reasonable Further Progress (RFP) analysis in Chapter 6. Note that this chapter only provides a discussion of control measures not included in the baseline emission inventory. Existing controls, such as the New Jersey inspection and maintenance (I/M) program for gasoline vehicles prior to the initiation of mandatory on-board diagnostic inspections, existing reasonably available control technology (RACT) rules, and federal reformulated gasoline (RFG), are not included in this chapter. These controls are included in the 2002 baseline inventory.

Table 4.1: Control Measures

Control Measures	Sector
Pre-2002 with benefits achieved Post-2002 - On the Books	
New Jersey	
NOx Budget Program (SIP Call)	Point
New Source Review (NSR)	Point
Federal	
Residential Woodstove NSPS	Area
Onboard Refueling Vapor Recovery (ORVR) beyond Stage II	Area/Onroad
Tier 1 Vehicle Program	Onroad
National Low Emission Vehicle Program (NLEV)	Onroad
Tier 2 Vehicle Program/Low Sulfur Fuels	Onroad
HDDV Defeat Device Settlement	Onroad
HDDV Engine Standards	Onroad
Nonroad Diesel Engines	Nonroad
Large Industrial Spark-Ignition Engines Over 19 Kilowatts	Nonroad
Recreational Vehicles (includes snowmobiles, off-highway motorcycles and all-terrain vehicles)	Nonroad
Diesel Marine Engines over 37 kilowatts	Nonroad
Phase 2 Standards for Small Spark-Ignition Handheld Engines at or below 19 kilowatts	Nonroad
Phase 2 Standards for New Nonroad Spark-Ignition Nonhandheld Engines at or below 19 kilowatts	Nonroad
Post-2002 - On the Books	
New Jersey Measures Done Through a Regional Effort	
Consumer Products 2005	Area

Control Measures	**Sector**
Architectural Coatings 2005	Area
Portable Fuel Containers 2005	Area and Nonroad
Mobile Equipment Repair and Refinishing	Area
Solvent Cleaning	Point and Area
NO_x RACT rule 2006 (includes distributed generation)	Point and Area
New Jersey Only Measures	
Stage I and Stage II (Gasoline Transfer Operations)	Area
On-Board Diagnostics (OBD) - (I/M) Program for Gasoline Vehicles	Onroad
New Jersey Heavy Duty Diesel Rules Including “Not-To-Exceed” (NTE) Requirements	Onroad
Federal	
USEPA MACT Standards including Industrial Boiler/Process Heater MACT	Point
CAIR	Point
Refinery Enforcement Initiative	Point
Post-2002 - Beyond on the Way	
New Jersey Measures Done Through a Regional Effort	
Consumer Products 2009 Amendments	Area
Portable Fuel Containers 2009 Amendments	Area and Nonroad
Asphalt Paving	Area
Adhesives and Sealants	Area and Point
Asphalt Production	Point and Area
Glass Manufacturing	Point
Certain Categories of ICI Boilers	Point
Refinery Rules	Point
High Electrical Demand Day Program	Point
New Jersey Only Measures	
Petroleum Storage Tank Measures	Point and Area
USEPA CTGs (5 categories)	Point and Area
Case by Case VOC and NO_x Emission Limit Determinations (FSELs/AELs)	Point
Municipal Waste Combustors	Point
New Jersey Low Emission Vehicle (LEV) Program	Onroad
Diesel Idling	Onroad
Diesel Inspection and Maintenance	Onroad
Federal	
National Aerosol Coatings Rule	Area
New Nonroad Engine Standards	Nonroad

4.1 Terminology

On The Books (OTB) – "On the Books (OTB)" control measures (State or Federal) are control measures that were a) adopted before 2002, but have implementation dates after 2002 or obtain benefits after 2002, due to turnover of products, equipment, or vehicles (the benefits from these measures are not included in the State's 2002 base year emissions inventory); or b) adopted and implemented after 2002. An example of an OTB measure for New Jersey is the NO_x Budget Program, which went into effect May 1, 1999; a lower cap was required effective May 1, 2003. Examples of other OTB measures in New Jersey are the six "shortfall"[1] measures that were adopted by New Jersey, and several of its neighboring states, between 2003 and 2005 in order to meet the 1-hour ozone standard. These include regulations on Architectural and Industrial Maintenance Coatings (AIM), Consumer Products, Portable Fuel Containers (PFCs), Mobile Equipment Repair and Refinishing (MERR), Solvent Cleaning and additional NOx controls, including the distributed generation initiatives.

On the Way (OTW) – The six "shortfall" measures discussed in the definition of the OTB were developed by the Ozone Transport Commission (OTC) specifically to address United States Environmental Protection Agency (USEPA)-identified deficiencies in the 1-hour ozone attainment demonstrations of several OTC states. New Jersey, New York, Delaware, Maryland and Pennsylvania, five of the "shortfall" states, adopted rules to implement these measures before the modeling inventory was prepared. However, other OTC states committed to propose these rules and were in the process of proposal/adoption when the modeling inventory was prepared. With approval of the states, the OTC and the Mid-Atlantic/Northeast Visibility Union (MANE-VU) called these rules that were not yet adopted on the way (OTW), assuming they would be proposed, adopted and implemented by 2009, and to distinguish them from the next round of potential rulemakings. This terminology does not apply to New Jersey, as all of the OTC shortfall rules were adopted in New Jersey prior to the development of the modeling inventory.

Beyond On The Way (BOTW) – These control measures (state, regional, or federal) will be proposed by New Jersey and will include those measures that were identified as part of the effort to reach attainment by June 15, 2010.[2]

[1] NJDEP. Mid-Course Review for the New Jersey Portion of the Philadelphia-Southern New Jersey and New York-Northern New Jersey 1-Hour Ozone Nonattainment Areas. New Jersey Department of Environmental Protection, January 2005.

[2] According to USEPA guidance, areas that have an attainment date of no later than June 15, 2010 must implement the emission reductions needed for attainment no later than the beginning of the 2009 ozone season (June 2009). Source: USEPA. Guidance on the Use of Models and Other Analyses in Attainment Demonstrations for the 8-hour Ozone NAAQS, United States Environmental Protection Agency, October 2005.

4.2 On the Books Controls

The following section provides descriptions of the New Jersey and Federal OTB measures that were included in the State's attainment demonstration and RFP demonstration.

4.2.1 New Jersey

Pre-2002 with benefits achieved Post-2002 – On the books

New Jersey NO_x Budget Program (SIP Call): On September 27, 1994, the OTC agreed to develop a regional program to achieve significant reductions in oxides of nitrogen (NO_x) emissions from large combustion sources. This program called for the establishment of a NO_x cap and trade program, as well as the establishment of an emissions cap or "budget" for all affected sources that in total must not be exceeded during each control period, beginning in 1999. The NO_x SIP Call is a similar regional NO_x reduction measure designed by the USEPA, in part, as a result of the Ozone Transport Assessment Group's (OTAG) final recommendation report addressing ozone transport over the Eastern United States.[3] New Jersey adopted its NO_x Budget Program[4] in 1998. The base emission budget of 17,340 tons of NO_x was established. This was approximately 65% less than 1990 emission levels and was termed Phase II. In 2003, the NO_x SIP Call replaced Phase III of the OTC's program with a reduction of the base emission budget to 8,200 tons. The NO_x SIP Call also expanded the geographical area beyond the Ozone Transport Region to the south and the west. The NO_x SIP Call will continue through the ozone season of 2008, at which point it will be superceded by the Clean Air Interstate Rule (CAIR). The NO_x Budget Program covers primarily electric generating units (EGUs) and some non-EGUs. The equipment covered by the NO_x Budget Program include fossil fuel fired indirect heat exchangers with a maximum rated heat input capacity of at least 250 million British thermal units (MMBtu) per hour and electric generating units with a rated output of at least 15 megawatts (MW). The USEPA approved the State's NOx SIP Call program on May 22, 2001.[5]

New Source Review: The Clean Air Act (CAA), 42 U.S.C. § 7503, requires new or modified major sources to install the Lowest Achievable Emission Rate (LAER) control equipment and obtain greater than one for one emission offsets in order to locate in a nonattainment area. Thus, the NSR program provides continual emission reductions to help improve the air quality in the nonattainment area and further downwind. In New Jersey, any significant new, reconstructed, or modified significant source is required to install state of the art (SOTA) control technology (similar to Best Available Control Technology (BACT) or LAER). SOTA also results in reductions in the actual emissions from the facilities.

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[3] USEPA. 1998 Ozone Transport Assessment Group (OTAG) Final Report. United States Environmental Protection Agency, Ozone Transport Assessment Group. Accessed from: http://www.epa.gov/ttn/naaqs/ozone/rto/otag/finalrpt/.
[4] N.J.A.C. 7:27-31
[5] 66 Fed. Reg. 28063 (May 22, 2001).

Post 2002 – On the books

New Jersey Measures Done Through a Regional Effort

Consumer Products 2005: The NJDEP adopted amendments to its consumer products rules at N.J.A.C. 7:27-24 on May 3, 2004. Consumer products are those items sold to retail customers for personal, household, or automotive use, along with the products marketed by wholesale distributors for use in commercial or institutional settings such as beauty shops, schools and hospitals. Consumer products include hundreds of individual products, including personal care products, household products, automotive aftermarket products, adhesives and sealant, Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) related insecticides, and other miscellaneous products. Volatile organic compound (VOC) emissions from these products are the result of the evaporation of propellant and organic solvents during use. The rule amendments were based on an OTC model rule dated November 29, 2001, which was based on several historical California Air Resources Board (CARB) rules and other data. The original New Jersey rule was adopted in November 1995. The USEPA National rule was adopted in September 1998.

The New Jersey adopted amendments set limits, effective January 1, 2005, on the VOC content of several consumer products such as air fresheners, automotive brake cleaners, carpet and upholstery cleaners, household adhesives, floor wax strippers and hairspray. The USEPA approved the New Jersey State Implementation Plan (SIP) revision including these rule amendments on January 25, 2006.[6] The NJDEP anticipates proposing additional amendments to its consumer products rules as a BOTW measure.

Architectural Coatings 2005: The NJDEP adopted amendments to its architectural coatings rules at N.J.A.C. 7:27-23 on June 21, 2004. Architectural coatings include, but are not limited to, paints, varnishes, stains, industrial maintenance coatings, and traffic coatings. An architectural coating[7] is applied in the field at the site of installation, rather than in a shop or factory where pollution control equipment may be installed. These amendments were based on an OTC model rule dated February 26, 2002, which was based on the CARB Suggested Control Measures (SCM), June 2000. The original New Jersey rule was adopted in 1989. The USEPA national rule was adopted in September 1998.

The New Jersey amendments set limits on the VOC content of architectural coatings, effective January 1, 2005. The USEPA approved the New Jersey SIP revision including these rule amendments on November 30, 2005.[8]

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[6] 71 Fed. Reg. 4045 (January 25, 2006).
[7] "Coating" is defined at N.J.A.C. 7:27-23 as a material applied onto or impregnated into a substrate for protective, decorative, or functional purposes. Such materials include, but are not limited to, paints, varnishes, sealers, and stains.
[8] 70 Fed. Reg. 71774 (November 30, 2005).

Portable Fuel Containers 2005: The NJDEP adopted a new portable fuel container (PFC) rule at N.J.A.C. 7:27-24 on May 3, 2004. PFCs are designed for transporting and storing fuel from a retail distribution to a point of use and the eventual dispensing of the fuel into equipment. Commonly referred to as "gas cans," these products come in a variety of shapes and sizes with nominal capacities ranging in size from less than one gallon to over six gallons. VOC emissions from PFCs are classified by five different activities: transport-spillage, diurnal emissions, permeation, and equipment refueling vapor displacement and spillage emissions. Diurnal evaporative emissions are the largest category. Diurnal evaporative emissions are evaporative emissions resulting from the daily cycling of ambient temperatures. This new rule was based on an OTC model rule dated March 6, 2001, which was based on CARB's PFC rule, which took effect January 2001.

Specifically, the New Jersey adopted rule contains requirements that address VOC emissions from PFCs, effective January 1, 2005. The rule requires that PFCs and/or spouts have a permeability mot to exceed 0.4 grams/gallon/day, be equipped with an automatic shut-off device and an automatic device that closes and seals when it is removed from the fuel tank. The rule also requires that a PFC have a fuel flow rate and fill level standards. The USEPA approved the New Jersey SIP revision including this rulemaking on January 25, 2006.[9] The NJDEP anticipates proposing amendments to its portable fuel container rules as a BOTW measure.

Mobile Equipment Repair and Refinishing (Autobody refinishing): The NJDEP adopted amendments to its autobody refinishing rules at N.J.A.C. 7:27-16.7 (old section number) and 16.12 (new section number) on June 2, 2003. These amendments were based on an OTC model rule dated March 6, 2001. Various limits in the previous New Jersey rule became effective between 1982 and 1990, but were not applicable to smaller facilities. The rule addresses VOC emissions from autobody refinishing operations.

The New Jersey autobody refinishing amendments establish requirements for using higher efficiency coating application equipment, such as high volume-low pressure paint guns, spray gun cleaning equipment that minimizes solvent loss, and enclosed spray gun cleaning. The USEPA national rule, effective September 11, 1998, regulates the VOC content of primers and coatings applied in autobody refinishing operations. The NJDEP amendments maintain the Federal VOC content limit for the paints used, but expands the scope of facilities to which this rule applies. The USEPA approved the New Jersey SIP revision including these rule amendments on July 2, 2004.[10]

Solvent Cleaning (Degreasing): The NJDEP adopted amendments to its solvent cleaning rules at N.J.A.C. 7:27-16.6 on June 2, 2003. The adopted amendments contain requirements to address VOC emissions from both vapor and cold solvent metal parts cleaning operations. Vapor cleaning machines are generally used in manufacturing operations, and the rules for these machines are based on Maximum Achievable Control Technology (MACT). Cold cleaners are smaller units more typically used in automobile

[9] 71 Fed. Reg. 4045 (January 25, 2006).
[10] 69 Fed. Reg. 40321 (July 2, 2004).

repair and maintenance facilities and in industrial maintenance shops. These new requirements were based on an OTC model rule dated March 6, 2001, which was based on the Federal MACT standard for chlorinated solvent vapor degreasers, and on regulatory programs already in place in several States, including Maryland and Illinois.

Specifically, the New Jersey amended requirements apply to vapor cleaning machines using either halogenated or non-halogenated solvents and apply to machines with a solvent surface area greater than one square foot. The adopted amendments require that the solvents used in cold cleaning machines containing greater than one liter of solvent not exceed a volatility of one millimeter of mercury. The USEPA approved the New Jersey SIP revision including these rule amendments on July 2, 2004.[11]

NO_x RACT Rule 2006 (includes distributed generation): The NJDEP adopted amendments to N.J.A.C. 7:27-19, Control and Prohibition of Air Pollution from NO_x, on September 8, 2005. The amendments were based on the OTC's March 6, 2001 model rules to control NO_x emissions tied to shortfall measures. The OTC model rules were created as the result of the agreement formally set forth in a "Memorandum of Understanding Among the States of the Ozone Transport Commission Regarding the Development of Specific Control Measures to Support Attainment and Maintenance of the Ozone National Ambient Air Quality Standards" (MOU), which was approved by the OTC on June 1, 2000. Specifically, the New Jersey amendments apply to owners and operators of stationary sources of NO_x emissions, including industrial/commercial/institutional (ICI) boilers, combustion turbines, and reciprocating engines. Owners and operators of such sources are required to achieve the emission limit specified in the rules or to comply instead with alternative requirements, such as an emission averaging plan, an alternative maximum allowable emission rate or a plan for phased compliance (repowering or use of innovative technology). In addition, moderate size boilers (boilers with a maximum gross heat input rate of at least 50 MMBtu per hour but less than 250 MMBtu per hour) are required to have an annual tune up. The amendments also regulate distributed generation[12] of electricity, consistent with the OTC recommendation in its March 28, 2001 "Resolution of the States of the Ozone Transport Commission Concerning the Creation of incentives for Additional Distributed Generation of Electric Power." On March 14, 2007, the USEPA proposed approval of the New Jersey SIP revision, including these rule amendments.[13] The comment period on that proposed approval closed on April 14, 2007.

[11] 69 Fed. Reg. 40321 (July 2, 2004).
[12] Distributed generation is a system composed of generation located near the energy consumer's site that may be highly integrated with the electric grid to provide multiple benefits on both sides of the utility meter. Source: CECA. Distributed Generation Facts, Consumer Energy Council of America, http://www.cecarf.org/Programs/DG/DGFacts.html.
[13] 72 Fed. Reg. 11812 (March 14, 2007).

New Jersey Only Measures

Stage I Vapor Recovery and Stage II Vapor Recovery (Gasoline Transfer Operations): The NJDEP adopted amendments to its gasoline transfer rules at N.J.A.C. 7:27-16.3 on June 2, 2003. The adopted amendments address VOC emissions from gasoline transfer operations, otherwise known as Stage I and Stage II. A Stage I vapor recovery system is a system that limits the discharge to the atmosphere of gasoline vapors displaced during the transfer of gasoline from a storage vehicle to a storage tank. A Stage II vapor recovery system is a system that limits the discharge to the atmosphere of gasoline vapors displaced during the dispensing of gasoline into motor vehicle fuel tanks. The adopted amendments were based partly on CARB's enhanced vapor recovery rules as discussed in their February 4, 2000 Enhanced Vapor Recovery Report.

Specifically, the New Jersey adopted amendments increase the required efficiency of the Stage I vapor recovery system from 90 to 98 percent and require annual testing of the Stage I and Stage II systems.[14] The amendments also require the installation of pressure/vacuum relief valves on atmospheric vent pipes, the installation of mini-boots on vapor assist systems, maintenance of the vapor recovery system to ensure that the system is vapor tight and leak free, and the use of unihoses at new stations. The USEPA approved the New Jersey SIP revision including these rule amendments on July 2, 2004.[15]

On-Board Diagnostics (I/M) Program for Gasoline Vehicles

A number of changes to New Jersey's I/M program for gasoline vehicles were implemented after 2002. The two program changes that materially impacted vehicle emissions were the extension for the new vehicle emission inspection from one inspection cycle (i.e., 2 years) to two inspection cycles (i.e., 4 years) and the initiation of mandatory on-board diagnostic (OBD) inspections for model year 1996 and newer vehicles. The OBD test largely replaced the dynamometer based Acceleration Simulation Mode (ASM5015) exhaust test for these newer vehicles. New Jersey submitted a Final SIP revision that contained the results of performance standard modeling for these I/M program changes on November 27, 2002.[16] The USEPA subsequently approved this SIP revision.[17]

[14] N.J.A.C. 7:27-16.3 requires that Stage II vapor recovery systems reduce the total applicable VOC emissions into the outdoor atmosphere by no less than 95 percent of the concentration of applicable VOC by volume in the air-vapor mixture displaced during the transfer of gasoline.
[15] 69 Fed. Reg. 40321 (July 2, 2004).
[16] NJDEP. Enhanced Inspection and Maintenance (I/M) Program for the State of New Jersey Revised Performance Standard Modeling SIP Revision. New Jersey Department of Environmental Protection. November 27, 2002. Available at http://www.state.nj.us/dep/baqp/sip/4year/4yrexempt_fin.doc.
[17] 68 Fed. Reg. 7704 (February 18, 2003).

New Jersey Heavy Duty Diesel Rules Including "Not-To-Exceed" (NTE) Requirements

The NJDEP adopted new rules and amendments on October 28, 2001 to N.J.A.C. 7:27-26 that added requirements for new heavy-duty diesel vehicles (HDDVs) equipped with model year 2005 and newer heavy-duty diesel engines (HDDEs) sold in New Jersey. Specifically, the rulemaking required these new HDDEs to be certified as meeting California's HDDE requirements. These requirements include both the federal emission standards applicable to all model year 2004 and newer HDDEs, plus a number of testing procedures which the USEPA required for model year 2007 and newer HDDEs. The NTE test procedure is so called because it is used to demonstrate that an engine does not exceed, under a wide variety of operating conditions, an emissions cap of 1.25 times the Federal Test Procedure emission standard. For this reason, the California requirements are often referred to as the NTE requirements. California promulgated these NTE requirements to address a temporal gap of two years between the end of the requirements set forth in the consent decrees entered into by seven major HDDE manufacturers and the effective date of equivalent federal testing requirements. It was anticipated that the adoption of the NTE requirements by states regulating the majority of HDDEs sold in the United States would encourage and provide incentive for engine manufacturers to produce only engines meeting the NTE requirements.

On October 25, 2005, the NJDEP adopted new rules, rule amendments, recodifications and repeals of rule provisions to clarify and supplement the existing requirements for the sale, for use or registration in New Jersey, of certain HDDVs and HDDEs, model years 2007 and later. The rulemaking did not impose any new standards for model year 2007 and later HDDEs per se; rather, it served to clarify the finer points of the application of CARB-certification requirements to model year 2007 and beyond, since CARB's standards for those model years are significantly different from the NTE requirements and standards for model years 2005 and 2006 and were not discussed in the NJDEP's 2001 rulemaking. In addition, a prohibition of the practice known as "stockpiling" was added. Stockpiling is the practice of purchasing vehicles and/or engines earlier than necessary in order to avoid more stringent emission standards. Finally, the NJDEP added provisions that would, in the event that the provisions of the Federal 2007 rule are not in effect, require recordkeeping and reporting of the sale, for use in New Jersey, of model year and later HDDEs.

4.2.2 Federal

Pre-2002 with benefits achieved Post 2002 – On the books

Residential Woodstove New Source Performance Standards (NSPS): The USEPA New Source Performance emission standards for new wood burning stoves[18] and fireplace inserts have not been updated since they were implemented in 1992. These standards are 7.5 grams per hour for non-catalytic controlled units and 4.1 grams per hour for catalytic controlled units. There are no control requirements for fireplace inserts or wood stove units installed prior to 1992, and these units emit from 30 to 70 grams per hour. The USEPA indicates that they do not have any plans to update the NSPS anytime soon. Instead, the USEPA is choosing to focus on voluntary wood stove change-out programs, rather than new standards.

Onboard Refueling Vapor Recovery (ORVR) Beyond Stage II: The USEPA published regulations requiring ORVR[19] standards for the control of vehicle refueling emissions in 1994.[20] ORVR works by routing refueling vapors to a carbon canister on the vehicle and is estimated to achieve a 95-98 percent reduction in VOC emissions for those vehicles equipped with ORVR. ORVR was required to be installed on some new vehicles in 1998, and was required in all new vehicles in 2006.

Tier 1 Vehicle Program: 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.[21] 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 non-methane hydrocarbons (NMHC), hydrocarbons measured on a non-methane basis. The standards themselves are a function of vehicle class, pollutant, useful life, engine cycle, and fuel. The Tier I rulemaking also established new intermediate and full useful life[22] levels for light-duty vehicles and light-duty trucks, as well as new vehicle weight classes. The regulation affected petroleum and methanol-fueled motor vehicles.

National Low Emission Vehicle Program (NLEV): The NLEV[23] program required automobile manufacturers to meet more stringent new car standards, starting with the 1999 model year in the OTC states and starting with the 2001 model year in the

[18] A wood burning stove is defined as a free standing enclosed wood-burning unit, vented to the atmosphere, and designed to provide heat to a home. In contrast, a fireplace insert is defined as a self-enclosed unit that sits within a masonry structure, vented to the atmosphere, that is not designed as a primary heating source for a home. The USEPA emission standards do not cover masonry-constructed fireplaces without fireplace inserts, but these unique fireplaces are thought to account for a very small segment of the wood burning conducted in the New Jersey.

[19] For more information on ORVR, see the USEPA's web page on *"Commonly Asked Questions About ORVR"* available at http://www.epa.gov/otaq/regs/ld-hwy/onboard/orvrq-a.txt.

[20] 59 Fed. Reg. 16262 (April 6, 1994).

[21] 56 Fed. Reg. 25724 (June 5, 1991).

[22] Useful life is the number of years that the vehicle is expected to be in use.

[23] For more information on NLEV, see USEPA website at http://www.epa.gov/otaq/lev-nlev.htm.

remainder of the nation except for California. New Jersey committed to participate in the NLEV Program starting with model year 2006, except as provided in 40 C.F.R. §86.1707. However, if by no later than December 15, 2000, the USEPA did not adopt standards at 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. 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 extended through the model year 2006, after which New Jersey came under the Federal Tier II program. New Jersey subsequently adopted the Low Emission Vehicle II (LEV II) program, which becomes effective for vehicles delivered for sale in New Jersey on and after January 1, 2009. A discussion of New Jersey's LEV II program is included in Section 5.3.1.

Tier 2 Vehicle Program/Low Sulfur Fuels: On February 10, 2000, the USEPA promulgated rules for its comprehensive TierII/Low Sulfur Gasoline program.[24] These regulations are designed to treat a vehicle and its fuel as a system, resulting in multiple efforts to reduce highway source emissions. 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. These regulations phased in between 2004 - 2007.

Heavy Duty Diesel Vehicle (HDDV) Defeat Device Settlement: On October 22, 1998, the U.S. Department of Justice and the USEPA announced a settlement with seven major diesel engine manufacturers to resolve claims that they installed computer software on 1993 through 1998 model year heavy-duty diesel engines which was designed to disengage the engine's emission control system during highway driving.[25] 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 settlement also required the manufacturers to offer software updates (chip reflash) at no cost to the truck owners at the time of engine rebuild.

Heavy Duty Diesel Vehicle (HDDV) Engine Standards[26]: 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. This rule finalized 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 began in 2007. This new rule required 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 emit 78 percent less NOx and hydrocarbons, and diesel trucks to emit 40

[24] 65 Fed. Reg. 6698 (February 10, 2000).
[25] For more information, see USEPA's web page on Heavy Duty Diesel Engine Consent Decree Documents at www.epa.gov/Compliance/resources/cases/civil/caa/diesel/condec.html.
[26] For more information, see the USEPA's Office of Transportation and Air Quality web site at http://www.epa.gov/otaq/hd-hwy.htm.

percent less NO_x and hydrocarbons, than current models. The second phase of the program required cleaner diesel fuels and even cleaner engines, reducing air pollution from trucks and buses by another 90 percent. The USEPA issued the final rule, to take effect in 2006-2007 on January 18, 2001.[27]

Nonroad Diesel Engines: 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).[28] These Tier 1 standards phased in from 1996 to 2000. In October 1998, the USEPA promulgated regulations to control VOC, NO_x and carbon monoxide (CO) emissions from diesel-powered compression ignition engines for all engine sizes.[29] This rule includes Tier 1 standards for engines under 50 horsepower (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 engines standards.[30] The new Tier 1 standards were phased in between the years 1999 and 2000, Tier 2 standards between 2001 and 2006, and Tier 3 between 2006 and 2008.

Large Industrial Spark-Ignition Engines over 19 kilowatts: Spark-ignition nonroad engines are mostly powered by liquefied petroleum gas, with others operating on gasoline or compressed natural gas. These engines are used in commercial and industrial applications, including forklifts, electric generators, airport baggage transport vehicles, and a variety of farm and construction applications.

In September 2002, the USEPA adopted new standards to regulate these engines.[31] The emission standards are two-tiered. The Tier 1 standards, which started in 2004, are based on a simple laboratory measurement using steady-state procedures. The Tier 2 standards starting in 2007 are based on transient testing in the laboratory, which ensures that the engines will control emissions when they operate under changing speeds and loads in the different kinds of equipment.

Also included is an option for manufacturers to certify their engines to different emission levels to reflect the fact that decreasing NO_x emissions tend to increase carbon monoxide emissions (and vice versa). In addition to these exhaust-emission controls, manufacturers must take steps starting in 2007 to reduce evaporative emissions, such as using pressurized fuel tanks. Tier 2 engines are also required to have engine diagnostic capabilities that alert the operator to malfunctions in the engine's emission-control system. Finally, the rule also includes special standards to allow for measuring emissions without removing engines from equipment.

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[27] 66 Fed. Reg. 5002 (January 18, 2001).
[28] 59 Fed. Reg. 31306 (June 17, 1994).
[29] 63 Fed. Reg. 56968 (October 23, 1998).
[30] USEPA. Regulatory Announcement: New Emission Standards for Nonroad Diesel Engines. United States Environmental Protection Agency Office of Mobile Sources, EPA420-F-98-034, August 1998.
[31] 67 Fed. Reg. 68241 (November 8, 2002).

Recreational Vehicles: Recreational vehicles include snowmobiles, off-highway motorcycles, and all-terrain-vehicles (ATVs). In September 2002, the USEPA adopted new standards to regulate nonroad recreational engines and vehicles.[32] These standards are presented in Table 4.2.

Table 4.2: Summary of Emission Standards for Recreational Vehicles

Vehicle	Model year	Emission standards		Phase-in
		HC g/kW-hr	CO G/kW-hr	
Snowmobile	2006	100	275	50%
	2007 through 2009	100	275	100%
	2010	75	275	
	2012*	75	200	
		HC+NOx g/km	CO g/km	
Off-highway Motorcycle	2006	2.0	25.0	50%
	2007 and later	2.0	25.0	100%
ATV	2006	1.5	35.0	50%
	2007 and later	1.5	35.0	100%

*Or equivalent per 40 C.F.R. §1051.103

Federal Compression Ignition Marine Engine Regulations (Commercial Marine Engines)[33, 34]: 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.[35] This rule established VOC and NO_x emission standards, starting in 2004, for new engines with per cylinder displacement up to 2.5 liters. This rule also established standards in 2007 for engines with per cylinder displacement between 2.5 and 30 liters.[36] The engines covered by this rule are divided into two categories: Category 1: rated power at or above 37 kW - specific displacement of less than 5 liters per cylinder. These engines are primarily found in fast ferries. Category 2: rated power at or above 37 kW - specific displacement greater than or equal to 5, but less than 30, liters per cylinder. These engines are primarily found in tug and towboats.

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[32] 67 Fed. Reg. 68241 (November 8, 2002).

[33] For more information, see the USEPA's regulatory announcement on Emission Standards for New Commercial Marine Diesel Engines at http://www.epa.gov/otaq/regs/nonroad/marine/ci/fr/f99043.pdf.

[34] The USEPA has not finalized Tier 2 standards for Category 3 commercial marine engines. The USEPA will promulgate final Tier 2 standards for Category 3 engines on or before December 17, 2009. ("Category 3" means relating to a marine engine with a specific engine displacement greater than or equal to 30 liters per cylinder). Source: 40 C.F.R. §§ 94.1, 94.8; 72 Fed. Reg. 20948 (April 27, 2007).

[35] 64 Fed. Reg. 73300 (December 29, 1999).

[36] USEPA. Technical Highlights: Organization of Gasoline and Diesel Marine Engine Emission Standards. United States Environmental Protection Agency Office of Mobile Sources, EPA420-F-99-046. December 1999.

Federal Small Spark Ignition Engine Regulations: In July 1995, the USEPA promulgated the first phase of its regulations to control emissions from new nonroad spark ignition engines.[37] This regulation established VOC and carbon monoxide emission standards for all model year 1997[38] and newer nonroad 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. In March 1999, the USEPA promulgated Phase 2 regulations to control emissions from new nonroad spark ignition engines.[39] These regulations established tighter VOC and NO_x standards for non-handheld equipment such as lawn mowers and commercial turf equipment. The new standards were phased in between the years 2001 and 2007. In March 2000, the USEPA promulgated additional Phase 2 regulations to control emissions from new nonroad spark ignition engines.[40] 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 were phased in between the years 2002 to 2007.

Post 2002 – Federal On the Books

USEPA Maximum Achievable Control Technology (MACT) Standards[41]: MACT is the level of control required for hazardous air pollutants (HAPs)[42,43] under 42 U.S.C. § 7412 of the Clean Air Act. Specifically, 42 U.S.C. § 7412 of the Clean Air Act requires that emission standards for hazardous air pollutant (HAP) categories be promulgated on a 2-, 4-, 7- or 10-year schedule, but not later than 10 years after the date of the enactment of the Clean Air Act Amendments of 1990. The USEPA established these standards. Generally the MACT standard only applies to sources that are considered major sources of HAP, i.e., sources with plant-wide potential to emit more than 10 tons per year of any individual HAP or 25 tons per year of aggregate HAPs. HAPs are substances that cause serious health effects. These health effects include cancer, birth defects, nervous system problems and death due to massive accidental releases.[44] Several of the regulated HAPs are also VOCs, which are precursors to the formation of ozone. Therefore, a reduction in HAPs can also lead to a reduction in VOCs.

[37] 60 Fed. Reg. 34581 (July 3, 1995).
[38] Ibid; Model year 1997 is defined as "The 1997 model year will run from January 2, 1996 to December 31, 1997".
[39] 64 Fed. Reg. 15207 (March 30, 1999).
[40] 65 Fed. Reg. 24268 (April 25, 2000).
[41] For a list of all the MACT standards, visit USEPA's Air Toxics website at http://www.epa.gov/ttn/atw/mactfnlalph.html.
[42] Substances listed in 1990 Clean Air Act Title I, Sec. 112(b).
[43] For more information, visit the USEPA's Air Toxics website at http://www.epa.gov/ttn/atw/mactfnlalph.html.
[44] United States Environmental Protection Agency's Plain English Guide to the Clean Air Act, April 1993.

Industrial Boiler/Process Heater MACT: On September 13, 2004, the USEPA established a MACT that applies to industrial, commercial, and institutional units firing solid fuel (coal, wood, waste, biomass) which have a design capacity greater than 10 MMBtu/hr and are located at a major source of HAPs.[45] See the discussion on HAPS under USEPA MACT Standards.

Clean Air Interstate Rule(CAIR): CAIR is the USEPA's attempt to address the interstate transport of ozone and fine particulate precursors by requiring emission reductions of sulfur dioxide (SO_2) and oxides of NO_x. The CAIR expects to obtain these reductions from large electric generating units (EGUs greater than 25 MW) through three cap-and-trade programs: ozone season NO_x, annual NO_x and annual SO_2. The CAIR ozone season NOx cap and trade program essentially replaces the NO_x Budget Program with lower caps and an expanded geographical region to the south and west of the NOx SIP Call region. The CAIR also creates new annual NO_x and SO2 cap and trade programs. New Jersey is adopting new rules for the CAIR NO_x Trading Program in the summer of 2007, which will allow New Jersey to allocate NOx allowances to New Jersey sources with similar equations used in the NO_x Budget Program beginning 2009.

Refinery Enforcement Initiative: The USEPA and various state and local agencies have negotiated, or are in the process of negotiating, Consent Decrees with the major refineries on the East Coast to elicit emission reductions from five major refinery processes. The processes are Fluid Catalytic Cracking Units (FCCUs) and Fluid Coking Units (FCUs), Process Heaters and Boilers, Flare Gas Recovery, Leak Detection and Repair (LDAR), and Benzene/Wastewater. The New Jersey refineries impacted by the settlements include Sunoco, Conoco Phillips, Valero, and Citgo Asphalt Refining Company.

For FCCUs/FCUs, the Consent Decree control requirements generally require the installation of wet gas scrubbers for SO_2 control, and selective catalytic reduction (SCR), selective non-catalytic reduction (SNCR), or optimization studies to reduce NO_x emissions.

For process boilers/heaters, the control requirements for SO_2 emissions generally require the elimination of burning solids/liquid fuels. For NO_x emissions, the control requirements generally apply to units greater than 40 MMBtu per hour capacity or larger. In many cases, the Consent Decrees establish NO_x emission reduction objectives across a number of refineries that are owned by the same firm. Therefore, the companies have some discretion in deciding which individual boilers/heaters to control as well as the control techniques to apply.

The Consent Decrees also included enhanced leak detection and repair programs (e.g., reducing the defined leak concentration) increased monitoring frequency, and other requirements.

Finally, the settlements are expected to produce additional SO_2, NO_x and VOC emissions reductions for flare gas recovery and wastewater operations. While the Consent Decrees

[45] 69 Fed. Reg. 55217 (September 13, 2004).

have various phase-in dates, significant emission reductions from five major refinery processes are expected prior to the 2009 ozone season.

4.3 Beyond On The Way Controls

The following sections discuss how state beyond on the way (BOTW) measures (both regional initiatives and state only) were identified and provides descriptions of the BOTW measures included in the State's attainment demonstration and RFP demonstration.

4.3.1 Identifying Measures

New Jersey participated in a wide variety of processes aimed at identifying viable control measures that could be implemented in time to help the State reach its 8-hour ozone attainment goal by June 15, 2010. The following section briefly discusses those processes, and the measures identified as viable through those processes that the State is moving forward to propose.

4.3.1.1 Regional Activities

New Jersey is an active member of four regional organizations, each with a unique focus with respect to either geographic area, air pollution concern or both. These organizations include:

The Ozone Transport Commission (OTC), a multi-state organization created under the Clean Air Act to advise the USEPA on ozone transport issues and develop and implement regional solutions to the ground-level ozone problem in the Northeast and Mid-Atlantic regions.

Mid-Atlantic Regional Air Management Association (MARAMA), a non-profit association of ten state and local air pollution control agencies whose mission is to strengthen the skills and capabilities of member agencies and to help them work together to prevent and reduce air pollution in the Mid-Atlantic Region.

Northeast States for Coordinated Air Use Management (NESCAUM), a nonprofit association of air quality agencies in the Northeast designed to provide scientific, technical, analytical, and policy support to the air quality programs of the eight Northeast states.

The Mid-Atlantic/Northeast Visibility Union (MANE-VU), which was formed by the Mid-Atlantic and Northeastern states, tribes, and federal agencies to coordinate regional haze planning activities for the region.

All of these organizations had an active role in the technical support work associated with this proposed SIP revision. MANE-VU supported the regional inventory work that was utilized in the regional modeling effort (see Chapter 5). NESCAUM focused on control measures more closely linked with fine particulate matter ($PM_{2.5}$) and regional haze reductions (mainly low sulfur fuel for industrial commercial and residential facilities). The OTC and MARAMA coordinated regional control measure identification efforts specific to ozone reductions. Their efforts and the results of those efforts are summarized in the following sections.

4.3.1.2 Ozone Transport Commission (OTC)

New Jersey worked with other jurisdictions in the Ozone Transport Region to explore reasonable control measures for potentially significant emission reductions. To accomplish this, the OTC staff and member jurisdictions formed workgroups to: 1) review mobile, point, and area source categories, 2) identify candidate source categories, and 3) consider potential control strategies for those source categories to reduce NO_x, VOC and SO_2 emissions.

Each OTC workgroup focused on a different sector (mobile/point/area) and compiled a list of viable control measures from sources published by the USEPA and various regional associations, OTC member state-specific control strategies already in place, and emission control initiatives from states outside the Ozone Transport Region, such as California. Then using 2002 emission inventories as the base year, the workgroups determined projected 2009 emission reductions based on currently existing controls including Federal rules, adoption of previous OTC model rules by member jurisdictions, enforcement settlements, and other state-specific control measures, and incorporated estimated growth of inventories. Based on the review of the list of control measures and the emission inventories, the workgroups developed a preliminary list[46] of candidate control measures thought to be most effective in reducing emission levels throughout the ozone transport region.

From this preliminary list, the OTC workgroups developed white papers, summarizing key facts about the relevant control alternatives. The white papers provided information such as descriptions of source categories and candidate control measures, 2002 base year emissions, 2009 projected emissions after implementation, preliminary cost estimates, current federal and state regulations, recommended method of implementation, applicability and geographic impact. Some of the papers reflected inter-regional efforts such as those by the MARAMA for refineries, and the NESCAUM for heating oil, and super-regional discussions with the Midwest Regional Planning Organization (MWRPO) regarding Industrial, Commercial and Institutional (ICI) boilers and Electric Generating Units (EGUs). Using a scale of recommendations from 1 (definitely recommended) to 5 (not recommended), the member jurisdictions ranked the relative importance of the source categories and control strategies based on a qualitative assessment of the information presented in the white papers. After consideration of the estimated costs and magnitude of reductions potentially achievable for the selected emission sources, the OTC member jurisdictions identified reasonable control measures for a variety of source categories. Both during and after the ranking process, the OTC received written

[46] To review the preliminary list of OTC-identified control measures that were further evaluated for potential emission reductions, see the OTC web site at http://www.otcair.org/document.asp?fview=Report.

comments from stakeholders, held public meetings, and interfaced with impacted industries to better understand the source categories and how to regulate them effectively. The final list of source categories recommended by OTC for member jurisdictions to consider for emission reductions in developing their 8-hour ozone SIPs are presented in Table 4.3.

Table 4.3: Final OTC Control Measure Source Categories[47]

Sector	Source Category
Area	Adhesives, Sealants, Adhesive Primers, and Sealant Primers (Industrial)
Area	Cutback and Emulsified Asphalt Paving
Area	Consumer Products
Area	Portable Fuel Containers
Area and Point	Asphalt Production Plants
Area and Point	Industrial/Commercial/Institutional (ICI) Boilers >250 MMBtu/hour
Area and Point	ICI Boilers 100-250 MMBtu/hour
Area and Point	ICI Boilers 25-100 MMBtu/hour
Area and Point	ICI Boilers <25 MMBtu/hour
Point	Glass Furnaces
Point	Cement Plants
Onroad Mobile	Diesel Truck Chip Reflash
Onroad Mobile	Regional Fuel based on Reformulated Gasoline Options

Those unshaded source categories in Table 4.3 are included for consideration in New Jersey's proposed SIP revision entitled "Proposed Reasonably Available Control Technology (RACT) for the 8-Hour Ozone National Ambient Air Quality Standard (NAAQS) and other Associated State Implementation Plan (SIP) Revisions for the Fine Particulate Matter National Ambient Air Quality Standard (NAAQS), Regional Haze, and the Clean Air Act Requirements on Transport of Air Pollution," which was submitted to the USEPA for their review and consideration on February 2, 2007. The shaded categories are not included in New Jersey's RACT SIP. A hearing on that proposed SIP revision was held on March 19, 2007, and New Jersey is reviewing the comments received from the public on those RACT-related control measures under consideration. For more on New Jersey's RACT process, see Section 4.3.1.4.3. It is anticipated that New Jersey's RACT SIP will be submitted in June 2007, and RACT rules will be proposed shortly thereafter.

For three of the OTC measures (adhesives and sealant, consumer products and portable fuel containers), the OTC drafted model rules. In addition, the NESCAUM developed a model rule for diesel chip reflash for state use, and this program was included in the OTC's final Technical Support Document. For the remaining measures shown in Table

[47] The following programs that are listed in Table 4.3 are not discussed in New Jersey's proposed SIP document: 1) Regional Fuel based on Reformulated Gasoline Options is not discussed because there is already a mandatory program required by Section 211(k) of the Clean Air Act in New Jersey. 2) Cement Plants are not discussed because there are no cement plants in New Jersey. 3) Diesel Chip Reflash is not discussed because the OTC states, including New Jersey, are considering possible actions to increase the number of chip reflash installations of HDDVs in the Northeast.

4.3, the OTC developed emission limits and rule specification guidance. Finally, the OTC member states recently signed a Memorandum of Understanding (MOU) (Appendix C1) that addresses emissions associated with high electrical demand days (HEDD) to compliment already existing and future cap-and-trade programs with respect to electrical generation. This regional HEDD program will address the peak load emissions from the electrical generation sector on a seasonal basis. A brief summary of all the OTC-identified control measures is included in the following subsection. For more information about the OTC control measure identification process, or the control measures identified for implementation through this process, please see Appendix C2.

New Jersey and other OTC member jurisdictions have resolved to pursue necessary and appropriate rulemakings to implement the emission reduction percentages, emission rates or technologies for the categories listed in Table 4.3 that are consistent with guidelines found in OTC Resolution 06-02 adopted on June 7, 2006, and amended on November 15, 2006, found in Appendix C3, as well as the High Electrical Demand Days MOU found in Appendix C1. The suggested compliance date for these guidelines is January 1, 2009, or as soon as practicable.

OTC Identified Beyond on the Way (BOTW) Measures:

Consumer Products 2009 Amendments: As discussed in Section 4.2.1, on May 3, 2004, New Jersey adopted amendments to its consumer product rules at N.J.A.C. 7:27-24 based on the OTC 2001 model rule. The OTC prepared amendments to their 2001 model rule based on the CARB 2005 amendments. New Jersey plans to propose amendments to its existing rule based on the OTC 2007 model rule. In July 2005, the CARB amended their consumer products rules. The new amendments to the CARB rule affected 18 categories of consumer products (14 new categories, including subcategories, with new product category definitions and VOC limits; one previously regulated category with a more restrictive VOC limit; and two previously regulated categories with additional requirements) such as electrical cleaners, footwear or leather care products, and toilet/urinal products. The OTC 2007 model rule does not include CARB's regulation for the second tier shaving gels and antistatic aerosols. For more details on this future rulemaking, see Appendix C2 and the OTC 2007 model rule.[48]

Portable Fuel Containers 2009 Amendments: As discussed in Section 4.2.1, on May 3, 2004, New Jersey adopted new rules to regulate PFCs at N.J.A.C. 7:27-24 based on the OTC 2001 model rule. Subsequent to New Jersey adoption, the CARB adopted a second set of amendments to its PFC rules in two phases. The OTC prepared amendments to their 2001 model rule based on the CARB 2006 amendments. New Jersey plans to propose amendments to its existing rule based on the OTC 2007 model rule.

The first phase of CARB amendments was filed on January 13, 2006, and became effective on February 12, 2006. For Phase I, the CARB amended their PFC regulation to address the use of utility jugs and kerosene containers that are sometimes used by

[48] The OTC 2007 model rule is available at http://www.otcair.org/projects_details.asp?FID=99&fview=stationary

consumers for gasoline. The second phase of the amendments was filed on September 11, 2006, and became effective on October 11, 2006. These amendments include the following:

1. Eliminate the requirement for an auto shutoff.
2. Eliminate fuel flow rate and fill level standards.
3. Eliminate one opening standard.
4. Establish a certification program for PFCs.
5. Change permeability standard from 0.4 grams ROG /gallon-day to 0.3 grams/gallon-day.

In addition, in February 2007, the USEPA finalized a national regulation to reduce hazardous air pollutant emissions from mobile sources, which is comparable to the CARB rules for gasoline PFCs. For more details on this future rulemaking, see Appendix C2 and the OTC 2007 model rule.[49]

Adhesives and Sealants: Adhesives and sealants are used in product manufacturing, packaging, construction, and installation of metal, wood, rubber, plastic, ceramics, or fiberglass materials. An adhesive is any material used to bond two surfaces together. A sealant is a material with adhesive properties that is used primarily to fill, seal, waterproof or weatherproof gaps or joints between two surfaces. VOC emissions in this category are primarily from industrial and commercial operations, such as wood product manufacturers, upholstery shops, adhesive retailers, and architectural trades, such as building construction, floor covering installation and roof repair.

The Federal, CARB, OTC and NJDEP consumer products rules, discussed in Section 4.2.1 and in the preceding paragraphs, regulate "household" adhesives. The OTC developed a model rule in 2007, based on CARB's 1998 model rule. New Jersey plans to propose new adhesive and sealant rules based on the OTC 2007 model rule. In December 1998, the CARB developed a model rule for adhesives and sealants sold in larger containers and used primarily in commercial and industrial applications, titled "Determination of Reasonably Available Control Technology (RACT) and Best Available Retrofit Control technology (BARCT) for Adhesives and Sealants." The CARB model rule regulates the application of adhesives, sealants, adhesive primers and sealant primers by providing options for appliers to either use a product with a VOC content equal to or less than a specified limit or to use add-on controls. The rule also sets VOC limits for certain categories of adhesives and sealants, has requirements for cleanup solvents, and surface preparation solvents and requires that VOC containing materials must be stored or disposed of in closed containers. For more details on this future rulemaking, see Appendix C2 and the OTC 2007 model rule.[50]

[49] ibid.
[50] ibid.

Asphalt Paving: Asphalt is used to pave, seal and repair surfaces such as roads, parking lots, driveways, walkways and airport runways. Asphalt paving is grouped into three general categories: hot-mix, cutback, and emulsified. Hot-mix asphalt is the most commonly used asphalt. Hot-mix asphalt produces minimal VOC emissions because its organic components have high molecular weights and low vapor pressures. Cutback asphalt is used as a tack coat between old and new layers of hotmix asphalt, in seal operations, in priming new roadbeds for hot-mix applications and in cold-mix applications for pavement repair. Emulsified asphalt is used in most of the same applications as cutback asphalt, but is a lower VOC alternative to cutback asphalt. In December 1977, the USEPA published a Control Technique Guideline (CTG) for the use of cutback asphalt. The CTG recommended replacing cutback asphalt binders with emulsified asphalt during the ozone season. In 1979, the USEPA added a specification for emulsified asphalt to its CTG recommendations to limit the content of oil distillate in emulsified asphalt to no higher than 7 percent oil distillate.

The NJDEP plans to propose amendments to it rules at N.J.A.C. 7:27-16.19 in order to lower VOC emissions from cutback and emulsified asphalt paving applications. The existing rule, based on the the USEPA CTG, bans cutback and emulsified asphalt use from April 16 through October 14, unless:

- they are used solely as a penetrating prime coat;
- the material is a cold-mix, stockpile material used for pavement repair;
- the user can demonstrate that there are no emissions of VOCs from the asphalt under conditions of normal use; or,
- the emulsified asphalt contains no greater than eight percent VOC by volume and is used for mixed-in-place construction.

The proposed amendments, based on OTC guidance, would ban the use or application of cutback asphalt or emulsified asphalt from April 15 through October 15, unless the emulsified asphalt contains no greater than 0.1 percent VOC; or the emulsified asphalt produces no greater than 0.5 milliliter of oil distillate, in accordance with American Society for Testing and Materials (ASTM) Test Method D 244 or American Association of State Highway and Transportation Officials (AASHTO) Test Method T 59. For more details on this future rulemaking, see Appendix C2.

Asphalt Production: Asphalt is a material produced by mixing and heating bituminous substances with gravel, crushed rock or similar materials, and used as a coating or paving. Two types of plants produce asphalt: drum mix and batch mix. In a drum mix asphalt plant, the asphalt cement or other binder is added to the aggregate while the aggregate is in a rotary dryer. In a batch type asphalt plant the asphalt cement or other binder is mixed with the aggregate in equipment other than a rotary dryer. The dryer operation is the main source of pollution at asphalt manufacturing plants. New Jersey has 70 production plants with rotary dryer burner capacities typically ranging from 40 MMBtu/hr, to as large as 150 MMBtu/hr that generally use natural gas, fuel oil and/or waste oil. The reaction of nitrogen and oxygen in the dryer creates NO_x emissions in the combustion zone. New Jersey's existing rules limits NO_x emissions from a drum mix or batch type asphalt plant to 200 parts per million by volume dry basis (ppmvd) at seven percent oxygen.

The NJDEP plans to propose amendments to its rules at N.J.A.C. 7:27-19.9 in order to lower NO_x emissions from asphalt production facilities. The proposed amendments, based on OTC guidance, would pursue control measures to achieve at least a 35% reduction of NO_x emissions from asphalt production plants from current levels, with the inclusion of emission limits based on type of fuel combusted and implementation of Best Management Practices (BMP) requirements. The OTC guidance is based on emission rates and percent reductions typically achieved from the installation of low NO_x burners (LNB) and flue gas recirculation (FGR) to reduce NO_x emissions from asphalt plants. A low NO_x burner reduces NO_x by controlling aspects of the combustion process. In flue gas recirculation, the flue gas is cooled and then used to assist in cooling the combustion temperature, which in turn reduces the NO_x generated. The implementation of Best Management Practices would allow for substantial reductions in fuel consumption and the corresponding products of combustion including NOx. Best Management Practices include annual combustor tune-ups, effective stockpile management to reduce aggregate moisture content, lowering mix temperature, and other maintenance and operational best practices. For more details on this future rulemaking, see Appendix C3.

<u>Glass Manufacturing</u>: The glass manufacturing process requires that raw materials, such as sand, limestone, soda ash, and cullet (scrap and recycled glass), be fed into a furnace at temperatures between 2,700 degrees Fahrenheit to 3,100 degrees Fahrenheit. The raw materials then chemically react creating the molten material known as glass. The main product types are flat glass, container glass, pressed and blown glass, and fiberglass. New Jersey’s six manufacturing plants operate 21 glass manufacturing furnaces (GMFs), of which, one plant manufactures fiberglass and the other five manufacture container-type glass. There are no flat glass facilities operating in New Jersey at this time.

The reaction of nitrogen and oxygen in the furnace creates NO_x emissions. New Jersey’s current NO_x emission limits for a glass manufacturing furnace used to produce a container-type glass is 5.5 pounds (lbs) NO_x per ton of pulled glass and 11 lbs NO_x per ton of pulled glass for specialty container glass.[51] Pulled glass is the total output from the furnace and includes the glass produced, including the rejected glass. New Jersey’s existing rule does not specify a NO_x emissions limit for a glass manufacturing furnace used to produce flat glass; instead, the NJDEP determines the limit on a case by case basis.

New Jersey plans to propose amendments its current glass manufacturing rules at N.J.A.C. 7:27-19.10. The proposed amendments, based on OTC guidance, would revise the NO_x emission rates to reduce emissions consistent with the installation of oxy-fuel firing at the time of the next furnace re-build. Although several alternative NO_x control technologies exist, including combustion modifications (low NO_x burners, oxy-fuel firing, oxygen-enriched air staging), process modifications (fuel switching, batch preheat,

[51] "Specialty container glass" means clear or colored glass made of soda-lime recipe, which is produced to meet the specifications of any standard set forth by The United States Pharmacopeia or The National Formulary, and which is used for pharmaceutical, cosmetic or scientific purposes.

electric boost), and post combustion modifications (fuel reburn, SNCR, SCR), oxyfiring is consider the most effective because it not only reduces NO_x emissions by as much as 85 percent, but also reduces energy consumption, increases production rates by 10-15 percent, and improves glass quality by reducing defects. In addition, oxyfiring is demonstrated technology and has penetrated into all segments of the glass industry. Of New Jersey's 21 glass manufacturing furnaces, four are already equipped with oxy-fuel firing and nine are electric. For more details on this future rulemaking, see Appendix C2.

Certain Categories of ICI Boilers: Industrial/commercial/institutional (ICI) boilers combust fuel to produce heat and process steam for a variety of applications, including chemical, metals, paper, petroleum, and food production industries, and for space heating in office buildings, hotels, apartment buildings, hospitals, and universities. Industrial boilers are generally smaller than boilers in the electric power industry, and typically have heat inputs in the 10-250 MMBtu/hr range; however, industrial boilers can be as large as 1,000 MMBtu/hr or smaller than 1 MMBtu/hr. Most commercial and institutional boilers have a heat input less than 100 MMBtu/hr. In New Jersey, 70 percent of the population is smaller than 50 MMBtu/hr. For emission inventory purposes, emissions from ICI boilers are included in both the point and area source emission inventories. Generally, the point source emission inventory includes all ICI boilers at major facilities and lists individual boilers, along with their size and associated emissions. The area source inventory generally includes emissions from ICI boilers located at minor facilities and does not provide emissions by the size of boiler, as is done in the point source inventory. Instead, the emissions are calculated based on the fuel use not accounted for in the point source inventory.

Currently, New Jersey ICI boilers are regulated according to size, fuel and boiler type. New Jersey's existing NO_x rules generally apply only to ICI boilers at least 50 MMBtu/hr located at major sources (i.e., point sources). ICI boilers at minor sources (i.e., area sources) are not subject to the maximum allowable emission rates, but are required to adjust the combustion process annually in boilers as small as 5 MMBtu/hr, effective as of 2010.

New Jersey plans to propose amendments to its current ICI boiler rules at N.J.A.C. 7:27-19.7. The proposed amendments would revise the NOx emission limits for both point and area source ICI boilers.

Under the proposed amendments, owners and operators of ICI boilers as small as 25 MMBtu/hr would be required to achieve emission limits specified in the rules. For more details on this future rulemaking, see Appendix C2.

High Electrical Demand Days Program: In March 2007, following a year long process, six of the OTC states committed to pursue reductions in NO_x emissions from electrical generating units that primarily operate on high electrical demand days (HEDD) starting with the 2009 ozone season.[52] On these high electric demand days, increased power generation is needed, usually on short notice. In Connecticut, Delaware, Maryland and Pennsylvania, boilers and turbines that primarily run to follow electrical load needs supply HEDD power generation. In New Jersey and New York, combustion turbines primarily supply HEDD power generation. The majority of the HEDD units in the six states are not controlled and produce significant NO_x emissions on HEDDs. For example, on a typical summer day (June 4, 2005), NO_x emissions for the six states for all Electric Generating Units (EGUs) were 551 tons per day (tpd). On a HEDD (July 26, 2005), NO_x emissions were 1,349 tpd. Most of this increase in emissions is due to power production from uncontrolled HEDD units.

As part of the HEDD initiative, New Jersey plans to reduce NO_x emissions by 19.8 tpd on these high electrical demand days. Specifically, power generators in New Jersey will be responsible for securing these reductions and will be required to submit a plan on how they will reduce NO_x. The generators will have flexibility in securing the 2009 reductions. New Jersey also plans to require that all HEDD units meet performance standards that reflect modern low NO_x technology by May 1, 2015.

4.3.1.3 MARAMA

The MARAMA states concentrated their efforts on identifying and analyzing emissions from all refinery processes to help states with refineries develop their SIPs for ozone, fine particles, and regional haze. The MARAMA Refinery Technical Oversight Committee (TOC), assisted by MACTEC Federal Programs, Inc., evaluated emissions and existing requirements for each type of source found at fourteen (14) petroleum refineries in the MARAMA area. Based on that preliminary review, the TOC selected catalytic and thermal cracking units, boilers and process heaters, flares, equipment leaks, wastewater treatment, storage tanks and sulfur recovery plants for further consideration.

MARAMA evaluated emissions, existing requirements, including recent Consent Decrees from 10 of the 14 identified refineries, available control technology options, and typical installation costs for each category. As a result of this study, MARAMA, assisted by MACTEC Federal Programs, Inc., developed three Model Rules for cracking units, flares and enhanced monitoring of equipment leaks at petroleum refineries. As part of this regional effort to attain the 8-hour ozone standard, the State of New Jersey expects to propose new rules based in part on MARAMA's model rules.[53]

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[52] Memorandum of Understanding Among the States of the Ozone Transport Commission Concerning the Incorporation of High Electrical Demand Day Emission Reduction Strategies into Ozone Attainment State Implementation Planning. Ozone Transport Commission, March 2, 2007.
[53] The MARAMA model rules are posted at http://www.marama.org for public review.

A brief summary of all the MARAMA-identified control measures is included in the following subsections. For more information about the MARAMA control measure identification process, or the control measures identified for implementation through this process, please see Appendix C4.

MARAMA-Identified Beyond on the Way (BOTW) Measures:

Refineries - Fluid Catalytic Cracking Units (FCCUs): Catalytic cracking units convert middle distillate, gas oil and residuum into primarily gasoline, jet and diesel fuels by using a series of processing steps that literally “crack” large, heavy molecules into smaller, lighter ones. Heat and catalyst are used to convert the heavier oils to lighter products. With fluid catalytic cracking (FCC), a fluidized catalyst is used to optimize the cracking process. Fluid catalytic cracking unit systems are the most widely used cracking process in the MARAMA region and are among the largest air emission sources at the refinery. New Jersey has four gasoline-producing refineries with fluid catalytic cracking units. These refineries are major facilities with Title V Operating Permits, and all emit large quantities of criteria pollutants (SO_2, NOx, VOCs, carbon monoxide and coarse particulate matter (PM_{10})) as well as hazardous air pollutants (HAPs). New Jersey currently regulates emissions from fluid catalytic cracking units at N.J.A.C. 7:27-19.13.

MARAMA’s model rule for FCCUs, which will be the basis for New Jersey’s proposed regulatory amendments, includes emissions limits for particulate matter, SO_2, NOx, and carbon monoxide. The MARAMA Technical Oversight Committee chose to use the most stringent limits based on recent Consent Decrees or rules in other jurisdictions. Feasible control technologies are summarized in Table 2-6 of their Final Report.

Refineries – Flares: Petroleum refinery flares are intended to be last-resort control devices used to safely dispose of flammable waste gases from emergency process upsets, as well as during start-up, shutdown and turnaround operations. The combustion of these gases can emit large quantities of NO_x, SO_2, and carbon monoxide into the atmosphere and are believed to be underestimated. New Jersey currently regulates emissions from refinery flares at N.J.A.C. 7:27-16.13.

MARAMA’s model rule for petroleum refinery flares, which will be the basis for New Jersey’s proposed regulatory amendments, includes the control measures designed to reduce NO_x, SO_2, VOC, and carbon monoxide emissions. Specifically, the model rule includes requirements for the owner/operators of refinery flares to operate and maintain a flare gas recovery system, and to eliminate the flaring of routinely generated refinery fuel gases. Other items included in MARAMA’s flare model rule include operational requirements, monitoring system requirements and guidelines for calculating flare emissions. Control technology options for flares are summarized in Table 4-5 of the Final Report.

Refineries - Fugitive Equipment Leaks: Equipment leaks are defined as emissions of VOC from pumps, compressors, pressure relief devices, sampling connection systems, open-ended or in-line valves, and instrumentation systems. Equipment leaks contribute to plant-wide emissions of fugitive VOCs at petroleum refineries. Leak Detection and Repair (LDAR) programs can reduce these fugitive emissions. New Jersey currently regulates equipment leak emissions at N.J.A.C. 7:27-16.18.

MARAMA's model rule for equipment leaks, which will be the basis for New Jersey's proposed regulatory amendments, includes pursuing:

- the enhanced LDAR standards (i.e., standards based on program elements contained in recent Consent Decrees which are generally more stringent measures than existing the federal or State LDAR requirements); and,
- recordkeeping and reporting requirements.

Some of the recommended elements of the enhanced LDAR program include:

- written facility-wide LDAR procedures;
- training of assigned personnel;
- internal and third party audits;
- more stringent leak definitions;
- increased monitoring frequency;
- corrective action for "chronic leakers";
- electronic storing and reporting of data;
- additional Quality Assurance/Quality Control requirements; and,
- routine inspection of external floating roof storage tanks.

A summary of the available control technologies for fugitive equipment leaks can be found at Table 5-2 of the Final Report.[54]

Refineries - Process Heaters and Boilers: Process heaters and boilers operating at petroleum refineries emit large amounts of NO_x, carbon monoxide, SO_2, and PM emissions. Boilers are designed to generate steam for use throughout the refinery, while process heaters burn fuels to transfer heat directly to process materials. Boilers and process heaters are similar in that they are indirect combustion devices that burn fuels such as natural gas, fuel oil, and refinery fuel gas. New Jersey currently regulates NO_x emissions from indirect heat exchangers at N.J.A.C. 7:27-19.7.

Available control technologies for controlling NO_x emissions from these units include Ultra Low NO_x Burners (LNB) and Selective Catalytic Reduction (SCR). These control technologies have been successfully applied to both types of equipment achieving emission reductions up to 90 percent. Recent enforcement settlements required some refineries to reduce NO_x emissions to 0.04 lbs NOx/MMBtu. The NJDEP is proposing new amendments that would established a new maximum allowable NO_x emission rate for boilers and process heaters combusting refinery fuel gas.

[54] Ibid, page ES-5.

4.3.1.4 State Specific Efforts

In addition to New Jersey's participation in the regional control measure identification efforts, the State implemented its own outreach initiative, entitled "Reducing Air Pollution Together." "Reducing Air Pollution Together" was designed to gather control measure ideas and suggestions from the New Jersey public, regulated communities, and other interested parties. In addition, the NJDEP, as required by the Clean Air Act, completed its own internal RACT analysis, to identify viable controls for major stationary sources within the State. Both of these efforts, as well as the control measures identified from them, are discussed in greater detail below.

4.3.1.4.1 New Jersey Workgroup Efforts

The NJDEP began a collaborative effort to discuss the air quality challenges facing New Jersey by hosting a public workshop on June 29, 2005. This workshop served to initiate a dialogue between the NJDEP and interested and affected parties about reducing emissions in order to improve air quality in New Jersey. Over 200 persons representing various industries, environmental and civic groups attended. As a result of the "Reducing Air Pollution Together" workshop, the following six air quality workgroups were formed and collaborated over several months to develop recommendations on how to reduce air emissions from their specific source categories:

- Diesel Initiatives
- Gasoline Cars and Trucks
- Homes and Restaurants
- Non-Automobile Gasoline Engines
- Stationary Combustion Sources
- Volatile Organic Compounds from Industrial Processes and Consumer Products

The workgroups identified potential control measures to reduce NO_x, VOC, $PM_{2.5}$, and VOC emissions for possible inclusion in the State's upcoming SIP revisions. Through the cooperative efforts of the NJDEP, federal agencies, industry, consultants, environmental groups, and other members of the regulated community, the workgroups evaluated available emission inventories, technical information and field data to develop lists of potential air emission control strategies related to their topic area. The criteria used by the workgroups to prioritize control measures included technical feasibility, economic feasibility, environmental benefits, and implementation feasibility. The air quality workgroups compiled their recommendations into reports that were submitted to the NJDEP for further consideration on October 31, 2005. The workgroups presented a summary of their recommendations to the NJDEP's Air Quality Management Team on November 14, 2005. This event was another opportunity for the NJDEP staff and workgroup members to discuss the workgroup recommendations.

The NJDEP's workgroup leaders and facilitators met with the NJDEP's Air Quality Management team to review the over 200 workgroup recommendations and identify those control strategies with significant potential emissions reductions. After culling that list down to 60 potential control measures, the NJDEP then generated white papers[55] for each measure. These white papers were posted on the NJDEP's website for public review and comment. The NJDEP made revisions to individual white paper where appropriate, based on comment and/or additional information. In addition, the NJDEP invited the public, representatives from local businesses, industry and environmental groups, and others to a follow-up workshop to discuss potential emission reduction strategies on May 17, 2006. The purpose of that workshop was for the NJDEP to provide an update on efforts during the past year to address air quality challenges facing New Jersey and to share preliminary regulatory and nonregulatory plans to reduce air emissions. Following the May 17, 2006 workshop, the public was asked to provide feedback on the workshop, and on the 60 white papers drafted by the NJDEP and discussed at the workshop.[56]

Many of the white paper measures are the same as those identified through the OTC and MARAMA effort, and the State's own RACT and Reasonably Available Control Measure (RACM) analyses, discussed in more detail in Section 4.3.1.4.3 and Chapter 7, respectively. The remainder of the measures identified will continue to be used as a resource in the future, to help the State decide which strategies to include in its upcoming $PM_{2.5}$ and regional haze SIP.

4.3.1.4.2 New Jersey Board of Public Utilities (BPU) Energy Master Plan Efforts

On October 3, 2006, Governor Jon S. Corzine announced the commencement of an interagency planning process that will culminate in an energy master plan, a long-term energy vision for the state that plans for the state's energy needs through 2020.[57] New Jersey is statutorily required to prepare an Energy Master Plan every 10 years and to update the plan every three years.[58] The most recent Energy Master Plan was published in 1991 and updated in 1995 in response to the introduction of wholesale competitive electricity markets in the region.[59]

The Energy Master Plan will address three areas: security, safety, and reliability of prices of energy supply and services; economic impact of energy production, transportation, and end use; and environmental impact associated with the production of energy.[60] The main goal of the Energy Master Plan is to reduce projected energy use by 20% by 2020 and

[55] A complete list of white papers, with links to the actual papers, can be found at www.nj.gov/dep/airworkgroups/docs/wp_summary_table_web.xls.
[56] Comments received on the white papers are posted at www.nj.gov/dep/airworkgroups/comments.html.
[57] State of New Jersey Office of the Governor. *Governor Corzine Announces Initial Phase of Energy Master Plan*. Available at http://www.nj.gov/governor/news/news/approved/20061003.html. October 3, 2006.
[58] N.J.S.A. 52:27F-14
[59] State of New Jersey Energy Master Plan. *Planning for New Jersey's Energy Future*. Available at: http://www.nj.gov/emp/about/.
[60] Op. Cit., note 49

meet 20% of the State's electricity needs with Class 1 renewable energy sources by 2020.[61] Other goals of the Energy Master Plan are described below:

> **Goal 1: Secure, Safe, and Reasonably Priced Energy Supplies and Services –** To provide safe, secure, reasonably priced energy supplies and services to New Jersey's commercial, industrial, transportation, and residential customers, while reducing dependence on traditional fossil fuels and fossil fuel generation, decreasing electric and natural gas transmission congestion, utilizing efficiency and renewable resources to supplement the State's energy resources, proactively planning for in-state electricity generation retirements, and reducing the demand for energy.[62]
>
> **Goal 2: Economic Growth and Development –** To encourage and maintain economic growth prospects for the State by recognizing and fostering the multiple functions of energy in the economy.[63]
>
> **Goal 3: Environmental Protection and Impact –** To promote the achievement of Federal and State environmental requirements and objectives in an effective and low-cost manner and, where possible, provide market-based incentives to achieve those goals.[64]

Public participation began October 2006, with a series of stakeholder meetings held throughout the state. That continued with the formation of External Working Groups for energy categories. More than 250 people have attended Energy Master Plan meetings, offered input and ideas, and joined the listserv. Opportunities for public comment will be available when the draft Energy Master Plan is released on or before July 10, 2007. Public hearings are tentatively scheduled for the week of September 10, 2007. The completed Energy Master Plan is expected to be released by Governor Corzine October, 2007.[65]

4.3.1.4.3 Reasonably Available Control Technology (RACT)

On February 2, 2007, the State submitted its proposed 8-hour ozone RACT plan to the USEPA as part of a SIP revision. A hearing to accept public comment on that SIP proposal was held on March 19, 2007. The 8-hour ozone RACT analysis was conducted pursuant to Clean Air Act 42 U.S.C. § 7502 for the primary ozone precursors (VOCs and NO_x). However, in so much as NO_x, and to a lesser extent VOCs, also contribute to the formation of $PM_{2.5}$, the identified control measures will also result in $PM_{2.5}$ emission reductions and regional haze benefits. Hence, New Jersey also plans to use this proposed RACT analysis to meet the $PM_{2.5}$ RACT analysis for those precursors for some source categories. Also, in the cases where the RACT analysis identified control measures will also reduce direct $PM_{2.5}$ or SO_2 emissions, New Jersey stipulated that we would claim

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[61] State of New Jersey Energy Master Plan. *Energy Master Plan Goals*. Available at: http://www.nj.gov/emp/about/goals.html.
[62] ibid.
[63] ibid.
[64] ibid.
[65] State of New Jersey Energy Master Plan. *Planning New Jersey's Energy Future - Energy Master Plan Calendar*. Available at: http://www.nj.gov/emp/calendar/.

these co-benefits as part of its $PM_{2.5}$ attainment demonstration SIP due in April of 2008. The RACT analysis identified a number of source categories where emission requirements needed to be updated based on technological advances. Many of these identified source categories are the same as those identified through the OTC and MARAMA effort. This includes asphalt production, asphalt paving, adhesives and sealants, glass manufacturing, ICI boiler (both area and point), and refinery processes. The remainder of this section discusses those RACT measures additionally identified through the New Jersey RACT analysis. In its proposed RACT SIP revision, New Jersey committed to propose rule changes to implement those control measures identified as "reasonable" by the analysis.

Petroleum Storage Tanks: Some petroleum and VOC products are stored in large storage tanks that are capped with floating roofs. Evaporative VOC emissions from floating roof tanks are the result of standing storage and working losses. Standing storage losses are evaporative losses through rim seals, deck fittings, and or deck seams. Floating roof storage tanks move vertically on slotted guide pole legs. VOCs escape from gaps at the juncture of the roof and legs. Working losses, including landing losses[66], are due to changes in the stored liquid levels due to filling and draining operations. There are several control techniques now available to limit emissions due to standing storage and working losses including vapor recovery systems, retrofitting slotted guidepoles with covers or sleeves, retrofitting to domed roof, and lower landing heights.

New Jersey currently regulates petroleum storage tank emissions at N.J.A.C. 7:27-16.2 The NJDEP proposes to amend its existing rules to control VOC emissions from petroleum and VOC storage tanks as follows:

- Cover external floating roof tanks;
- Implement measures to reduce VOC emissions emitted during degassing, cleaning, and landing operations, and from slotted guidepoles;
- Apply to existing tanks the new source performance standards (NSPS) for floating roof seal and deck fitting specifications; and tank preventive inspection and maintenance requirements.

USEPA Control Technique Guidelines (CTGs): The USEPA provides guidance regarding what level of control may be RACT for a given source through control technique guideline (CTG). The Clean Air Act provides that nonattainment areas must revise their ozone SIPs to include RACT for VOC-emitting sources covered by a CTG document, either by adopting regulations to implement the recommendations contained in the CTGs, or adopting its own equivalent RACT level. The CTGs and alternative control techniques (ACTs) for VOC were completed over a period from the late 1970s to mid-1990s and, with few exceptions, have not been updated. However, on October 5, 2006, the USEPA finalized four new CTGs covering five categories: flexible packaging printing materials, lithographic printing materials, letterpress printing materials, industrial cleaning solvents, and flat wood paneling coatings. The USEPA further provided that states should submit

[66] "Landing losses" refer to emissions that occur from floating-roof tanks whenever the tank is drained to a level where its roof rests on its deck legs (or other supports).

their SIP revisions addressing these revised CTGs within one year of the date that the CTGs are finalized (that is, October 5, 2007).

An investigation of these revised CTGs shows that New Jersey has sources in these categories, and that, with the exception of industrial cleaning solvents, the CTGs' recommended control levels are more stringent than New Jersey's current regulations. The NJDEP is working on proposed amendments to its existing regulations at N.J.A.C. 7:27-16.7, Surface Coating and Graphic Arts operations, to address the recommendations contained in the final CTGs for these four source categories.

Case-by-Case VOC and NO_x Limit Determinations (FSELs/AELs): Existing RACT rules set performance standards for many source categories. Large facilities with major sources where no previous NJDEP RACT limit has been established in the RACT Rules (N.J.A.C. 7:27-16 and N.J.A.C. 7:27-19), i.e., sources without performance standards, must apply to the NJDEP for a Facility-Specific Emission Limit (FSEL). When a performance standard exists and the source determines it is not reasonable, they apply to the NJDEP for an Alternative Emission Limit (AEL). FSELs and AELs are determined on a case-by-case basis.

Currently, New Jersey has about 40 of these case-by-case FSEL/AEL determinations for sources throughout the State. New Jersey's FSEL and AEL provisions for volatile organic compounds are found at N.J.A.C. 7:27-16.17. New Jersey's FSEL and AEL provisions for oxides of nitrogen are found at N.J.A.C. 7:27-19.13. Also, a similar case-by-case technology review is being added for BART-affected equipment, whether or not there are currently specific RACT limits in the RACT rules for these emission units. This will ensure that sources subject to RACT will also comply with BART.

As part of its RACT analysis, the NJDEP reviewed all of its existing FSELs and AELs and found that many were approved as long ago as 1997. In many cases, control technologies have advanced sufficiently since that time, warranting the reevaluation of these case-by-case determinations. The NJDEP proposes to require all facilities with existing FSELs or AELs to either comply with the existing or revised RACT limits, where applicable, or demonstrate that a new FSEL/AEL is warranted. The NJDEP further proposes that the newly issued AELs will terminate after a certain number of years, requiring periodic re-evaluations and determinations, in an effort to keep these limits current until compliance with specific rule emission limits are achieved.

4.3.1.4.4 Additional State Measures

There are additional State measures that, while not identified specifically in any of the regional or state control measure initiatives, have been, or will be, implemented in time to provide quantitative emission reductions prior to the summer of 2009. The remainder of this section discusses these measures:

Diesel Idling: Since diesel engines are significant contributors of ozone and fine particulate precursors in the State of New Jersey, any efforts to control and reduce those emissions contribute to the State's attainment of those NAAQS. On September 18, 2006, the NJDEP proposed amendments to the existing diesel idling rules.[67] These rules address the allowable idling duration for diesel-powered motor vehicles, and exemptions to that maximum idling limit. The proposed changes reduce the allowable exemptions to a three-minute diesel idling standard. Currently, there are exemptions to the idling limit which allow qualified vehicles to idle for an unlimited length of time under certain conditions. The proposed revisions to the rule modify these exemptions to further limit idling in cold weather; limit the idling time for vehicles that transport people; clarify the idling rules regarding trucks waiting in line; clarify the type of vehicle which would be considered an "emergency motor vehicle", and the times which would be considered "an emergency situation"; eliminate the exemption for idling while a vehicle is in for repairs that do not require the engine to be engaged to complete; eliminate the exemption for idling while attaching or detaching a trailer, should it take longer than the allowed three consecutive minutes; and phase out the exemption for sleeper berths.

Diesel Inspection and Maintenance: Like the diesel idling efforts, the NJDEP requirements for the inspection and maintenance (I/M) of diesel vehicles are designed to reduce the emissions from diesel engines, which are significant contributors to ozone and fine particulate precursors. The NJDEP is currently working to propose amendments to its existing diesel I/M rules to reduce the allowable smoke from heavy-duty diesel vehicles. Smoke opacity, which is used as a surrogate for particulate matter, is the degree to which a plume of smoke will obstruct transmission of visible light. Smoke opacity is used as an indicator for mal-maintenance.

Currently available technology allows diesel engines to emit smoke at rates much lower than the existing cutpoints, when operating in accordance with the manufacturers' specifications. Therefore, it is appropriate to revise the heavy-duty diesel vehicle inspection program standards to reflect the current diesel engine technology and ensure appropriate maintenance is performed. Although newer diesel-powered vehicles and equipment usually operate more cleanly and may contribute less to air quality problems than their predecessors, diesel-powered trucks and buses tend to remain in service for 20 years or more. Unless the excess emissions due to mal-maintenance or lack of repair are reduced, trucks and buses will continue to emit excess levels of exhaust particles and contribute to air pollution in the State for many years to come. Implementing stricter opacity cutpoints for diesel-powered vehicles will require appropriate maintenance and reduce emissions.

[67] Control and Prohibition of Air Pollution from Diesel-Powered Motor Vehicles
Air Administrative Procedures and Penalties Proposed Amendments: N.J.A.C. 7:27-14.1, 14.3, 7:27A-3.10(m)14. New Jersey Department of Environmental Protection. September 18, 2006.

Municipal Waste Combustors: New Jersey has five resource recovery facilities (RRF) located in Essex, Union, Camden, Gloucester, and Warren Counties, respectively. There are 13 municipal waste combustors (MWC) at these five facilities. The NJDEP approved FSELs pursuant to N.J.A.C. 7:27-19.13 for each of these MWCs to meet the 1-hour ozone NAAQS, because these facilities qualified as major facilities (i.e., those facilities with the potential to emit more than 10 tons of NO_x per year) and the State did not establish specific RACT source requirements for MWCs. The USEPA has adopted Federal Plans for both large and small MWCs. New Jersey is the delegated state authorized to implement and enforce those plans, in accordance with Memoranda of Agreement (MOAs) between the State and the USEPA. The Federal standard for emissions of NO_x from MWCs, as reflected in the Federal rules dated May 10, 2006, and previous Federal plans, is 205 ppm.[68] Currently, all New Jersey MWCs are in compliance with the Federal standard.

As part of its RACT analysis, the NJDEP reviewed the Municipal Waste Combustor FSELs and determined that, when equipped with selective non-catalytic reduction (SNCR), NO_x controls are capable of more NO_x reductions than are currently being achieved. The RACT proposal will eliminate the various MWC FSELs and set a more stringent source category NO_x emission limit, which will result in further NO_x emission reductions.

New Jersey Low Emission Vehicle Program: The NJDEP's Low Emission Vehicle (LEV) program (or Clean Car Program) rule was adopted on November 28, 2005, with an operative date of January 27, 2006.[69] The rule requires all new vehicles offered for sale in New Jersey to be California certified for emissions beginning January 1, 2009. This rule also establishes a zero emission vehicle (ZEV) sales requirement for New Jersey and requires that each auto manufacturer's sales fleet in New Jersey meet a declining fleet average non-methane organic gas (NMOG) emission standard.

The rule is designed, in part, to encourage auto manufacturers to offer the ultra-low emitting California certified models in New Jersey prior to the 2009 mandatory compliance start date. Auto manufacturers delivering such vehicles to New Jersey can earn ZEV credits that can be used by manufacturers to help transition into the mandatory requirements in 2009 and beyond. Currently, 36 models are certified to the Partial ZEV (PZEV) or Advanced Tech PZEV (ATPZEV) standard, which will generate such credits if sold in New Jersey. There are 23,493 vehicles that have either received or are currently receiving ZEV credits in New Jersey.

[68] 70 Fed. Reg. 75348 (May 10, 2006).
[69] 38 N.J.R. 497(b) (January 17, 2006).

4.3.1.5 Federal

The federal government plans to implement several measures that will provide quantitative emission reductions prior to the summer of 2009. The remainder of this section discusses these measures.

National Aerosol Coatings Rule: The USEPA is considering a national rule using the CARB aerosol coating rule[70] as its model. The CARB rule is a reactivity-based approach that replaces VOC limits for aerosol coatings with reactivity limits. The air quality effects of such a change on the east coast nonattainment areas has not been determined.

The USEPA plans to propose this rule in 2007, with a compliance date of January 1, 2009. On May 30, 2007, the USEPA released a memorandum to the states allowing them to take credit for this rulemaking effort in the 8-Hour Ozone Attainment Demonstration SIP submittals, since the compliance date would allow benefits prior to the 2010 ozone attainment dates.[71] Based on this guidance, New Jersey claimed credit for this expected proposal in both its attainment and RFP demonstrations.

Small Offroad Engine Rule: On May 18, 2007, the USEPA proposed new rules that would set stricter standards for most lawn and garden equipment and small recreational watercraft.[72,73] Specifically, the proposal would establish new exhaust emission standards that manufacturers are expected to meet using catalytic converters in many types of small watercraft, lawn, and garden equipment. This proposed rule also includes fuel evaporative standards for all the types of equipment and watercraft covered in the rulemaking. The new standards would apply as early as 2011 for most lawn and garden equipment (under 25 horsepower) and 2009 for watercraft. Comments on the proposal are due to USEPA by August 3, 2007.

4.4 Conclusions on Control Measures

The control measures discussed in this section make up the core of the State's 8-hour ozone attainment demonstration, demonstration of Reasonably Further Progress (RFP) and contingency measures. The use of these measures in each of those demonstrations, as well as how the benefits from the implementation of those measures were calculated, is discussed in Chapters 5, 6 and 8, respectively. Many of the benefits were determined from the USEPA MOBILE6 model and the USEPA Nonroad model, while other benefits

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[70] Additional information on the CARB rule is available at: http://www.arb.ca.gov/regact/conspro/aerocoat/aerocoat.htm.

[71] Emission Reduction Credit for Three Federal Rules for Categories of Consumer and Commercial Products under Section 183(e) of the Clean Air Act. United States Environmental Protection Agency. May 30, 2007.

[72] 72 Fed. Reg. 28098 (May 18, 2007).

[73] For more information about the proposal, visit USEPA's websites at Lawn and Garden http://www.epa.gov/otaq/equip-ld.htm for lawn and garden equipment and http://www.epa.gov/otaq/marinesi.htm for gasoline boats and personal watercraft.

were calculated manually. Most of the control measure benefits (quantitatively) were included in the attainment modeling. Those that were not included in the attainment modeling are listed and discussed in Chapter 5.

There are a host of other measures that have been, or will be, implemented in and around New Jersey whose benefits cannot be accurately estimated or quantified. These measures are described in Section 5.4.5. The State knows that these measures, while not quantified, are providing a benefit to the air quality in New Jersey, as well as its upwind states,[74] and provide further evidence that the State will attain the 8-hour ozone health standard by its attainment date of June 15, 2010.

Table 4.4 shows a summary of New Jersey's control measures and how they are being used to meet SIP requirements.

Table 4.4: Ozone Control Measure Summary

Control Measures	Attainment 2009 modeling[75]	Control Measures Not Captured in the 2009 Regional Modeling	2008 RFP	2009 RFP	RFP (2008) Contingency	Attainment (2009) Contingency	2012 Modeling
Pre-2002 with benefits achieved Post-2002 – On the Books New Jersey							
NOx Budget Program (SIP Call)			X				
NSR		X					
Pre-2002 with benefits achieved Post-2002 – On the Books Federal							
Residential Woodstove NSPS	X		X	X			X
Onroad Vapor Recovery (beyond Stage II)	X		X	X			X
Tier 1 Vehicle Program	X		X	X			X
National Low Emission Vehicle Program (NLEV)	X		X	X			X
Tier 2 Vehicle Program/Low Sulfur Fuels	X		X	X	X		X
HDDV Defeat Device Settlement	X		X	X			X
HDDV Engine Standards	X		X	X	X		X
Nonroad Diesel Engines	X		X	X			X
Large Industrial Spark-Ignition Engines over 19 kilowatts	X		X	X			X
Recreational Vehicles (includes snowmobiles, off-highway motorcycles and all-terrain vehicles)	X		X	X			X
Diesel Marine Engines over 37 kilowatts	X		X	X			X

[74] Please see Chapter 9 for a discussion of the impact of New Jersey control measures on upwind states.
[75] These are the measures that are needed for attainment.

Control Measures	Attainment 2009 modeling[75]	Control Measures Not Captured in the 2009 Regional Modeling	2008 RFP	2009 RFP	RFP (2008) Contingency	Attainment (2009) Contingency	2012 Modeling
Phase 2 Standards for Small Spark-Ignition Handheld Engines at or below 19 kilowatts	X		X	X			X
Phase 2 Standards for New Nonroad Spark-Ignition Nonhandheld Engines at or below 19 kilowatts	X		X	X			X
Post-2002 – On the Books New Jersey Measures Done Through a Regional Effort							
Consumer Products 2005	X		X[A]	X	X		X
Architectural Coatings 2005	X		X[A]	X	X		X
Portable Fuel Containers 2005	X		X[A]	X	X		X
Mobile Equipment Repair and Refinishing	X		X	X			X
Solvent Cleaning	X		X	X			X
NO_x RACT Rule 2006 (includes distributed generation)	X		X	X			X
Post-2002 – On the Books New Jersey Only							
Stage I and Stage II (Gasoline Transfer Operations)	X		X	X	X		X
On-Board Diagnostics - I/M	X		X	X	X		X
New Jersey Heavy Duty Diesel Rules Including "Not-To-Exceed" (NTE) Requirements	X						X
Post-2002 – On the Books Federal							
USEPA MACT Standards (including Industrial Boiler/Process Heater MACT)	X			X			X
CAIR	X			X			X
Refinery Enforcement Initiative	X			X			X
Post-2002 – Beyond on the Way New Jersey Measures Done Through a Regional Effort							
Consumer Products 2009 Amendments	X			X			X
Portable Fuel Containers 2009 Amendments	X		X	X	X		X
Asphalt Paving	X			X			X
Adhesives and Sealants	X			X			X
Asphalt Production		X					X
Glass Manufacturing							X
Certain Categories of ICI Boilers	X[B]						X
Refinery Rules		X				X	
High Electric Demand Day Program		X					
Post-2002 - Beyond on the Way New Jersey Only							
Petroleum Storage Tank Measures		X				X	
USEPA CTGs (5 categories)		X					

Control Measures	Attainment 2009 modeling[75]	Control Measures Not Captured in the 2009 Regional Modeling	2008 RFP	2009 RFP	RFP (2008) Contingency	Attainment (2009) Contingency	2012 Modeling
Case by Case VOC & NO_x Emission Limit Determinations (FSELs/AELs)		X					
Municipal Waste Combustor Measures		X				X	
New Jersey Low Emission Vehicle (LEV) Program	X			X	X		X
Diesel Idling		X				X	
Diesel Inspection and Maintenance		X				X	
Post 2002 – Beyond on the Way Federal							
National Aerosol Coatings Rule		X				X	
New Nonroad Engine Standards		X				X	
Additional 2009 Benefits[76]							
Portable Fuel Containers - additional credit		X		X			
NO_x RACT Rule 2006 - additional credit		X		X			
Certain Categories of ICI Boilers - additional credit		X		X			
	A - Portion not included as contingency for 2008 RFP						
	B - Some Categories have 2009 compliance dates; remainder have 2012 compliance dates.						

[76] These measures are above and beyond what went into the modeling.

5.0 ATTAINMENT DEMONSTRATION

5.1 Introduction

As discussed in Section 1.1, states are required to submit State Implementation Plans (SIP) that contain attainment demonstrations for their 8-hour ozone nonattainment areas within 3 years after the effective date of an area's nonattainment designation. The designation date for both the Northern New Jersey/New York/Connecticut (NNJ/NY/CT) nonattainment area and the Southern New Jersey/Philadelphia (SNJ/Phila.) nonattainment area was June 15, 2004. These SIPs must demonstrate that the measures and rules contained within them are adequate to provide for the timely attainment and maintenance of the 8-hour ozone National Ambient Air Quality Standard (NAAQS) of 0.08 ppm. In accordance with 40 C.F.R. §51.112, each demonstration must include:

- A summary of the computations, assumptions, and judgments used to determine the degree of reduction of emissions (or reductions in the growth of emissions) that will result from the implementation of the control strategy;
- A presentation of emission levels expected to result from implementation of each measure of the control strategy;
- A presentation of the air quality levels expected to result from implementation of the overall control strategy showing expected maximum pollutant concentration;
- A description of the dispersion models used to project air quality and to evaluate control strategies; and
- For interstate regions, the analysis from each constituent State must, where practicable, be based upon the same regional emission inventory and air quality baseline.

According to the United States Environmental Protection Agency (USEPA) guidance,[1] areas that have an attainment date of no later than June 15, 2010, must implement the emission reductions needed for attainment no later than the beginning of the 2009 ozone season (June 2009). Otherwise the emission reductions will not affect the monitored ozone in 2009, which is the last ozone season before the attainment date of June 15, 2010.

Chapter 4 discussed and summarized New Jersey and regional efforts to identify control measures. This Chapter identifies those control measures used to demonstrate

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[1] The USEPA finalized modeling guidance for 8-hour ozone attainment demonstrations in October of 2005 but subsequently incorporated the ozone guidance in the final 2007 guidance for regional haze and $PM_{2.5}$:

USEPA. Guidance on the Use of Models and Other Related Analyses in Attainment Demonstrations for the 8-Hour Ozone NAAQS. United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Emissions, Monitoring, and Analysis Division, Air Quality Modeling Group, Research Triangle Park, NC, EPA-454/R-05-002, October 2005.

USEPA. Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5, and Regional Haze. United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Air Quality Analysis Division, Air Quality Modeling Group, Research Triangle Park, NC, EPA-454/B-07-002, April 2007.

attainment, and Chapter 11 provides for contingencies in the event of a nonattainment area's failure to reach either Reasonable Further Progress or attainment milestones. This Chapter presents the State's analyses of the impact that the implementation of the control measures identified for attainment and contingency, in combination with existing and already on the way measures, would have on the State's air quality by the summer of 2009.

New Jersey uses a comprehensive approach to this attainment demonstration. This approach considers the cumulative body of science and is comprised of numerous technical tools, including rigorous data analysis, observations and modeling. The net result of applying this comprehensive approach is that the Northern New Jersey/New York/Connecticut and Southern New Jersey/Philadelphia nonattainment areas are projected to attain the 8-hour ozone NAAQS by 2010. In addition, there are supplemental analyses to support this conclusion. These supporting analyses and data include a modeling analysis for 2012, which predicts even lower 8-hour ozone values in each of the nonattainment areas by that year. This is also relevant since the USEPA is considering revisions to the 8-hour ozone standard that would make it more stringent, thereby requiring greater emission reductions in the nonattainment areas. The remainder of this chapter outlines the photochemical modeling results and comprehensive analysis of those results on which New Jersey bases its attainment demonstration.

5.2 Photochemical Modeling

5.2.1 Introduction

The Clean Air Act requires that states use "…photochemical grid modeling or any other analytical method determined by the [USEPA] Administrator... to be at least as effective [as photochemical grid modeling]" as part of their demonstration of attainment of the ozone health-based standard by the required attainment date.[2] As such, New Jersey's attainment demonstrations for both Northern New Jersey/New York/Connecticut and the Southern New Jersey/Philadelphia nonattainment areas include photochemical grid modeling, supplemented by other analytical methods, to demonstrate attainment of the 8-hour ozone health-based standard by 2010. This approach is consistent with the USEPA's final guidance on modeling for 8-hour ozone attainment demonstrations.[3]

The objective of the photochemical modeling test is to enable New Jersey, in coordination with the other state and local agencies within its multi-state nonattainment areas,[4] to analyze the efficacy of various control strategies in reducing air pollution.

[2] 42 U.S.C. § 7511a(c)(2)(A) (see also 40 C.F.R. §51.908(c)).
[3] USEPA. Guidance on the Use of Models and Other Related Analyses in Attainment Demonstrations for the 8-Hour Ozone NAAQS. United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Emissions, Monitoring, and Analysis Division, Air Quality Modeling Group, Research Triangle Park, NC, EPA-454/R-05-002, October 2005.
[4] Delaware Department of Natural Resources and Environmental Control, Pennsylvania Department of Environmental Protection, the Philadelphia Air Management Services, and the Maryland Department of the Environment for the Southern New Jersey/Philadelphia nonattainment area and New York Department of

The Ozone Transport Commission (OTC) on behalf of its member states (which include New Jersey, New York, Connecticut, Maryland, Delaware, and Pennsylvania) undertook a photochemical modeling study to demonstrate compliance with the 8-hour ozone NAAQS for their multi-state nonattainment areas. The OTC Modeling Committee, which consisted of the following workgroups, directed the 8-hour ozone attainment modeling study: OTC Photochemical Workgroup, OTC Meteorological Modeling Workgroup, OTC Emissions Inventory Development Workgroup, and the OTC Control Strategy Workgroup. The emissions inventory work was performed in conjunction with MANE-VU. The OTC Air Directors served on the OTC Oversight Committee and provided oversight of the process. The remainder of this section discusses the model used in this regional modeling analysis, the specific modeling parameters, including inventory development, and the results of that modeling exercise.

5.2.2 "One-Atmosphere" Air Quality Model

The photochemical model selected for the attainment modeling demonstration was the USEPA's Models-3/Community Multi-scale Air Quality (CMAQ) modeling system. Under the direction of the OTC Modeling Committee, several states and modeling centers performed the regional modeling runs and/or contributed to the preparation of technical information for the regional modeling effort. Those organizations included:

1) the New York State Department of Environmental Conservation (NYSDEC),
2) the Ozone Research Center at University of Medicine & Dentistry of NJ/Rutgers University ,
3) the University of Maryland,
4) the Virginia Department of Environmental Quality,
5) the Northeast States for Coordinated Air Use Management (NESCAUM)
6) the Maryland Department of the Environment,
7) the New Hampshire Department of Environmental Services, and
8) the Mid-Atlantic Regional Air Management Agency (MARAMA).

The lead agency for coordinating the running of the CMAQ model and performing the modeling runs for the OTC was the NYSDEC.[5] The NYSDEC ran the CMAQ model using the protocol in Appendix D1, and was responsible for post-processing the results, including calculating the projected ozone concentrations using the relative response factor (RRF) method specified in the USEPA's Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze (April 2007) (hereafter referred to as the Modeling Guidance), included in Appendix D2-2.

The CMAQ modeling system was selected for the attainment demonstration primarily because it is a photochemical grid model capable of modeling a variety of pollutants over

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Conservation and the Connecticut Department of Environmental Protection for the Northern New Jersey/New York/Connecticut nonattainment area.

[5] New Jersey wishes to thank the NYSDEC for its leadership in the regional modeling effort.

a range of time and space scales, i.e. a "one-atmosphere" photochemical grid model. Not only was CMAQ used to model ozone, but it is also being used to model particles with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers ($PM_{2.5}$) and Regional Haze in the Northeast. The model is also recommended in the USEPA's Modeling Guidance. All the regional modeling was conducted in accordance with the USEPA's Modeling Guidance.

The CMAQ model requires specific inputs, including meteorological information and emissions information. The remainder of this section discusses, in general, the needed data inputs for the CMAQ model, the particular parameters of the CMAQ model chosen for the OTC modeling runs, and the validation of the CMAQ model for use in the OTC regional modeling effort. For more specific information, see Appendices G and I.

5.2.2.1 Meteorology Data

As explained in the USEPA's Emission Inventory Guidance,[6] 2002 was designated as the base year for 8-hour ozone and $PM_{2.5}$ SIPs and regional haze plans; therefore, wherever possible, 2002 was used for baseline modeling for the 8-hour ozone standard. The Pennsylvania State University/National Center for Atmospheric Research Mesoscale Meteorological Model (MM5) version 3.6 was used to generate the annual 2002 meteorology for the OTC modeling analysis. The MM5 model is a non-hydrostatic, prognostic meteorological model routinely used for urban- and regional-scale photochemical regulatory modeling studies. Professor Da-Lin Zhang (University of Maryland) performed the MM5 modeling for the OTC in consultation with the NYSDEC and Maryland Department of the Environment staff. The analyses showed that in general, the performance of the MM5 is reasonable both at the surface and in the vertical, thereby providing confidence in the use of these data in the CMAQ simulations. The documents supporting the MM5 modeling analysis are provided in Appendix D4. Based on model validation and sensitivity testing, the model results met the evaluation criteria and the MM5 configurations were used for the regional modeling effort.

5.2.2.2 Regional Emission Inventories

Both the nonattainment areas associated with New Jersey have an attainment date of no later than June 15, 2010. Since June 15th is early in the 2010 ozone season, attainment must be demonstrated for the last full ozone season; in this case the 2009 ozone season.[7] Emission reductions, therefore, need to be implemented no later than the beginning of the 2009 ozone season. As such, the attainment modeling run is designed to show the

[6] USEPA. Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations. United States Environmental Protection Agency, Emissions Inventory Group, Emissions, Monitoring, and Analysis Division, Office of Air Quality Planning and Standards, Research Triangle Park, NC, EPA-454/R-05-001, August 2005, updated November 2005.

[7] Success will be judged by three years of data, i.e,. 2007, 2008, and 2009, to calculate the 2009 design value.

incremental emission reductions associated with the implementation of control measures between the base year (2002) and the "attainment" year (2009).

To complete this modeling exercise, two regional emission inventories were developed to represent the 2002 base case and the 2009 control case. In addition, two other future control case emission inventories (for 2012 and 2018, respectively) were developed simultaneous with the 2009 control case emission inventory to allow for additional modeling exercises. These future year emission inventories were developed by projecting the 2002 base year emissions inventory using standard emissions projection techniques discussed in Appendices D3-1, D5, and D6. These future year emission inventories include emissions growth due to projected increases in economic activity as well as the emissions reductions due to the implementation of control measures. All of the regional emission inventories in this chapter are hereafter referred to as the modeling inventories.

The 2002 emissions were first generated by the individual Ozone Transport Region states. MARAMA then coordinated and quality assured the 2002 inventory data, and projected it for the relevant control years. The 2002 emissions for non-Ozone Transport Region areas within the modeling domain were obtained from other Regional Planning Organizations for their corresponding areas. These Regional Planning Organizations included the Visibility Improvement State and Tribal Association of the Southeast (VISTAS), the Midwest Regional Planning Organization and the Central Regional Air Planning Association. The documentation for the OTC base and control modeling inventories are presented in Appendices D7 and D8, respectively. The use of emission inventory data from the non-Mid-Atlantic/Northeast Visibility Union (MANE-VU) states is documented in Appendix D8.

As discussed in detail in Chapter 4, the OTC member states selected several control strategies for inclusion in the attainment demonstration modeling. These strategies were selected from groups of measures developed by the technical subcommittees responsible for identifying and developing the regulations and/or control measures. Consideration was given to maintaining consistency with control measures likely to be implemented in other Regional Planning Organizations. Emission reduction requirements mandated by the Clean Air Act were also included in projecting future year emissions. Additional information on the emissions used in future year modeling is provided in Appendices D8 and D9. The following sections provide a more detailed discussion of base and control inventories used in the regional modeling:

5.2.2.2.1 Base Emission Inventory

Version 3 of the 2002 base year emission inventory was used in the regional modeling exercises. A technical support document for this inventory, which is included in Appendix D7**,** explains the data sources, methods, and results for preparing this version of the 2002 base year criteria air pollutant and ammonia emissions inventories for point, area, onroad, nonroad, and biogenic sources for the MANE-VU Regional Planning

Organization. In addition to relying on this base inventory for ozone SIP-related activities, the MANE-VU states will use this base inventory to support air quality modeling, control measure development, and implementation activities for the upcoming Regional Haze Rule and $PM_{2.5}$ SIP efforts.

The inventory and supporting data prepared includes the following:

1) Comprehensive, county-level, mass emissions and modeling inventories for 2002 emissions for criteria air pollutants and ammonia for the State and Local agencies included in the MANE-VU region;
2) The temporal, speciation, and spatial allocation profiles for the MANE-VU region inventories;
3) Inventories for wildfires, prescribed burning, and agricultural field burning for the southeastern provinces of Canada; and
4) Inventories for other Regional Planning Organizations, Canada, and Mexico.

The mass emissions inventory files were converted to the National Emissions Inventory Input Format Version 3.0. As discussed in greater detail in Section 5.2.2.3, the modeling inventory files were processed in Sparse Matrix Operator Kernel Emissions/Inventory Data Analyzer (SMOKE).

The inventories include annual emissions for oxides of nitrogen (NO_x), volatile organic compounds (VOC), carbon monoxide, ammonia, particles with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM_{10}) and $PM_{2.5}$. The inventories also included summer day, winter day, and average day emissions. However, not all states included daily emissions in their inventories. In these instances, temporal profiles prepared for this project were used to calculate daily emissions.

Work on Version 1 of the 2002 MANE-VU inventory began in April 2004. The consolidated inventory for point, area, onroad, and nonroad sources was prepared by starting with the inventories that MANE-VU state/local agencies submitted to the USEPA from May through July of 2004 as a requirement of the Consolidated Emissions Reporting Rule. The USEPA's format and content quality assurance (QA) programs (and other QA checks not included in USEPA's QA software) were run on each inventory to identify format and/or data content issues.[8] A contractor, E.H. Pechan & Associates, Inc. (Pechan), worked with the MANE-VU state/local agencies and the MARAMA staff to resolve QA issues and augment the inventories to fill data gaps in accordance with the Quality Assurance Project Plan prepared for this project.[9] The final inventory and SMOKE input files were finalized during January 2005.

[8] USEPA. Basic Format & Content Checker 3.0 (Formerly known as the Quality Assurance / Quality Control Software 3.0) - March 2004; Extended Quality Control Tool - Updated May 18, 2004. United States Environmental Protection Agency, 2004.
[9] MANE-VU. Quality Assurance Project Plan (QAPP) for Area and Point Source Emissions Modeling Inventory Project, Final. Prepared for the Mid-Atlantic/Northeast Visibility Union by E.H. Pechan & Associates, Inc. and Carolina Environmental Program, August 3, 2004.

Work on Version 2 (covering the period from April through September 2005) involved incorporating revisions requested by some MANE-VU state/local agencies on the point, area, and onroad inventories. Work on Version 3 (covering the period from December 2005 through April 2006) included additional revisions to the point, area, and onroad inventories as requested by some states. Thus, the Version 3 inventory for point, area, and onroad sources were built upon Versions 1 and 2. This work also included development of the biogenics inventory. In version 3, the nonroad inventory was completely redone because of changes that the USEPA made to the NONROAD2005 model.

5.2.2.2.2 Emission Control Inventories

An inventory technical support document for these future inventories is included in Appendix D8-2 and explains the data sources, methods, and results for future year emission forecasts for three years; three emission sectors; two emission control scenarios; seven pollutants; and eleven states plus the District of Columbia. The following is a summary of the future year inventories that were developed:

- The three projection years are 2009, 2012, and 2018;
- The three source sectors are non-Electric Generating Units (non-electrical generating units (EGUs)) point sources, area sources, and nonroad mobile sources. Under separate efforts, MANE-VU prepared EGU projections using the Integrated Planning Model and onroad mobile source projections using the SMOKE emission modeling system. The documentation for those efforts is included in Appendix D8-1.
- The two emission control scenarios are:
  a) a combined “on-the-books/on-the-way” (OTB/W) control strategy accounting for emission control regulations already in place, as well as some emission control regulations that are not yet finalized but are likely to achieve additional reductions by 2009 (i.e., adoption of the six shortfall measures by states outside the core Ozone Transport Region states); and
  b) a beyond on the way (BOTW) scenario to account for controls from potential new regulations that may be necessary to meet attainment and other regional air quality goals.
- The inventories were developed for seven pollutants, which are sulfur dioxide, NO_x, VOCs, carbon monoxide, PM_{10}-$_{Primary}$ (sum of the filterable and condensable components), $PM_{2.5}$-$_{Primary}$ (sum of the filterable and condensable components), and ammonia.
- The states are those that comprise the MANE-VU region. In addition to the District of Columbia, the 11 MANE-VU states are Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.

5.2.2.3 Emissions Processor Selection and Configuration

The SMOKE Processing System was selected for the OTC modeling analysis. SMOKE is principally an emissions processing system, as opposed to a true emissions inventory preparation system, in which emissions estimates are simulated from "first principle". This means that, with the exception of mobile and biogenic sources, its purpose is to provide an efficient, modern tool for converting emissions inventory data into the formatted emissions files required for a photochemical air quality model.

Inside the Ozone Transport Region, the modeling inventories were processed by the NYSDEC using the SMOKE (Version 2.1) processor to provide inputs for the CMAQ model. Wherever possible, the mobile source emission inventories (in vehicles miles traveled format) were replaced with source classification code specific county level emissions to more accurately reflect actual emissions for typical ozone season day. In addition, NESCAUM provided the mobile source files processed through SMOKE.

A detailed description of all SMOKE input files such as area, mobile, fire, point and biogenic emissions files and the SMOKE model configuration are provided in Appendices D3-1, D5, and D6**.**

5.2.2.4 Regional Modeling Coordination

The CMAQ model was installed at all participating modeling centers and diagnostic tests were run to insure that the model was operating as designed. In addition, the CMAQ model was benchmarked against other modeling platforms to ensure similar results. The OTC modeling committee oversaw the modeling effort and reported to the OTC Oversight Committee through regular briefings and presentations, and when needed offered additional information in cases where specific technical decisions had policy implications. The New Jersey Department of Environmental Protection (NJDEP) participated as a member of the various OTC committees.

5.2.2.5 Domain and Data Base Issues

5.2.2.5.1 Episode Selection

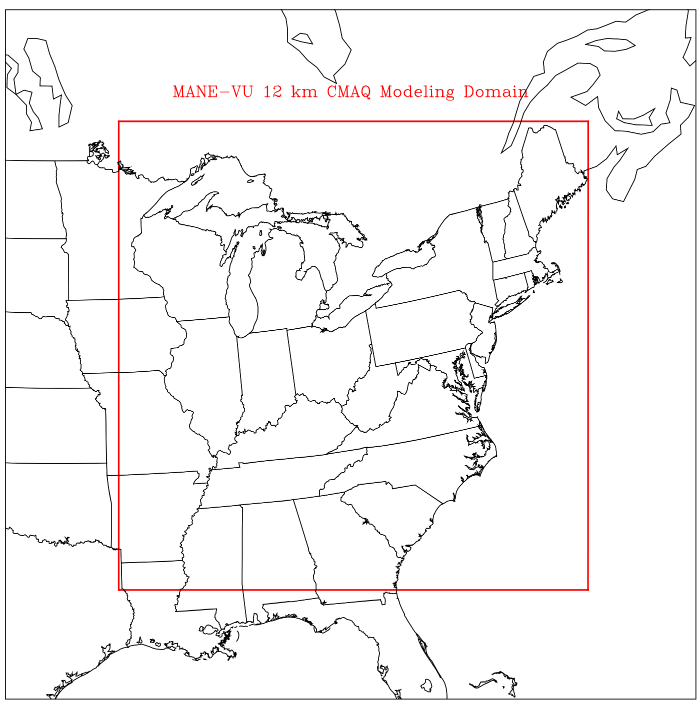
The entire ozone season was simulated for the 2002 and 2009 (with 2002 meteorology conditions) modeling runs (May 1 to September 30). As a result, the total number of days examined for the complete ozone season far exceeds the USEPA Modeling Guidance, and provides for better assessment of the simulated pollutant fields.

5.2.2.5.2 Size of the Modeling Domain

In defining the modeling domain, one must consider the location of the local urban area, the downwind extent of the elevated ozone levels, the location of large emission sources, and the availability of meteorological and air quality data. The domain or spatial extent to be modeled includes as its core the nonattainment area. Beyond this, the domain includes enough of the surrounding area such that major upwind sources fall within the domain and the emissions produced in the nonattainment area remain within the domain throughout the day.

Figure 5.1 shows the OTC modeling boundaries. This domain covers the Northeast region, including the Northeastern, Central and Southeastern United States as well as Southeastern Canada. The final SIP modeling analysis utilized this modeling domain. Further discussion of the OTC modeling domain selection is provided in Appendices D3-1 and D3-6.

Figure 5.1: MANE-VU 12-Kilometer CMAQ Modeling Domain



5.2.2.5.3 Horizontal Grid Size

The basic CMAQ modeling platform utilized a a 36 km horizontal grid resolution for the continental United States domain. A larger domain was selected for the MM5 simulations to provide a buffer of several grid cells around each boundary of the CMAQ 36 km domain. This was designed to minimize any errors in the meteorology from boundary effects. A 12 km inner domain was selected to better characterize air quality in the Ozone Transport Region and surrounding Regional Planning Organization regions. The horizontal grid definitions for the CMAQ and MM5 modeling domains are contained in Appendices D3-1, D3-4, D4-1, and D4-5.

5.2.2.5.4 Vertical Resolution

The vertical grid used in the CMAQ modeling was primarily defined by the MM5 vertical structure. The MM5 model employed a terrain following coordinate system defined by atmospheric pressure. The layer averaging scheme adopted for CMAQ is designed to reduce the computational cost of the CMAQ simulations, therefore only the uppermost layers of the CMAQ domain were coalesced. All layers in the planetary boundary layer were left undisturbed in moving from the MM5 to the CMAQ simulation. This ensures that the near-surface processes that affect air pollution the most are represented realistically in CMAQ, while the meteorological systems that are driven by upper level winds are allowed to develop properly in MM5. The effects of layer averaging have a relatively minor effect on the model performance metrics when compared to ambient monitoring data. The vertical layer definitions other details related to the MM5 and CMAQ modeling domains are contained in Appendices D3-1, D3-5, D4-1, and D4-6.

5.2.2.5.5 Initial and Boundary Conditions

The objective of a photochemical grid model is to estimate the air quality given a set of meteorological and emissions conditions. When initializing a modeling simulation, the exact concentration fields are not known in every grid cell for the start time. Therefore, typically photochemical grid models begin with clean conditions within the domain and are allowed to stabilize before the period of interest is simulated. In practice this is accomplished by starting the model several days prior to the period of interest; this is called spin-up time.

The winds move pollutants into, out of, and within the domain. The model handles the movement of pollutants within the domain and out of the domain. An estimate of the concentration of pollutants at the edge of the domain, and therefore the quantity of pollutants moving into the domain, is needed as an input to the model. These are called boundary conditions. The 12 km grid boundary conditions were extracted from the 36 km CMAQ simulation. To estimate the boundary conditions for the modeling study, boundary conditions for the outer 36 km domain were derived every three hours from an annual model run performed by researchers at Harvard University using the GEOS-CHEM global chemical transport model.[10,11]

[10] Moo, N. and Byun, D. A Simple User's Guide For "geos2cmaq" Code: Linking CMAQ with GEOS-CHEM. Version 1.0. Institute for Multidimensional Air Quality Studies (IMAQS). University of Houston, Houston, Texas, 2004.

The influence of initial conditions was minimized by using a 15-day spin-up period, which is sufficient to establish pollutant levels that are encountered in the Eastern United States. Additionally, the predominate winds flow from west to east, thus New Jersey is not influenced by nearby boundary conditions. Additional information on the extraction of boundary conditions is provided in Appendix D3-6.

5.2.2.6 Quality Assurance

All the air quality, emissions, and meteorological data within the MANE-VU Regional Planning Organization used in the regional modeling effort were reviewed to ensure completeness, accuracy, and consistency before proceeding with modeling. Any errors, missing data or inconsistencies, were addressed using appropriate methods that are consistent with standard practices. All modeling was benchmarked through the duplication of a set of standard modeling results across different modeling centers. Emissions inventories obtained from the other Regional Planning Organizations were examined to check for errors in the emissions estimates. When such errors were discovered, the problems in the input data files were corrected, and the models were run again.

The CMAQ air quality model inputs and outputs were plotted and examined to ensure sufficiently accurate representation of the observed data in the model ready fields, and temporal and spatial consistency and reasonableness. The CMAQ model underwent operational and scientific evaluations in order to facilitate the quality assurance review of the meteorological and air quality modeling procedures and are discussed in greater detail in Section 5.2.2.7.

5.2.2.7 Model Performance Evaluation

The first step in the modeling process is to verify the model’s performance in terms of its ability to predict ozone and precursor concentration fields in the right locations and at the right levels. To do this, model predictions for the base year simulation are compared to the actual ambient data observed in the historical episode. This verification is a combination of statistical and graphical evaluations. If the model appears to be predicting ozone in the right locations for the right reasons, then the model can be used as a predictive tool to evaluate various control strategies and their effects on ozone. The purpose of the model performance evaluation is to assess how accurately the model predicts ozone levels observed in the historical episode and to use the knowledge of CMAQ’s performance to put CMAQ’s predictions of future year air quality in the appropriate context so that future policy decisions are informed by CMAQ’s predictions and its performance.

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[11] Baker, K. Model Performance for Ozone in the Upper Midwest over 3 Summers. Presentation given at the Lake Michigan Air Directors Consortium, 2005 AWMA Annual Conference, Minneapolis, MN, June 24, 2005.

The results of a model performance evaluation were examined prior to using CMAQ's results to support the attainment demonstration. The performance of CMAQ was evaluated using both operational and diagnostic methods. Operational evaluation refers to the model's ability to replicate observed concentrations of ozone and/or precursors (surface and aloft), whereas diagnostic evaluation assesses the model's accuracy with respect to characterizing the sensitivity of ozone to changes in emissions (i.e., relative response factors).

The NYSDEC conducted a performance evaluation of the 2002 base case CMAQ simulation (May 15-September 30) on behalf of the Ozone Transport Region member States. Appendix D10 provides comprehensive operational and diagnostic evaluation results, including spreadsheets containing the assumptions made to compute statistics. Highlights of this evaluation are summarized in Section 5.2.2.7.1.

5.2.2.7.1 Summary of Model Performance

The CMAQ model was employed to simulate ozone for the full 2002 ozone season (May through September). A comparison of the temporal and spatial distributions of ozone and its precursors was conducted for the study domain, with additional focus placed on performance in both the Northern New Jersey/New York/Connecticut and Southern New Jersey/Philadelphia nonattainment areas.

This evaluation showed that the CMAQ model performance for surface ozone is quite good, with low bias and error. Model performance is generally consistent from day to day. The results of the 2002 ozone season show that the modeling system tends to over-predict minimum concentrations and slightly underpredict peak concentrations. The over-prediction of minimum concentrations is not of great regulatory concern since attainment tests are based on the application of relative response factors (RRF), to daily peak concentrations. Prediction of minimum concentrations is still important to appropriately model regional transport and nighttime ozone removal processes in order to accurately estimate peak concentrations.

The model performance for both Northern New Jersey/New York/Connecticut and the Southern New Jersey/Philadelphia nonattainment areas averaged over all stations and all days met the guidelines in the USEPA Modeling Guidance. Applying those criteria to individual days is a much more stringent test that is not required by the USEPA.

No significant differences in model performance for ozone and its precursors were encountered across different areas of the Ozone Transport Region. While there are some differences in the spatial data among sub-regions, there is nothing to suggest a tendency for the model to respond in a systematically different manner between regions. Examination of the statistical metrics by sub-region confirms the absence of significant performance problems arising in one area but not in another, building confidence that the

CMAQ modeling system is operating consistently across the full Ozone Transport Region domain.

As stated previously, the model performance for the 2002 ozone season meets all USEPA guidelines and thus demonstrates that the modeling platform is appropriate for modeling emissions control scenarios for the Northern New Jersey/New York/Connecticut and the Southern New Jersey/Philadelphia nonattainment areas 8-hr ozone SIPs. At the same time it must be remembered that CMAQ has been evaluated by using measures that reflect its ability to represent average conditions instead of its ability to respond to changes in emissions. Therefore, although CMAQ has met the traditional performance measures as stated in the USEPA Modeling Guidance, it may in fact under predict the magnitude of ozone changes due to various control measures being modeled. This means future year (i.e., 2009) modeling results should not be viewed as exact, but should be utilized in a relative manner (see Section 5.2.4). Additional discussion on the uncertainty associated with the CMAQ model results is provided in Section 5.3.

5.2.3 Control Measures Modeled

As previously stated, the objective of the photochemical modeling analysis is to enable state air agencies to analyze the efficacy of various control strategies, and to demonstrate that the measures adopted as part of the SIP will result in attainment of the 8-hour ozone standard by 2009. New Jersey's attainment demonstration relies on the Beyond-on-the-Way (BOTW) 2009 modeling run, which predicts future 2009 air quality conditions, after accounting for all air pollution controls that have been implemented since the base year of 2002 (OTB measures), and applying new control measures (BOTW measures) that will be implemented in time to reduce emissions in 2009. Table 5.1 lists all of the control measures included for New Jersey in the projected 2009 BOTW CMAQ modeling run. Each of these control measures is discussed in detail in Chapter 4.

Table 5.1: Modeled Control Measures Included in the 2009 BOTW Model Run

Pre-2002 with benefits achieved Post-2002 - On the Books
Federal
Residential Woodstove NSPS
Onboard Refueling Vapor Recovery (ORVR) beyond Stage II
Tier 1 Vehicle Program
National Low Emission Vehicle Program (NLEV)
Tier 2 Vehicle Program/low sulfur fuels
HDDV Defeat Device Settlement
HDDV Engine Standards
Nonroad diesel engines
Large industrial spark-ignition engines over 19 kilowatts
Recreational Vehicles (includes snowmobiles, off-highway motorcycles and all-terrain vehicles)
Diesel Marine Engines over 37 kilowatts

Phase 2 standards for small spark-ignition handheld engines at or below 19 kilowatts
Phase 2 standards for new nonroad spark-ignition nonhandheld engines at or below 19 kilowatts
Post-2002 - On the Books
New Jersey Measures Done Through a Regional Effort
Consumer Products 2005
Architectural Coatings 2005
Portable Fuel Containers 2005
Mobile Equipment Repair and Refinishing
Solvent Cleaning
NO_x RACT rule 2006 (including distributed generation)
Stage I and Stage II - Gasoline Transfer Operations
On-Board Diagnostics – I/M
New Jersey Heavy Duty Diesel Rules Including "Not-To-Exceed" (NTE) Requirements
Federal
USEPA MACT Standards including Industrial Boiler/Process Heater MACT
CAIR
Refinery Enforcement Initiative
Post-2002 - Beyond on the Way
New Jersey Measures Done Through a Regional Effort
Consumer Products 2009 Amendments
Portable Fuel Containers 2009 Amendments
Asphalt Paving
Adhesives and Sealants
Certain Categories of ICI Boilers

While Table 5.1 shows all the OTB and BOTW measures that New Jersey took credit for in the 2009 attainment demonstration model run, the overall attainment demonstration is reliant upon all the states' in the Ozone Transport Region implementing measures to reduce ozone in order for New Jersey to achieve its goals. As such, Table 5.2 shows which BOTW measures each state in the Ozone Transport Region believed would be implemented in time to achieve benefits in 2009. These were the measures included in the BOTW model run for each state.

<u>Table 5.2</u>: Ozone Transport Region-Wide Modeling Assumptions for the 2009 BOTW Model Run

	Consumer Products 2005/2009	PFC 2005/ 2009	Asphalt Paving	Adhesives & Sealants	ICI Boilers - Area Sources			ICI Boilers - Non-EGU Point Sources					Cement Kilns	Glass Furnances	Asphalt Plants
					< 25 mmBtu/ hr	25-50 mmBtu/ hr	50-100 mmBtu/ hr	< 25 mmBtu/ hr	25-50 mmBtu/ hr	50-100 mmBtu/ hr	100-250 mmBtu/ hr	>250 mmBtu/ hr			
<u>NY NAA</u>															
Connecticut	x	x	x	x	x	x	x	x	x	x	x				x
New Jersey	x	x	x	x		x	x	x			x				
New York	x	x	x	x	x	x	x	x	x	x	x		x	x	x
<u>Phila. NAA</u>															
Delaware	x	x		x							x				
Maryland	x	x	x	x							x		x	x	
New Jersey	x	x	x	x		x	x	x							
Pennsylvania	x	x		x										x	
<u>Other States</u>															
Maine	x	x		x									x		
New Hampshire	x	x	x						x	x	x				
Vermont															
Massachusetts	x		x	x										x	
Rhode Island	x	x	x	x											
DC	x	x	x	x											x

*Source: MACTEC. Development of Emission Projections for 2009, 2012, and 2018 for NonEGU Point, Area, and Nonroad Sources in the MANE-VU Region, Final TSD. Prepared for the Mid-Atlantic Regional Air Management Association by MACTEC Federal Programs, Inc., February 28, 2007.

5.2.4 Photochemical Modeling Results

The USEPA recommends using the model estimates in a "relative" rather than "absolute" sense, due to the uncertainties and biases in the modeling system. Thus, the assumption is that the change between the modeled base year and the modeled future year (2009) reflects the impact of growth and control over time, is appropriate use of the results. The "absolute" modeled results are used in a "relative" sense by applying the ratios of the model's future to current (baseline) predictions at each ozone monitor to the actual 2002 design values, thereby grounding the future design value to the monitored results. These ratios are termed "relative reduction factor" (RRF).

The first step in converting the modeled output to a "relative" result requires the creation of an RRF. An RRF is defined by the USEPA as the ratio of the future 8-hour daily maximum concentration predicted "near a monitor" to the baseline 8-hour daily maximum concentration predicted "near the monitor" averaged over selected days.[12, 13] More simply put, the RRF is the ratio of average future concentrations over average baseline concentrations for each monitoring site. For more information about the calculation of RRFs and the selection of relevant days for each monitoring site in both New Jersey-associated nonattainment areas, see Appendix D11.

Once calculated, the RRF is then used to project the baseline modeling design values (DVs) at each monitoring site into the future.[14] The baseline design values used in the modeling application are calculated differently from the monitored design values discussed in Chapter 3, although both are based on monitored ambient air quality data. The monitoring design values are calculated as the 3-year average of the fourth highest monitored daily 8-hour maximum value at each monitoring site. For modeling purposes the baseline design value is calculated by averaging three design value periods, centered around the base inventory year of 2002. Specifically, the modeling baseline design value was calculated using the 2000-2002, 2001-2003, and 2002-2004 periods. Since the baseline design value is the anchor point for the future year projected concentrations it is believed that the average of the three design value periods best represents the baseline concentrations, while taking into account the variability of the meteorology and emissions (over a five year period).[15] For more information about the modeling design values and how they were calculated, see Appendix D11.

The following equation illustrates how New Jersey calculated the future design values for each monitor:

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[12] ibid.

[13] "Near a monitor" was determined by using a 3x3 array of grid cells surrounding each monitor, as recommended by the USEPA for 12-km grid resolution modeling.

[14] Design value is calculated as the 3-year average of the fourth highest monitored daily 8-hour maximum value at each monitoring site.

[15] USEPA. Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5, and Regional Haze. United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Air Quality Analysis Division, Air Quality Modeling Group, Research Triangle Park, NC, EPA-454/B-07-002, April 2007.

$DV_{F-I} = RRF_I * DV_{B-I}$

Where:

DV_{B-I} = the base concentration monitored at site I, in parts per billion (ppb)

RRF_I = the relative response factor, calculated near site I

DV_{F-I} = the estimated future design value for the time attainment is required, in ppb.

Table 5.3 shows the modeling results for the 2009 BOTW run.

Table 5.3: 2009 Modeled Design Values for the Northern New Jersey/New York/Connecticut and Southern New Jersey/Philadelphia Nonattainment Areas

Site Name – County, State	Site Number	Air Monitoring Data	Modeling Results
		2002 Modeling Baseline (DV_B) (ppb)	2009 Modeled (DV_F) (ppb)
NNJ/NY/CT Nonattainment Area			
Teaneck - BERGEN CO, NJ	340030005	91	85
Bayonne - HUDSON, NJ	340170006	84	77
Flemington - HUNTERDON, NJ	340190001	95	83
Rutgers Univ. - MIDDLESEX CO, NJ	340230011	96	83
Monmouth Univ. - MONMOUTH CO, NJ	340250005	95	84
Chester - MORRIS CO, NJ	340273001	95	84
Ramapo - PASSAIC CO, NJ	340315001	86	77
Botanical Garden - BRONX CO, NY	360050083	83	78
Queens College - QUEENS CO, NY	360810124	83	74
Susan Wagner - RICHMOND CO, NY	360850067	93	84
Babylon - SUFFOLK CO, NY	361030002	93	85
Holtsville - SUFFOLK CO, NY	361030009	97	89
Riverhead - SUFFOLK CO, NY	361030004	83	74
White Plains - WESTCHESTER CO, NY	361192004	91	85
Danbury - FAIRFIELD CO, CT	90011123	95	85
Greenwich - FAIRFIELD CO, CT	90010017	95	87
Stratford - FAIRFIELD CO, CT	90013007	98	90
Westport - FAIRFIELD CO, CT	90019003	94	85
Middletown - MIDDLESEX CO, CT	90070007	95	84
Hamden - NEW HAVEN CO, CT	90099005	93	85
Madison - NEW HAVEN CO, CT	90093002	98	88

SNJ/Phila. Nonattainment Area			
Fairhill - CECIL CO, MD	240150003	97	81
Brandywine Creek - NEW CASTLE CO, DE	100031010	92	81
Bellefonte - NEW CASTLE CO, DE	100031013	90	78
Killens Pond - KENT CO, DE	100010002	88	78
Lewes - SUSSEX CO, DE	100051003	87	77
Lums Pond - NEW CASTLE CO, DE	100031007	94	79
Seaford - SUSSEX CO, DE	100051002	90	75
Bristol - BUCKS CO, PA	420170012	99	88
West Chester - CHESTER CO, PA	420290050	95	82
New Garden - CHESTER CO, PA	420290100	94	79
Chester - DELAWARE CO, PA	420450002	91	81
Norristown - MONTGOMERY CO, PA	420910013	92	81
Elmwood - PHILADELPHIA CO, PA	421010136	83	75
Lab - PHILADELPHIA CO, PA	421010004	71	64
Roxborough - PHILADELPHIA CO, PA	421010014	90	82
Northeast Airport - PHILADELPHIA CO, PA	421010024	96	87
Colliers Mills - OCEAN CO, NJ	340290006	106	92
Rider - MERCER CO, NJ	340210005	97	86
Ancora State Hospital - CAMDEN CO, NJ	340071001	100	87
Camden - CAMDEN CO, NJ	340070003	98	88
Clarksboro - GLOUCESTER CO, NJ	340155001	98	88
Millville - CUMBERLAND CO, NJ	340110007	95	81
Nacote Creek - ATLANTIC CO, NJ	340010005	89	77

NOTE: Highlighted sites are the monitor in each nonattainment area with the highest ozone design value, e.g. the controlling monitor.

5.3 Demonstrations

5.3.1 Introduction

New Jersey is applying a comprehensive approach to the attainment demonstrations for its two multi-state 8-hour ozone nonattainment areas. This approach considers the cumulative body of science and is comprised of numerous technical tools including rigorous data analysis, observations, and modeling.

While the USEPA attainment demonstration guidance emphasizes a single design value from a single modeling simulation as the core of any attainment demonstration, [16] it also supports, in conjunction with the Clean Air Act Advisory Committee (CAAAC), states utilizing a multi-analysis approach to their 8-hour ozone attainment demonstrations (as

[16] USEPA. Guidance on the Use of Models and Other Related Analyses in Attainment Demonstrations for the 8-Hour Ozone NAAQS. United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Emissions, Monitoring, and Analysis Division, Air Quality Modeling Group, Research Triangle Park, North Carolina, EPA-454/R-05-002, October 2005.

they did for the 1-hour ozone attainment demonstrations).[17] This is because the principles of atmospheric science acknowledge that, in using models, all of the uncertainties and biases need to be considered. Uncertainties associated with emission inventories, meteorological data, and the representation of ozone photochemistry in the model can result in over or under predictions in design values. The CAAAC also recommends that states decrease reliance on modeling results to demonstrate attainment and rather focus more on ambient air monitoring data. These recommendations are reflected in the USEPA's modeling guidance, which provides for other evidence to address model uncertainties so that a more robust assessment of the probability to attain the 8-hour ozone standard can be made. Therefore, a variety of data is collectively analyzed to determine whether the 8-hour ozone standard will be met, instead of the results of the modeling attainment test alone. This more comprehensive view of the modeling results ultimately produces not a single design value, but a range of predicted future design values.

The guidelines presented by the USEPA are intended to assist states with demonstrating attainment in their 8-hour ozone SIPs.[18] However, there are no requirements specific to using a multi-analysis approach in the Phase I[19] or Phase II[20] implementation rules, 40 C.F.R. 51.112, or 42 U.S.C. § 7502(c)(1). As such, no one specific air modeling system is recommended and the inherent uncertainty and limitations within such modeling systems is acknowledged and addressed by the array of supplemental analyses possible as explained within the USEPA modeling guidance.[21] Further, while the regional transport of ozone has a major influence on ozone concentrations in a given area, analyses conducted on a local-scale are suggested in addition to the regional-scale modeling efforts.

The net result of applying this comprehensive multi-analysis approach to the photochemical modeling outputs is a plausible demonstration of attainment for the Northern New Jersey/New York/Connecticut and Southern New Jersey/Philadelphia 8-hour ozone nonattainment areas by 2010. Figures 5.2a and 5.2b show the range of modeled design values adjusted for transport for 2009 for all monitoring sites in the multi-state nonattainment areas. Ranges are provided, instead of single values, for each site in order to better represent the uncertainty of the modeling. The remainder of this section discusses the fundamental knowledge gained from the comparisons of observations and sensitivity model runs that resulted in these design value ranges.

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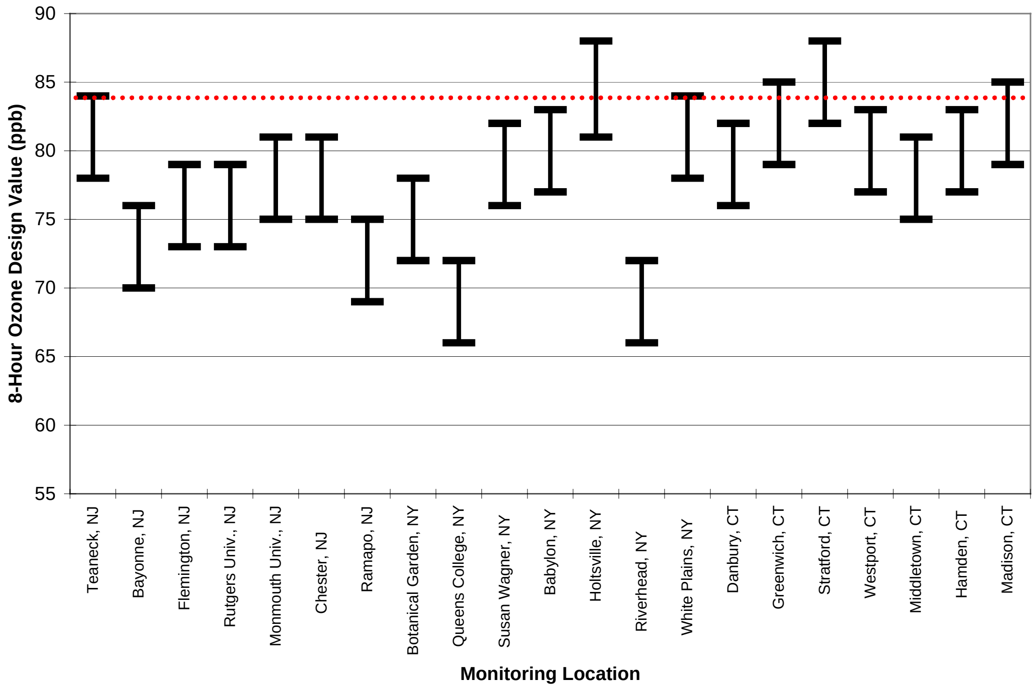
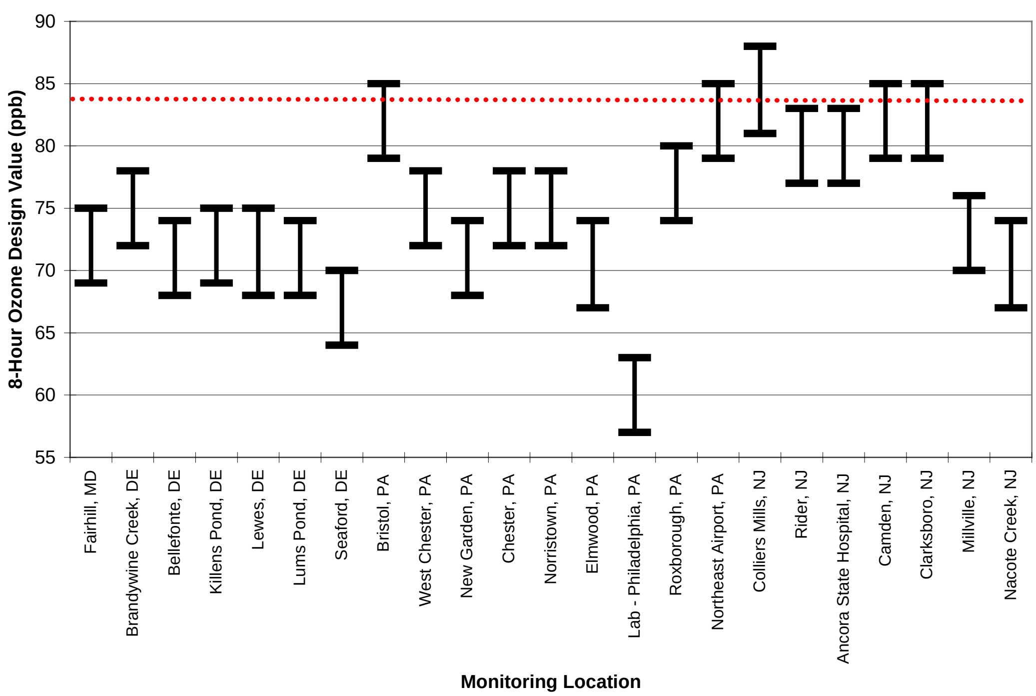
[17] ibid.
[18] 42 U.S.C. § 7511a(c)(2)(A) (see also 40 C.F.R. §51.908(c)).
[19] USEPA. Final Reconsideration of Phase 1 Rule to Implement the 8-Hour Ozone NAAQS (185 Fee Provisions and Timing for Determining Applicable Requirements). United States Environmental Protection Agency , May 25, 2005.
[20] USEPA. Final Rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard - Phase 2; Final Rule to Implement Certain Aspects of the 1990 Amendments Relating to New Source Review and Prevention of Significant Deterioration as they Apply in Carbon Monoxide, Particulate Matter and Ozone NAAQS; Final Rule for Reformulated Gasoline. United States Environmental Protection Agency, November 8, 2005.
[21] op. cit., note 1

<u>Figure 5.2a</u>: 2009 Modeled 8-Hour Ozone Design Values Adjusted for Transport for Monitoring Sites in the NNJ/NY/CT Nonattainment Area



<u>Figure 5.2b</u>: 2009 Modeled 8-Hour Ozone Design Values Adjusted for Transport for Monitoring Sites in the SNJ/Phila. Nonattainment Area



5.3.1.1 Modeling and Transport - Transport Mechanisms

Transport of pollutants and the affect of transport on ozone levels were discussed in Chapter 2. A brief review of that material is presented here, as it pertains to regional photochemical modeling.

Transport of air pollution is an important factor in understanding how ground-level ozone is produced and what geographical areas influence ozone production. New Jersey and its associated nonattainment areas are part of the Ozone Transport Region, which is a region of the eastern United States from Maine to the District of Columbia Consolidated Metropolitan Statistical Area. During ozone events, the high levels of ozone extends beyond the Ozone Transport Region's borders and impacts over 200,000 square miles across the eastern United States. In addition to air pollution transported hundreds of miles from distant sources in and outside the Ozone Transport Region, local sources of air pollution also contribute to New Jersey's and the multi-state nonattainment areas' air quality problems.

There are three meteorological mechanisms that contribute to the transport of air pollution into and within the Ozone Transport Region: ground level transport, transport by the nocturnal low level jet, and westerly transport aloft.

Ground-level transport is the result of interaction between the broad meteorological feature and local effects, such as sea breeze and the Appalachian lee side trough.

Transport within the Ozone Transport Region can also occur via the nocturnal low level jet that forms late at night or in the very early morning hours. The nocturnal low level jet is a regional scale phenomenon of higher wind speeds that often forms a few hundred meters above the ground just above the stable nocturnal boundary layer. This phenomenon is a result of the differential heating of the air between the Appalachian Mountains and the Atlantic Ocean. The land, sea, mountain, and valley breezes can selectively affect relatively local areas and they play a vital role in drawing ozone-laden air into some areas, such as coastal areas, that are far removed from major emission source regions. The nocturnal low level jet can transport ozone that formed within the Ozone Transport Region to other areas, can transport ozone formed outside the region into the Ozone Transport Region or can move locally formed ozone within the confines of the Ozone Transport Region. It extends the entire length of the Northeast corridor from Virginia to Maine, and has been observed as far south as Georgia.

Finally, westerly transport aloft is dominated by the anti-cyclonic flow around a high pressure system, which can lead to transport of an ozone reservoir, created by emissions in areas that lie outside the Ozone Transport Region, into the Ozone Transport Region. Local emissions within the Ozone Transport Region add to the polluted air mixing down from above that arrived from more distant locations.

It is important that air quality models replicate these transport mechanisms correctly, as they significantly affect ground-level ozone concentrations throughout the East Coast.

Furthermore, it is critical that the models correctly capture the amount of ozone at the different atmospheric heights.

5.3.1.2 Characterizing Ground Level Transport at Special Sites

Given the importance of large-scale transport in the formation of ozone, meteorological conditions are particularly important to the site selection process.[22] Regional scale monitors are placed upwind and downwind of metropolitan areas to evaluate the ozone entering a geographic area or to help evaluate the peak ozone concentrations experienced within a geographic area.

The highest monitored 8-hour ozone design value in the Southern New Jersey/ Philadelphia nonattainment area is at Colliers Mills, Ocean County, New Jersey. Two major upwind urban areas, Washington DC-Baltimore and Philadelphia, influence this monitor. Colliers Mills is downwind of both these areas and therefore provides a view of the peak ozone concentrations experienced in the region. However, given this monitor's proximity to the Atlantic Ocean, ozone concentrations are often influenced by a sea breeze. Field studies and numerical modeling efforts around the country and internationally have shown that a sea breeze circulation can influence local ozone concentrations.[23,24,25,26,27,28,29] A sea breeze may exacerbate air pollution levels by constricting horizontal and vertical ventilation, and re-circulates air that would otherwise move offshore. On other occasions, a sea breeze may move relatively clean air onshore, which will rapidly lower ozone concentrations. The Maryland Department of the Environment examined the theoretical impact of the Chesapeake Bay sea breeze on the ozone monitor site in Edgewood, Maryland.[30] The conclusions of this analysis were that

[22] USEPA. Guideline on Ozone Monitoring Site Selection. United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Emissions, Monitoring, and Analysis Division, Research Triangle Park, NC, EPA-454/R-98-002, August 1998.
[23] Seaman, N. L. and Michelson, S.A. Mesoscale Meteorological Structure of a High-Ozone Episode during the 1995 NARSTO-Northeast Study. *Journal of Applied Meteorology*, 39, 384-398, 1998.
[24] McElroy, M.B. and Smith, T.B. Vertical Pollutant Distributions and Boundary Layer Structure Observed by Airborne LIDAR near the Complex California Coastline. *Atmospheric Environment*, 20, 1555-1566, 1986.
[25] Bornstein, R.D., Thunis, P., and Schayes, G. Simulation of Urban Barrier Effects on Polluted Urban Boundary-Layers Using the Three Dimensional URBMET/TVM Model with Urban Topography-New Results from New York City. In: Zanetti, P. (Ed), Air Pollution, Computational Mechanics Publications, Southampton, Boston, 15-34, 1993.
[26] Cheng, W. L. Ozone Distribution in Coastal Central Taiwan under Sea-Breeze Conditions. *Atmospheric Environment*, 36, 3445-3459, 2002.
[27] Boucouvala, D. and Bornstein, R. Analysis of Transport Patterns during an SCOS97-NARSTO Episode. *Atmospheric Environment*, 37(S2), S73-S94, 2003.
[28] Martilli, A., Roulet, Y.A., Junier, M., Kirchner, F., Mathias, W. R., and Clappier, A. On the Impact of Urban Surface Exchange Parameterizations on Air Quality Simulations: The Athens Case. *Atmospheric Environment*, 37, 4217-4231, 2003.
[29] Evtyugina, M. G., Nunes, T., Pio, C., and Costa, C. S. Photochemical Pollution under Sea Breeze Conditions, during Summer, at the Portuguese West Coast. *Atmospheric Environment*, 40, 6277-6293, 2006.
[30] Maryland Department of the Environment. Appendix G-11: The Role of Land-Sea Interactions on Ozone Concentrations at the Edgewood, Maryland Monitoring Site, Cecil County, Maryland 8-Hour Ozone

a local-scale sea breeze circulation can exacerbate peak ozone concentrations not only during regional-scale high ozone episodes, but also during periods when local scale circulation is more significant than regional transport. These conclusions likely apply at Colliers Mills as well. The impact of the sea breeze is an important consideration because it is highly likely that CMAQ could be making the planetary boundary layer too shallow, thus forcing ventilation to calm conditions which would effectively create CMAQ over-predictions of 8-hour ground-level ozone concentrations at Colliers Mills.

The highest monitored 8-hour ozone design value in the Northern New Jersey/New York/ Connecticut nonattainment area is at Stratford, Fairfield County, Connecticut. The Stratford monitoring site is located directly downwind from a major highway, I-95, and the major metropolitan area of New York City, which makes it heavily influenced by transported air pollutants. Also, the Stratford monitoring site is situated very close to Long Island Sound making it susceptible to a bay breeze affect that is similar to a sea breeze effect.

The ground level transport effects at the controlling monitors for 8-hour ozone in Northern New Jersey/New York/Connecticut and Southern New Jersey/Philadelphia nonattainment areas are likely not reflected accurately in the CMAQ predicted ozone concentrations. This is because the model does not accurately capture these ground level transport effects.

5.3.1.3 Characterizing Westerly Transport of the Ozone Reservoir Using High Elevation Monitors

As discussed in Chapter 2, there are several elevated monitoring sites located inside the Ozone Transport Region (see Figure 5.3). Between the hours of 2:00 – 7:00 a.m. EST, these high elevation monitors exhibit remarkably different ozone concentrations from the lower elevation monitors. In fact, during these hours, the high elevation monitors can register concentrations up to 85 ppb. That concentration level is more than 4 times the average sampled at most of lower elevation monitoring sites (20 ppb concentrations).

As an example, the Methodist Hill monitor recorded ozone concentrations above 80 ppb in the early morning hours of August 12, 2002 (e.g., 5 a.m.).[31] This concentration was significantly higher than the concentrations recorded at the surrounding lower elevation monitors (e.g., Little Buffalo State Park, PA, South Carroll County, MD, Frederick, MD, Ashburn, VA, Long Park, VA) for that date and time period (see Figure 5.4). A similar effect was seen at the other high elevation monitors in the Ozone Transport Region (specifically, Mohawk Mountain, CT; Cadillac Mountain, ME; Mt. Greylock, MA; Mt. Monadanock, NH; Mt. Washington, NH; and Whiteface Mountain, NY) on the same day,

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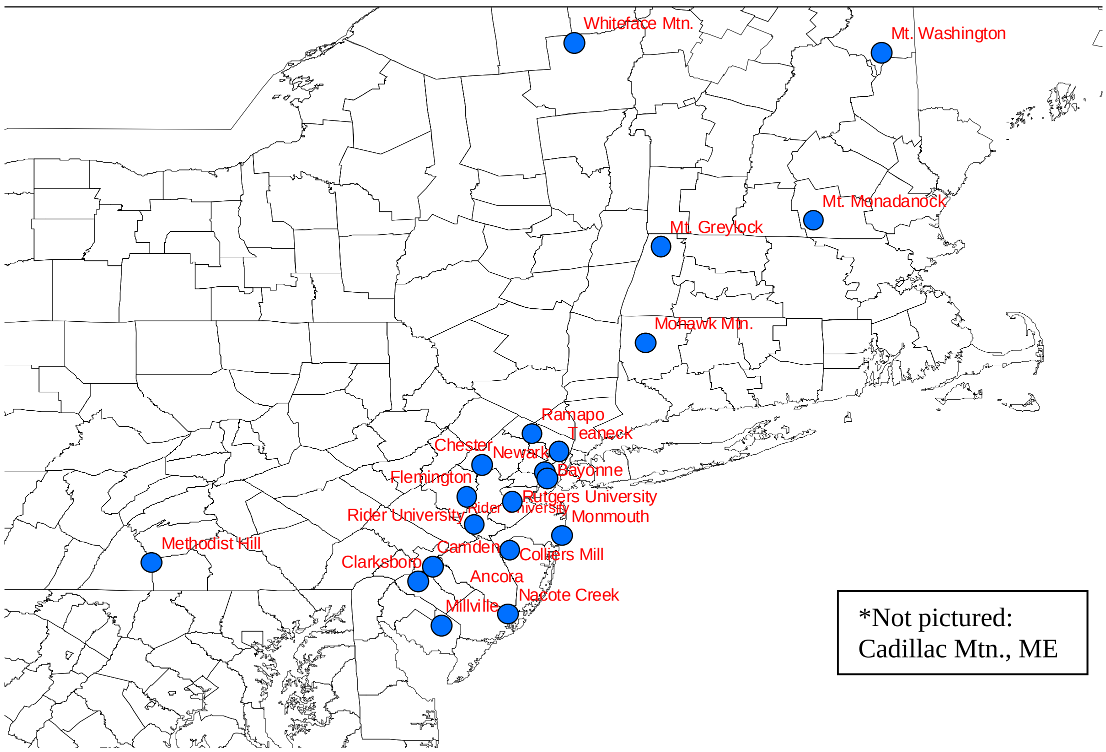
State Implementation Plan and Base Year Inventory. Maryland Department of the Environment, June 15, 2007.

[31] The ozone monitor at Methodist Hill, PA is located at 1900 ft in altitude in south central Pennsylvania, and is above the nocturnal inversion.

as compared to surrounding lower elevation sites below the nocturnal inversion (e.g., Danbury, CT) (see Figure 5.5).

<u>Figure 5.3</u>: Location of New Jersey Monitors and Upper Air Monitoring Stations in the Northeastern United States*



A significant ozone reservoir, which is above the nocturnal inversion layer, develops during daylight hours and is transported into the region. The high night time ozone levels recorded at the elevated monitoring sites indicate the presence of the ozone reservoir. Based on what is being seen at the high elevation monitors, this ozone reservoir extends across the entire Ozone Transport Region. With the break up of the nocturnal inversion after sunrise (e.g., starting about 7 a.m.), ozone concentrations at the lower elevation monitors rapidly increase. By mid-day, the nocturnal boundary layer has broken down, mixing the transported ozone from the reservoir above into the precursor laden, locally produced ozone below.

Figure 5.4: Hourly Ozone Profiles in the Southern Ozone Transport Region, August 12, 2002

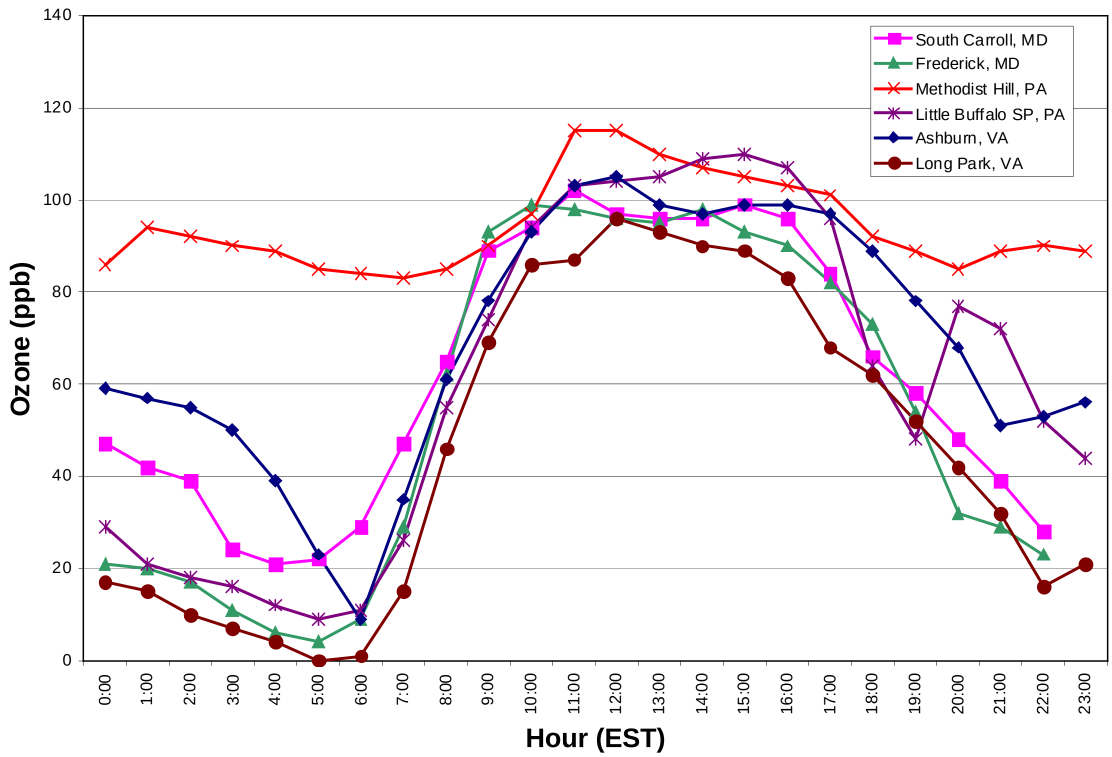
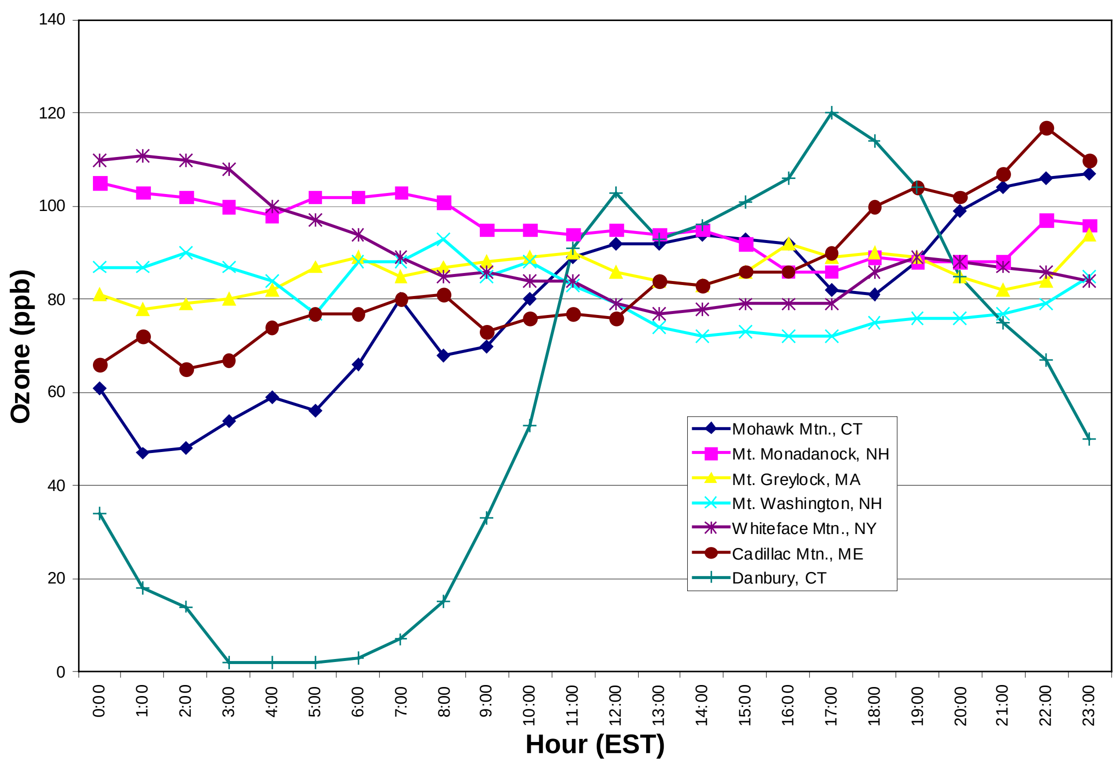


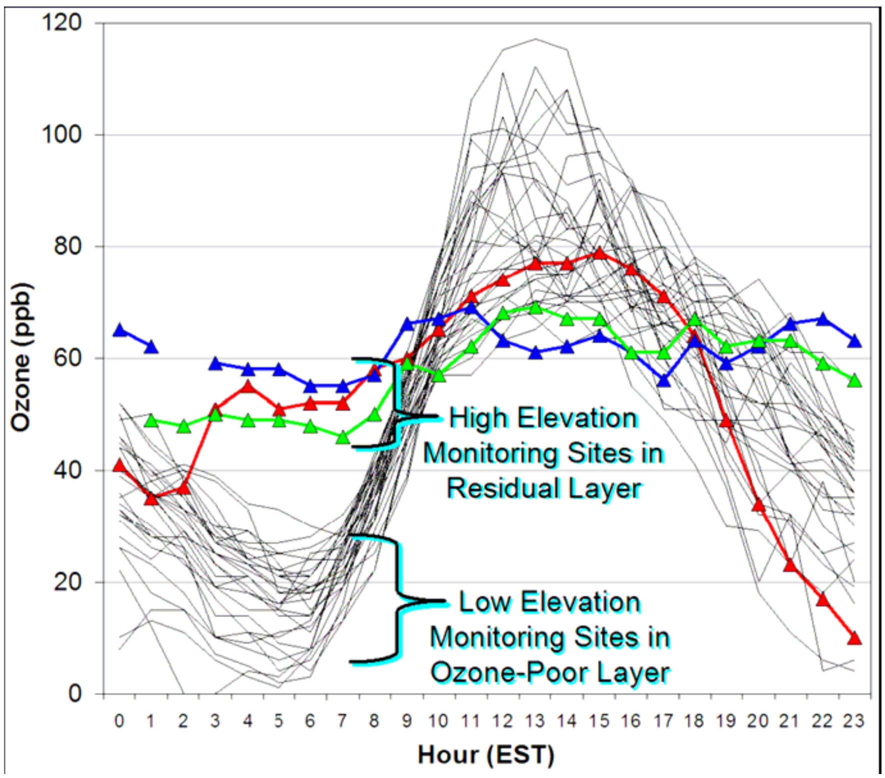
Figure 5.5: Hourly Ozone Profiles in the Northern Ozone Transport Region, August 12, 2002



Data provided by Tom Downs, Maine Department of Environmental Protection.

Staff at the Maryland Department of the Environment recently examined the 2005 data from the Methodist Hill, PA monitor.[32] Figure 5.6a is a snap shot of the air quality on August 13, 2005, which shows a marked improvement in the ozone levels at Methodist Hill monitor from the 2002 levels. During the night hours, this monitor registered concentrations of approximately 55 ppb, compared to approximately 85 ppb in 2002, indicating a reduction in the ozone reservoir concentration. Figure 5.6b shows that the reduction in the ozone reservoir concentration, as measured at Methodist Hill, have been reduced significantly. This decrease in the reservoir ozone levels is not an unexpected result. Reductions due to implementation of the NO_x SIP Call in states west of the Ozone Transport Region were fully implemented by 2005, accounting for some, if not most, of this reduction.

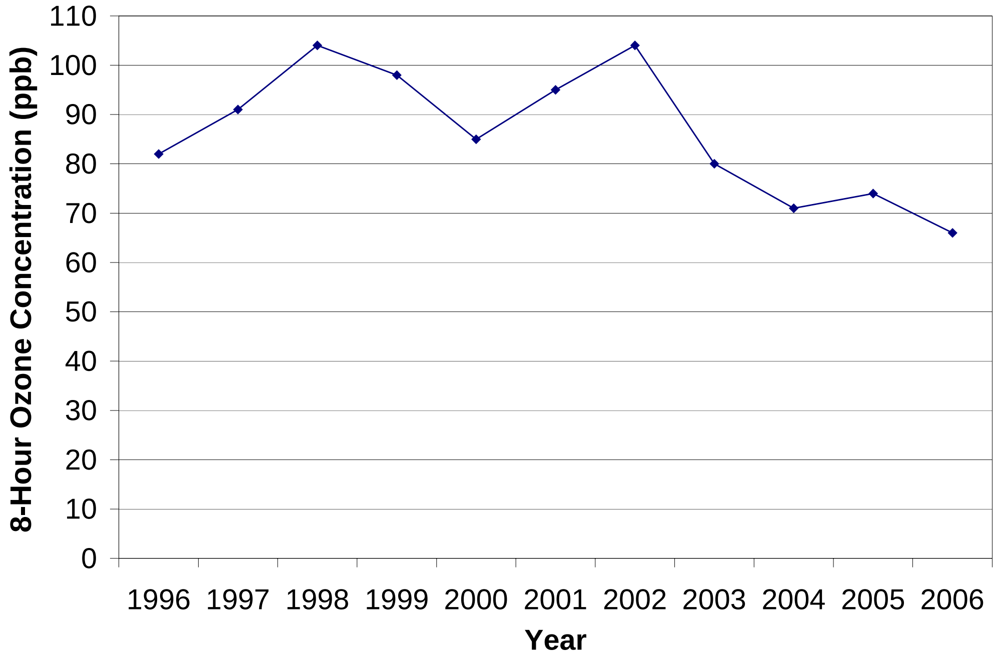
<u>Figure 5.6a</u>: Hourly Ozone at Various Monitors on August 13, 2005



High Elevation Monitoring Sites - Red = Piney Run, MD; Green = Methodist Hill, PA; Blue = Shenandoah National Park, VA; Black = Low Elevation Monitoring Sites in DE, MD, VA, and DC.

[32] Maryland Department of the Environment. Cecil County, Maryland, 8-Hour Ozone State Implementation Plan and Base Year Inventory: SIP Revision 07-05. Maryland Department of the Environment, June 15, 2007.

Figure 5.6b: Fourth Maximum 8-Hour Ozone Concentrations at the Methodist Hill, PA Monitor, 1996 - 2006



Collectively, the high elevation measurements show that when the morning mixing begins, ozone in the reservoir may have an immediate contribution of approximately 55 ppb or more to the daily ozone concentrations in New Jersey and other locations in the Ozone Transport Region. Starting a day with 55 ppb represents almost two-thirds of the ozone NAAQS and makes it difficult for downwind areas to attain especially when night time levels are approximately 20 ppb. This leaves little room for fresh emissions from the next day. The ozone in the reservoir is due to transport. Additional cost effective controls on the largest upwind sources are still needed to reduce the ozone and ozone precursors being transported into the Ozone Transport Region.

5.3.1.4 The Contribution of Transport to Nonattainment

Representing the amount of transported ozone, and ozone precursors, correctly in the regional modeling not only affects the accuracy of the modeling results but also the contribution of regional sources to nonattainment at a particular location. This information ultimately helps to inform the process on what sources to control to reduce precursor pollutants and thus ozone.

Three studies conducted by the University of Maryland demonstrate why it is important to understand regional transport. The first study measured ground-level ozone in the Mid-Atlantic region to understand how ozone concentrations in this region are affected by NO_x emissions.[33] This study analyzed 232 aircraft vertical profiles performed in the Mid-Atlantic and Northeast US between 1997 and 2003. The data showed that the ozone concentrations during the flights were strongly influenced by point source emissions. The study showed that if NO_x from upwind point source emissions were reduced, ozone in Maryland should also be reduced. Cecil County, Maryland is part of the Southern New Jersey/Philadelphia nonattainment area and Maryland is upwind of New Jersey on many days. Therefore, it is assumed that ozone in New Jersey would also be reduced.

A second study performed by the University of Maryland examined the relative contribution of transported and local photochemistry to the ozone levels for six exceedance days in August 2002. This study showed that if local photochemistry were the only source of ozone, none of the 6 days examined would have exceeded the 8-hour ozone standard.[34] The effect of the transported ozone is to add ozone early in the day, expanding the time interval over which the ozone levels may exceed 84 ppb.

In a third study, the University of Maryland conducted a cluster analysis of hundreds of aircraft profile spirals.[35] This analysis revealed that when the greatest cluster trajectory density lay over the Ohio River Valley (approximately 59 percent of the profiles), transport accounted for 69–82 percent of the afternoon boundary layer ozone for the Baltimore area. Even under stagnant conditions (approximately 27 percent of the profiles), transport still accounted for 58 percent of the afternoon boundary layer ozone. Combined, the three University of Maryland studies demonstrate that transport significantly affects 8-hour ground-level ozone concentrations, particularly in the Ozone Transport Region.

Additionally, ozone pollution apportionment modeling analyses show that transport from states outside and inside of the Ozone Transport Region are significant contributors to nonattainment in New Jersey. Modeling conducted in 1998 by the USEPA to support the NO_x SIP Call indicated that 85 percent of the predicted 8-hour ozone levels in 2007 in New Jersey would be attributable to out-of-state sources on high ozone days.[36] More recent modeling conducted in 2005 by the USEPA to support the implementation of the Clean Air Interstate Rule (CAIR) indicates that out-of-state contributions to Ocean

[33] Maryland Department of the Environment. Appendix G-1: Ozone Sensitivity to NO_x Emissions, Cecil County, Maryland, 8-Hour Ozone State Implementation Plan and Base Year Inventory: SIP Revision 07-05. Maryland Department of the Environment, June 15, 2007.

[34] Maryland Department of the Environment. Appendix G-7: Regional Nature of Ozone Transport, Cecil County, Maryland, 8-Hour Ozone State Implementation Plan and Base Year Inventory: SIP Revision 07-05. Maryland Department of the Environment, June 15, 2007.

[35] Taubman, B.F., Hains, J.C., Thompson, A.M., Marufu, L.T., Doddridge, B.G., Stehr, J.W., Piety, C.A., and Dickerson, R.R. Aircraft Vertical Profiles of Trace Gas and Aerosol Pollution over the Mid-Atlantic United States: Statistics and Meteorological Cluster Analysis. *Journal of Geophysical Research*., 111, D10S07, 2006.

[36] USEPA. Appendix E, 1-Hour and 8-Hour Percent Contribution Tables, Table E-34, Air Quality Modeling Technical Support Document for the NO_x SIP Call. United States Environmental Protection Agency, Office of Air and Radiation, September 23, 1998.

County, New Jersey are 82 percent of the projected 2010 8-hour ozone levels at the site. [37,38]

The same modeling conducted in 1998 by the USEPA to support the NO_x SIP Call indicated that 88 percent of the predicted 8-hour ozone levels in 2007 in Connecticut were attributable to out-of-state sources on high ozone days.[39] The more recent modeling conducted by the USEPA to support the CAIR indicates that out-of-state contributions to Fairfield County, Connecticut are 80 percent of the projected 2010 8-hour ozone levels at the site.[40]

The diverse array of studies and modeling analyses conducted by the University of Maryland and the USEPA demonstrate that regional transport into and within the Ozone Transport Region has a significant impact on ground-level ozone concentrations. Therefore, if the photochemical model used to evaluate future 8-hour ozone concentrations is not capturing transport correctly then the model results will not accurately reflect the magnitude of the transported precursors and ozone nor the magnitude of the benefits of control strategies.

5.3.2 2009 Modeled Design Value Ranges Adjusted for Transport

In this section, a case is made on why CMAQ under represents changes in ozone. Then the uncertainty in future year design values will be examined. In light of these discussions, it is shown that a single future year design value cannot be accurately predicted and therefore, a range of 2009 design values is appropriate.

5.3.2.1 Assessment of Model Response

In an effort to assess the ability of the CMAQ model to replicate ozone patterns and changes in ozone, particularly for high ozone events throughout the Ozone Transport Region, the Maryland Department of the Environment performed comparisons between surface and aircraft ozone measurements, and CMAQ ozone simulations using the 2002 base case B1 emissions inventory.[41] This analysis explored several methods of evaluating the CMAQ model by examining its performance only on high ozone days, by

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[37] The monitor with the highest modeled design value is termed the controlling monitor. In the Southern New Jersey/Philadelphia nonattainment area, the controlling monitor is in Colliers Mills, NJ, with a 2009 modeled design value of 92 ppb.

[38] USEPA. Appendix G: 8-Hour Contributions to Each Nonattainment County in 2010, Technical Support Document for the Final Clean Air Interstate Rule: Air Quality Modeling. United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, March 2005.

[39] op. cit., note 37, Table E21

[40] The monitor with the highest modeled design value is termed the controlling monitor. In the Northern New Jersey/New York/Connecticut nonattainment area, the controlling monitor is in Stratford, CT, with a 2009 modeled design value of 90 ppb.

[41] Maryland Department of the Environment. Appendix G-8: Comparison of CMAQ-calculated Ozone to Surface and Aloft Measurements, Cecil County, Maryland 8-Hour Ozone State Implementation Plan and Base Year Inventory. Maryland Department of the Environment, June 15, 2007.

separating performance at rural, suburban, and urban sites, and by comparing CMAQ to aloft ozone data from aircraft flights. The results of these comparisons show that CMAQ has shortcomings that appear to be magnified during periods when high ground level ozone concentrations are a concern.

In their first analysis, Maryland used 136 aircraft profiles from the Regional Atmospheric Measurement Modeling and Prediction Program flights to compare to CMAQ modeled results.[42] Agreement between CMAQ-calculated and aircraft-measured ozone varied substantially from flight to flight. CMAQ, in general, replicated the mean distribution of surface layer ozone during the ozone season and the spatial pattern of high ozone events, but often did not capture the full spatial extent or magnitude of the high ozone patterns. This analysis suggests that CMAQ over estimates ozone from the near surface to approximately 500 meter above ground by approximately 15 percent and under estimates ozone aloft, from 600 – 2600 meters, by approximately 10 percent. This under estimation aloft is indicative of an underestimation of ozone transport by CMAQ.

The University of Maryland also analyzed CMAQ model performance by comparing the mean CMAQ-calculated and measured 8-hour ozone values from 66 surface ozone monitors in the Baltimore, Washington, D.C., and Southern New Jersey/Philadelphia nonattainment areas. CMAQ-calculated and measured 8-hour ozone values were highly correlated (correlation coefficient, R=0.92) over the ozone season (May 15 – September 15) and well correlated (R=0.81) when a subset of 38 high ozone exceedance days were compared. Biases between CMAQ-calculated and measured 8-hour ozone concentrations were minimal (1-2 ppb) when averaged over the summer, but larger (7-8 ppb) on days when the air quality was poor.

The Maryland analyses also show that CMAQ exhibits its best performance in urban areas (small bias), less success in suburban areas (underestimates ozone, a larger negative bias), and its worst performance in rural areas (significantly underestimates ozone, larger negative bias). This bias may indicate that CMAQ's relatively coarse vertical resolution is unable to resolve the transport of emissions. In particular, performance at upwind sites with few nearby sources is poorer on the whole than it is at other sites. As a result, the significance of regional controls, including fleet turnover, heavy duty diesel controls, and the NO_x SIP Call, are all probably under estimated.

In addition, Maryland’s analyses show that CMAQ’s performance in capturing surface ozone is poor in the Ohio River Valley, i.e. under predicted.[43] This area is known to be a source region of transported emissions for New Jersey during high ozone episodes.[44] Therefore, the performance of the CMAQ model adds uncertainty to estimates of transport into the Mid-Atlantic region and northeast corridor.

[42] ibid., page 125

[43] Maryland Department of the Environment. Appendix G-8: Comparison of CMAQ-calculated Ozone to Surface and Aloft Measurements, Cecil County, Maryland 8-Hour Ozone State Implementation Plan and Base Year Inventory. Maryland Department of the Environment, June 15, 2007.

[44] USEPA. Technical Support Document for the Final Clean Air Interstate Rule: Air Quality Modeling, page 31. USEPA, Office of Air Quality Planning and Standards, Research Triangle Park, NC, March 2005.

Other studies suggest that the CMAQ model, and likely photochemical models in general, under predict the change in ozone concentrations that result from a change in NO_x emissions, particularly those from power plants.

A study of the August 2003 Northeast Blackout offers some of the most compelling information regarding response of the CMAQ model to emission changes.[45] University of Maryland flight data collected 24 hours into the Northeast Blackout shows that ozone was 30 ppb lower throughout the 0.5-1.5 km section of the atmosphere and 38 ppb lower at ground level, than on a meteorologically similar day. When the ozone levels on the blackout day were compared to a reference day it was shown that the blackout caused a drop of at least 7 ppb ozone, and likely considerably more. However, a modeling study of the same event using CMAQ predicted only a 2 ppb change.[46] These results seem to clearly demonstrate that CMAQ greatly under predicts transport and changes in ozone due to emission reductions, primarily at power plants, by a factor of approximately 3.

The USEPA is currently concluding a modeling study that offers a more detailed analysis of CMAQ response to emission reductions at power plants. In this study, the USEPA is performing a CMAQ simulation of 2002 and 2004 summertime air quality to determine the benefits of the NO_x SIP Call. While the results have not yet been published, they suggest that although observed median 8-hour ozone levels changed by about 18 ppb, the CMAQ model only simulated a change of about 8 ppb.[47] Therefore, these results suggest that the CMAQ model under predicts changes in ozone, especially power plant emissions, by a factor of approximately 2.

The results of these studies show that CMAQ under predicts transport and therefore, under predicts ozone changes due to emission reductions by a factor of at least 2. This information will be used later in this section to calculate a range of future year design values.

5.3.2.2 Model Uncertainty

Two sources of uncertainty in modeling future year design values are relatively straight forward to quantify: 1) the representativeness of the modeling base year design values as indicators of current air quality and 2) how the model responds to changes in emissions. There are other sources of uncertainty, i.e., model formulation or degree to which the meteorological fields represent actual conditions in 2002, however they are difficult to quantify. Maryland examined sources of uncertainty and calculated reasonable estimates of the uncertainty, not to be confused with model error.

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[45] Marufu, L.T., Taubman, B. F., Bloomer, B., Piety, C. A., Doddridge, B. G., Stehr, J. W., and Dickerson, R. R. The 2003 North American Electrical Blackout: An Accidental Experiment in Atmospheric Chemistry. *Geophysical Research Letters*, 31, L13106, 2004.

[46] Hu, Y., Odman, M. T., and Russell, A. G. Re-examination of the 2003 North American Electrical Blackout Impacts on Regional Air Quality. *Geophysical Research Letters*, 33, 2006.

[47] The University of Maryland is reviewing preliminary results of the study, which were unavailable to New Jersey as of the date of this SIP document.

5.3.2.2.1 Uncertainty in Modeling Base Year Design Value

The USEPA's recommended procedure for calculating modeling design values calls for creating 3-year averages of the fourth highest 8-hour average ozone reading for the individual years. Since there is some variability in these 3-year averages, the USEPA further recommends averaging three such values from successive years to obtain a design value that is centered on the base year (e.g., for 2002, one would take the 3-year averages from 2000-2002, 2001-2003 and 2002-2004, thereby giving 2000 and 2004 single weight, 2001 and 2003 double weight, and 2002 triple weight in a 5-year average). Since variations in meteorology lead to substantive variations in year-to-year peak ozone values, the degree to which the base year, or any of these 3-year periods, is representative of overall conditions in the area is one source of uncertainty in determining whether or not an area will come into attainment in the future.

Currently, most ozone monitoring locations throughout the Northeast show improving trends in ozone concentrations over the years that went into the 5-year weighted average, though the design values at some have risen modestly. The average difference between the highest and lowest 3-year design values is 6 ppb. Similarly, the average standard deviation for each site over this time period is +/- 3 ppb (using standard deviation only as an estimate of variability and not suggesting that a 3-data point standard deviation is adequate for any individual station). Both these measures suggest that variations in meteorology can reasonably be expected to produce substantial variability in the design values themselves. Therefore, it appears resonable that the representativeness of the design value can produce an uncertainty of 3 ppb about some central value.

5.3.2.2.2 Uncertainty in Model Response to Changes

Results from similar 2009 photochemical modeling scenarios that predict 8-hour ozone concentrations were used to provide insight into how the CMAQ model responds to changes in emissions. The modeling scenarios used were the OTC base A and base B modeling, model outputs at overlapping monitors from VISTAS Regional Planning Organization, and OTC's 2009 BOTW modeling run. The OTC base A and base B cases utilize two different versions of the CMAQ model (4.4 and 4.5) and different versions of the base year inventory. The VISTAS modeling represented a different, partially independent, attempt at modeling future year design values using somewhat different emissions, different meteorology, and a slightly different modeling platform. The OTC BOTW modeling run was also examined because its results are similar to the other 2009 future base scenarios, except for a few additional emissions control strategies.

There were not enough scenarios to generate a proper standard deviation at each site. However, the average difference from the predictions give an estimate of variability between model runs at ozone monitoring sites across the OTC modeling domain. The average difference was +/- 0.8 ppb. The range represents the variability to be expected from different attempts at modeling future year air quality, and some of the variability expected from small errors in the emissions inventory. The range of 2009 projections does not represent the full uncertainty in future year results, but represents the sensitivity of the model to small variations in emissions. Therefore, the range represents only part of the uncertainty in the modeled result. Emissions are likely more uncertain than these simple estimates would suggest, with uncertainty in some emissions inventory categories as high as 50 percent.[48]

5.3.2.2.3 Results

The results of these analyses can be combined to give a conservative estimate of the uncertainty in future year design values. Since the representativeness of the base year design year and variations in future year design values due to emission changes are not correlated, standard error propagation techniques can be used, namely by squaring and adding the uncertainties, and taking the square root of the sum to get the combined uncertainty. The uncertainties (+/- 3 ppb and +/- 0.8 ppb) do not add because they are not correlated, so one is as likely to be positive as the other is to be negative. Therefore, the combination gives an uncertainty in future year design values of 3.1 ppb.

5.3.2.3 Design Value Ranges

The previously discussed analyses show that on the highest ozone days, CMAQ's performance is not as good as on lower ozone days, which is a statistical reflection of CMAQ's inability to capture large-scale deviations from average or median conditions. This conclusion is a reasonable assumption since all the USEPA modeling performance criteria are strongly geared toward average performance at the surface. However, excellent performance in predicting domain-wide ozone averages does not mean CMAQ will predict excessive ozone concentrations, ozone changes, or the dynamic range of ozone concentrations at particular locations with similar accuracy. These deviations occur on days with poor air quality. Therefore, these shortcomings and associated uncertainties need to be taken into consideration when producing future year design values.

In order to account for CMAQ's under prediction of transport and emission reduction benefits, the 2009 model results presented in Table 5.3 are adjusted. This adjustment is based on a methodology developed by the Maryland Department of the Environment.[49] Staff at the Maryland Department of the Environment calculated a range of 2009 design values at each site in the Southern New Jersey/Philadelphia nonattainment area. The Maryland methodology was then used to calculate a range of 2009 design values at each site in the Northern New Jersey/New York/Connecticut nonattainment area.

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[48] Choi, Y.J., Ehrman, S. H., Calabrese, R. V., Stehr, J. W., and Dickerson, R. R. A Combined Approach for the Evaluation of a VOC Emissions Inventory. *Journal of the Air and Waste Management Association*, 56, 169–178, February 2006.

[49] Maryland Department of the Environment. Appendix G-9: Uncertainty in CMAQ and Over-predictions of Future Year Ozone Design Values, Cecil County, Maryland 8-Hour Ozone State Implementation Plan and Base Year Inventory. Maryland Department of the Environment, June 15, 2007.

The methodology and calculations employed in arriving at the 2009 modeled design value ranges adjusted for transport are outlined in Table 5.4. As previously discussed, the CMAQ model seems to under predict emission reduction benefits by a factor of at least 2 (i.e. 100%). In order to be conservative, in these calculations it is assumed that CMAQ under predicts by a factor of 1.5 (i.e. 50%).

<u>Table 5.4</u>: Methodology for Calculating 2009 Modeled Design Value Ranges Adjusted for Transport

Note: All values are 8-hour ozone design values (ppb)

The monitoring station at Fairhill, Maryland, which is part of the Southern New Jersey/ Philadelphia nonattainment area, was used for the following sample calculations.

Given:

Observed 2002 = 97.7 ppb
Modeled 2009 BOTW = 81 ppb
Modeled Benefit = Observed 2002 –Modeled 2009 BOTW-B4
= 97.7 ppb – 81 ppb = **16.7 ppb**

'Actual' Benefit = Modeled Benefit x 2 → Explanation: Factor of 2 is used to account for the 100% under estimation of the emissions reduction benefits by CMAQ. This is due to the model's insensitivity to emissions changes.

Allowing for considerable margin, the under estimation of the 'Actual' Benefit is conservatively cut in half (50%). The conservative 'Actual' Benefit is calculated as follows:

'Actual' Benefit$_{Conservative}$ = Modeled Benefit x 1.5 = 16.7 ppb x 1.5 = **<u>25.05 ppb</u>**

2009 Transport Adjusted = Observed 2002 – 'Actual' Benefit$_{Conservative}$
= 97.7 ppb – 25.05 ppb = **<u>72.7 ppb</u>**

2009 Transport Adjusted Range Calculations:

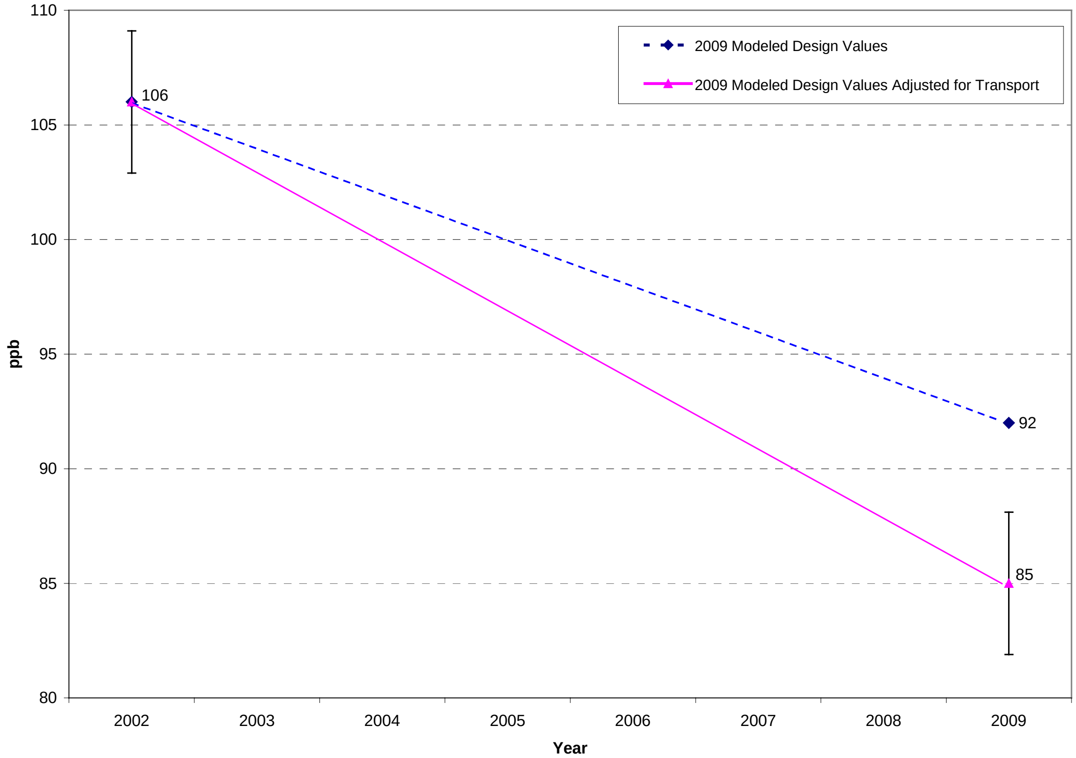
Upper Bound = 2009 Transport Adjusted + 3.1 ppb = 72.7 ppb + 3.1 ppb = **<u>75.8 ppb</u>**
Lower Bound = 2009 Transport Adjusted – 3.1 ppb = 72.7 ppb – 3.1 ppb = **<u>69.6 ppb</u>**

The 3.1 ppb adjustment to calculate the lower bound and upper bound represents the uncertainty in future design values.[50]

[50] Maryland Department of the Environment. Appendix G-9: Uncertainty in CMAQ and Over-predictions of Future Year Ozone Design Values, Cecil County, Maryland 8-Hour Ozone State Implementation Plan and Base Year Inventory. Maryland Department of the Environment, June 15, 2007.

As an example, the comparison of the 2009 modeled design value and the 2009 modeled design value ranges adjusted for transport for Colliers Mills is presented in Figure 5.7.

<u>Figure 5.7</u>: 2009 Modeled Design Value vs 2009 Modeled Design Value Ranges Adjusted for Transport for Colliers Mills, New Jersey



The base year (2002) design values, the CMAQ modeled design values for 2009, and the 2009 modeled design value ranges adjusted for transport, which are based on the conservative 50 percent under response estimate and accounts for the CMAQ model's lack of responsiveness, are presented in Table 5.5 and Figure 5.8a and Figure 5.8b.

Table 5.5: Observed (DV_B), Modeled (DV_F) and Modeled Adjusted for Transport (DV_{AT}) Design Values for the NNJ/NY/CT and SNJ/Phila. Nonattainment Areas

Site Name - County, State	Site Number	Air Monitoring Data	Modeling Results	Modeling Results Adjusted for Transport	
		2002 Modeling Baseline (DV_B) (ppb)	2009 Modeled Results (DV_F) (ppb)	2009 DV_{AT} (ppb)	Upper and Lower Bound of 2009 DV_{AT} (ppb)
NNJ/NY/CT Nonattainment Area					
Teaneck - BERGEN CO, NJ	340030005	91	85	81	84 - 78
Bayonne - HUDSON, NJ	340170006	84	77	73	76 - 70
Flemington - HUNTERDON, NJ	340190001	95	83	76	79 - 73
Rutgers Univ. - MIDDLESEX CO, NJ	340230011	96	83	76	79 - 73
Monmouth Univ. - MONMOUTH CO, NJ	340250005	95	84	78	81 - 75
Chester - MORRIS CO, NJ	340273001	95	84	78	81 - 75
Ramapo - PASSAIC CO, NJ	340315001	86	77	72	75 - 69
Botanical Garden - BRONX CO, NY	360050083	83	78	75	78 - 72
Queens College - QUEENS CO, NY	360810124	83	74	69	72 - 66
Susan Wagner - RICHMOND CO, NY	360850067	93	84	79	82 - 76
Babylon - SUFFOLK CO, NY	361030002	93	85	80	83 - 77
Holtsville - SUFFOLK CO, NY	361030009	97	89	85	88 - 81
Riverhead - SUFFOLK CO, NY	361030004	83	74	69	72 - 66
White Plains - WESTCHESTER CO, NY	361192004	91	85	81	84 - 78
Danbury - FAIRFIELD CO, CT	90011123	95	85	79	82 - 76
Greenwich - FAIRFIELD CO, CT	90010017	95	87	82	85 - 79
Stratford - FAIRFIELD CO, CT	90013007	98	90	85	88 - 82
Westport - FAIRFIELD CO, CT	90019003	94	85	80	83 - 77
Middletown - MIDDLESEX CO, CT	90070007	95	84	78	81 - 75
Hamden - NEW HAVEN CO, CT	90099005	93	85	80	83 - 77
Madison - NEW HAVEN CO, CT	90093002	98	88	82	85 - 79
SNJ/Phila. Nonattainment Area					
Fairhill - CECIL CO, MD	240150003	97	81	72	75 - 69
Brandywine Creek - NEW CASTLE CO, DE	100031010	92	81	75	78 - 72
Bellefonte - NEW CASTLE CO, DE	100031013	90	78	71	74 - 68
Killens Pond - KENT CO, DE	100010002	88	78	72	75 - 69
Lewes - SUSSEX CO, DE	100051003	87	77	72	75 - 68
Lums Pond - NEW CASTLE CO, DE	100031007	94	79	71	74 - 68
Seaford - SUSSEX CO, DE	100051002	90	75	67	70 - 64
Bristol - BUCKS CO, PA	420170012	99	88	82	85 - 79
West Chester - CHESTER CO, PA	420290050	95	82	75	78 - 72
New Garden - CHESTER CO, PA	420290100	94	79	71	74 - 68
Chester - DELAWARE CO, PA	420450002	91	81	75	78 - 72
Norristown - MONTGOMERY CO, PA	420910013	92	81	75	78 - 72
Elmwood - PHILADELPHIA CO, PA	421010136	83	75	71	74 - 67
Lab - PHILADELPHIA CO, PA	421010004	71	64	60	63 - 57
Roxborough - PHILADELPHIA CO, PA	421010014	90	82	77	80 - 74
Northeast Airport - PHILADELPHIA CO, PA	421010024	96	87	82	85 - 79
Colliers Mills - OCEAN CO, NJ	340290006	106	92	85	88 - 81
Rider - MERCER CO, NJ	340210005	97	86	80	83 - 77
Ancora State Hospital - CAMDEN CO, NJ	340071001	100	87	80	83 - 77
Camden - CAMDEN CO, NJ	340070003	98	88	82	85 - 79
Clarksboro - GLOUCESTER CO, NJ	340155001	98	88	82	85 - 79
Millville - CUMBERLAND CO, NJ	340110007	95	81	73	76 - 70
Nacote Creek - ATLANTIC CO, NJ	340010005	89	77	71	74 - 67

NOTE: Highlighted sites are the monitor in each nonattainment area with the highest ozone design value, e.g. the controlling monitor.

Figure 5.8a: Various Design Values for the Ozone Monitoring Sites in the Northern New Jersey/New York/Connecticut Nonattainment Area

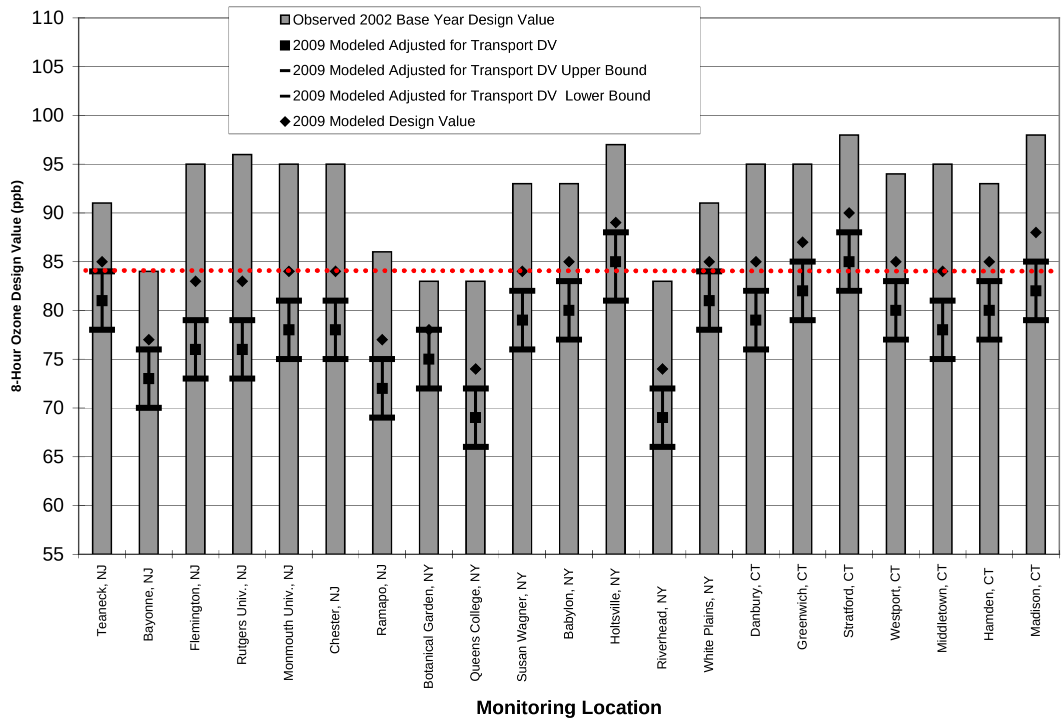
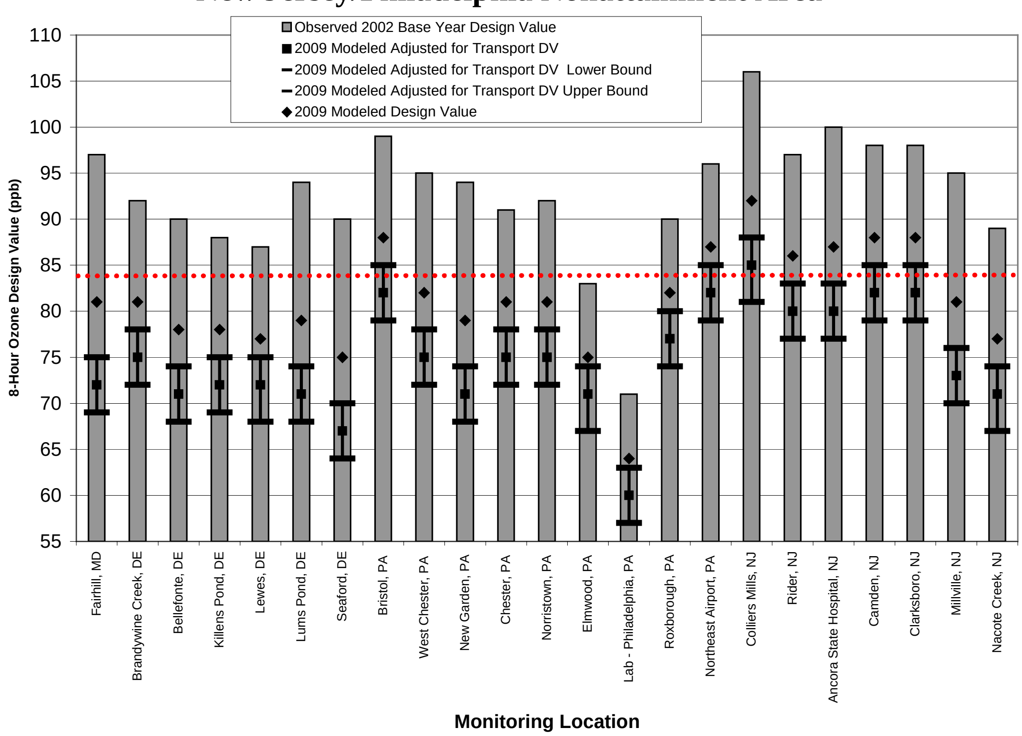


Figure 5.8b: Various Design Values for the Ozone Monitoring Sites in Southern New Jersey/Philadelphia Nonattainment Area



With respect to the demonstration of attainment for 8-hour ozone, the results of these analyses indicate that New Jersey's air quality should be better than CMAQ predicts. Based on the 2009 modeled design value ranges adjusted for transport, the New Jersey monitors in the Northern New Jersey/New York/Connecticut and Southern New Jersey/Philadelphia nonattainment areas show plausible attainment of the 8-hour ozone standard in 2010.

5.4 Supporting Analyses to Address Uncertainty

This section provides analyses and data that address the uncertainty in the modeled results and support New Jersey's conclusion that the 2009 modeled design values adjusted for transport reflect future ozone concentrations that demonstrate plausible attainment of the 8-hour ozone standard by 2010 in the Northern New Jersey/New York/Connecticut and Southern New Jersey/Philadelphia nonattainment areas.

5.4.1 2009 Modeled Ozone Design Values Are Being Measured Now

Monitored 8-hour ozone design values for the New Jersey monitors and the controlling monitors in both of the New Jersey multi-state associated nonattainment areas have decreased between 2002, the baseline year for this SIP, and 2006 (Figure 5.9). In fact, the average 2006 monitored ozone concentrations for the New Jersey monitors and the controlling monitors in both of the New Jersey associated multi-state nonattainment areas almost equal the average 2009 modeled design values (also shown in Figure 5.9 and Table 5.6).

Stratford, Connecticut and Colliers Mills, New Jersey, the controlling monitors in the Northern New Jersey/New York/Connecticut and Southern New Jersey/ Philadelphia nonattainment area, respectively, had 2006 monitored design value that were only 2ppb and 1 ppb, respectively, higher than that modeled for 2009. Additional control measures being implemented between 2006 and 2009 will result in additional air quality benefits. This comparison supports the argument that 2009 monitored design values will be lower than those predicted by CMAQ, i.e., the 2009 modeled design values.

<u>Figure 5.9</u>: 2002-2006 Averaged Monitored 8-Hour Ozone Design Values Compared to 2009 Modeled Ozone Design Values

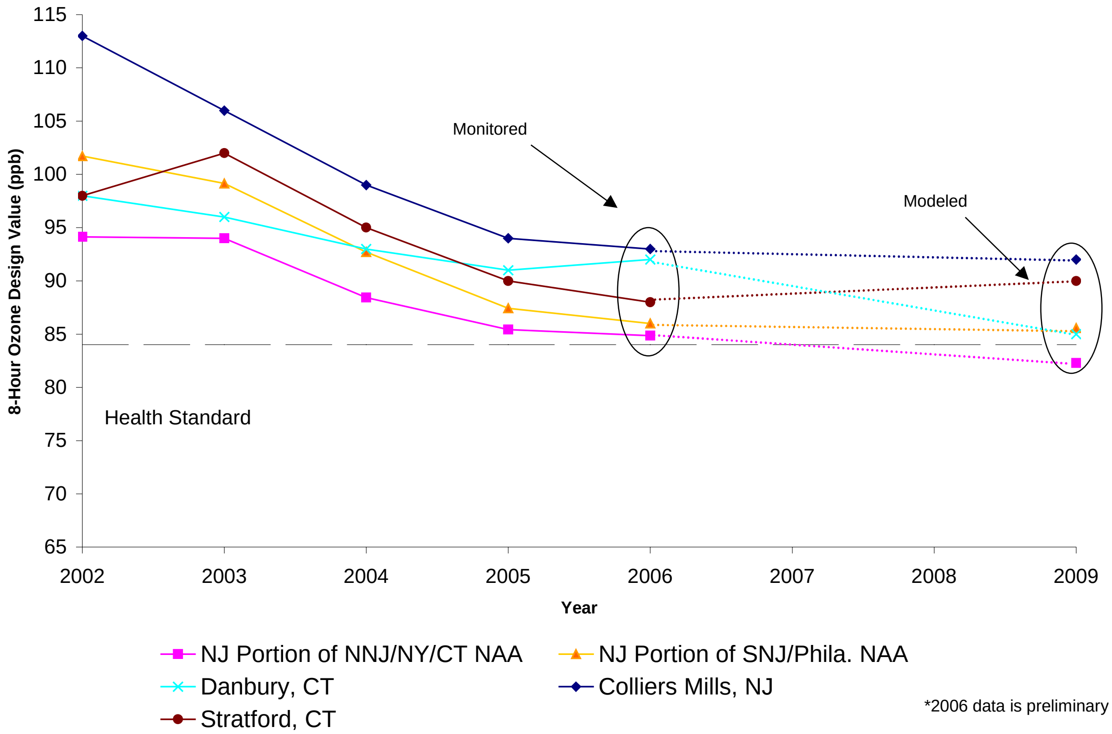


Table 5.6: 2002 and 2006 Monitored Ozone Design Values Compared to 2009 Modeled Ozone Design Values

Site Name - County, State	Site Number	Air Monitoring Data		Modeling Results
		2002 Modeling Baseline (DV_B)(ppb)	2004-2006 Actual Design Values (ppb)	2009 Modeled Results (DV_F) (ppb)
NNJ/NY/CT Nonattainment Area				
Teaneck - BERGEN CO, NJ	340030005	91	86	85
Bayonne - HUDSON, NJ	340170006	84	86	77
Flemington - HUNTERDON, NJ	340190001	95	89	83
Rutgers Univ. - MIDDLESEX CO, NJ	340230011	96	88	83
Monmouth Univ. - MONMOUTH CO, NJ	340250005	95	85	84
Chester - MORRIS CO, NJ	340273001	95	82	84
Ramapo - PASSAIC CO, NJ	340315001	86	78	77
Botanical Garden - BRONX CO, NY	360050083	83	74	78
Queens College - QUEENS CO, NY	360810124	83	72	74
Susan Wagner - RICHMOND CO, NY	360850067	93	89	84
Babylon - SUFFOLK CO, NY	361030002	93	89	85
Holtsville - SUFFOLK CO, NY	361030009	97	***	89
Riverhead - SUFFOLK CO, NY	361030004	83	85	74
White Plains - WESTCHESTER CO, NY	361192004	91	85	85
Danbury - FAIRFIELD CO, CT	90011123	95	92	85
Greenwich - FAIRFIELD CO, CT	90010017	95	87	87
Stratford - FAIRFIELD CO, CT	90013007	98	88	90
Westport - FAIRFIELD CO, CT	90019003	94	86	85
Middletown - MIDDLESEX CO, CT	90070007	95	89	84
Hamden - NEW HAVEN CO, CT	90099005	93	77	85
Madison - NEW HAVEN CO, CT	90093002	98	88	88
SNJ/Phila. Nonattainment Area				
Fairhill - CECIL CO, MD	240150003	97	90	81
Brandywine Creek - NEW CASTLE CO, DE	100031010	92	82	81
Bellefonte - NEW CASTLE CO, DE	100031013	90	81	78
Killens Pond - KENT CO, DE	100010002	88	80	78
Lewes - SUSSEX CO, DE	100051003	87	82	77
Lums Pond - NEW CASTLE CO, DE	100031007	94	78	79
Seaford - SUSSEX CO, DE	100051002	90	80	75
Bristol - BUCKS CO, PA	420170012	99	86	88
West Chester - CHESTER CO, PA	420290050	95	***	82
New Garden - CHESTER CO, PA	420290100	94	86	79
Chester - DELAWARE CO, PA	420450002	91	83	81
Norristown - MONTGOMERY CO, PA	420910013	92	85	81
Elmwood - PHILADELPHIA CO, PA	421010136	83	72	75
Lab - PHILADELPHIA CO, PA	421010004	71	62	64
Roxborough - PHILADELPHIA CO, PA	421010014	90	78	82
Northeast Airport - PHILADELPHIA CO, PA	421010024	96	90	87
Colliers Mills - OCEAN CO, NJ	340290006	106	93	92
Rider - MERCER CO, NJ	340210005	97	87	86
Ancora State Hospital - CAMDEN CO, NJ	340071001	100	89	87
Camden - CAMDEN CO, NJ	340070003	98	84	88
Clarksboro - GLOUCESTER CO, NJ	340155001	98	86	88
Millville - CUMBERLAND CO, NJ	340110007	95	84	81
Nacote Creek - ATLANTIC CO, NJ	340010005	89	79	77

*** Not enough data to calculate a 2006 design value.

NOTE: Highlighted sites are the monitor in each nonattainment area with the highest ozone design value, e.g. the controlling monitor.

5.4.2 Accounting for Unusual Meteorology

The impact of meteorology has a significant effect on year to year variations in ozone concentrations. Hot days of summer are particularly conducive to ozone formation and can produce long periods of elevated ozone concentrations. Several analyses demonstrate that the summer of 2002 was one of the worst ozone seasons since the early 1990s. As discussed in Appendix B, 2002 was also the year with the largest number of days equal to or greater than 90°F in the period 1997-2006 for both the Philadelphia International Airport and New York City-Central Park National Oceanic and Atmospheric Administration weather stations. Figures B37 and B38 show that the greatest exceedances of the 8-hour NAAQS in both the Northern New Jersey/New York/Connecticut and Southern New Jersey/Philadelphia nonattainment areas during this period occurred during 2002. In addition, the State of Connecticut determined the period of 2001-2003 as having the highest number of maximum temperatures in any 3-year period over the past 30 years at the Bradley International Airport weather station.[51] Furthermore, the USEPA analyzed meteorological effects on ozone levels and concluded that 2002 experienced above-normal ozone producing conditions, with above-normal temperatures and below-normal precipitation in most of the country.[52,53] As such, a year with abnormal meteorological conditions should not unduly influence the ozone modeling baseline design value for photochemical modeling and resulting planning actions.

As discussed in Section 5.2.4, the USEPA recommended method for calculating a monitor's modeling baseline design value places more emphasis on the 2002 ozone season than the other years used in the calculation. In the USEPA recommended method, the modeling design value is the average of three–three year periods centered around 2002. Therefore, the 2002 ozone season contributes a third of the baseline concentration; 2001 and 2003 contribute approximately 22% each, and 2000 and 2004 contribute about 11% each. Thus, this methodology more heavily weighs ozone concentrations for 2002 than for other years, thus biasing, on the high side, the modeling baseline design values.

An alternate method of calculating the modeling baseline design values that would not bias the results is to take the straight average of the 4th highest ozone values over the same five years used in the traditional calculation of the 2002 baseline (2000 to 2004). This approach weighs each year equally and results in a reduction of the 2002 modeling baseline design value by an average 2 ppb, as shown in the example in Table 5.7.

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[51] Connecticut Department of Environmental Protection. Revision to Connecticut's State Implementation Plan: Meeting the Interstate Air Pollution Transport Requirements of Clean Air Act Section 110(a)(2)(D)(I). Connecticut Department of Environmental Protection, March 13, 2007.

[52] USEPA. Evaluating the Ozone Control Programs in the Eastern United States: Focus on the NO_x Budget Trading Program, 2004. United States Environmental Protection Agency, Office of Air and Radiation, Office of Air Quality Planning and Standards, and Office of Atmospheric Programs, Washington, D.C., EPA454-K-05-001, August 2005.

[53] USEPA. 2005 Program Compliance and Environmental Results: NO_x Budget Trading Program. United States Environmental Protection Agency, Office of Air and Radiation, Office of Air Quality Planning and Standards, and Office of Atmospheric Programs, Air Quality Assessment Division, Washington, D.C., EPA430-R-06-013, September 2006.

<u>Table 5.7</u>: Alternate Modeling Baseline Design Value (DV_{Balt}) Using the Average of the Fourth Highest Maximum Ozone Concentration in the Five Year Period Centered Around 2002 for Colliers Mills, New Jersey

	2000	2001	2002	2003	2004	USEPA DV_B	Alternate DV_{Balt}
Fourth Maximum 8-Hour Ozone Concentration (ppb)	115	108	116	95	88	106	104

Use of an alternate modeling baseline design value based on a straight average is not an unreasonable proposition. In the current case (2000-2004), the straight average removes a high bias. However, use of the straight average with data from other years could remove a low bias. For example, consider a modeling baseline design value for Colliers Mills centered on 2004, i.e., the years 2002-2006. 2004 is generally considered to be an unusually cool summer with ozone concentrations that were generally lower than years before or after it. Using the USEPA method for calculating a monitor's modeling baseline design value places more emphasis on the modeling baseline year ozone season (2004 in this example) than the other years used in the calculation, and results in a modeling baseline design value of 96 ppb.[54] The straight average of the 4th highest ozone values over the same five years (2002-2006) is 98 ppb. In this case, the straight average method produces a higher baseline design value than the USEPA method. Thus illustrating that the alternate method provides a more robust approach.

If a 2002 alternate modeling baseline design value were used, the 2009 modeled design values would be lower, as shown in Table 5.8. The calculations on how the Alternative Modeling Baseline Design Values, or DV_{Balt}, were calculated are shown in Appendix D12.

[54] The fourth maximum 8-hour ozone concentrations at Colliers Mills, New Jersey for 2005 was 100 ppb and for 2006 was 92 ppb.

<u>Table 5.8</u>: Calculated and Modeled Design Values for Northern New Jersey/New York/Connecticut and Southern New Jersey/Philadelphia Nonattainment Areas

Site Name - County, State	Site Number	Air Monitoring Data		Modeling Results	
		2002 Modeling Baseline (DV_B) (ppb)	2002 Modeling Alternate Baseline (DV_{Balt}) (ppb)	2009 Modeled Results (DV_F) (ppb)	2009 Modeled Results using Alternate Baseline (DV_{Falt}) (ppb)
NNJ/NY/CT Nonattainment Area					
Teaneck - BERGEN CO, NJ	340030005	91	88	85	81
Bayonne - HUDSON, NJ	340170006	84	84	77	76
Flemington - HUNTERDON, NJ	340190001	95	94	83	82
Rutgers Univ. - MIDDLESEX CO, NJ	340230011	96	94	83	82
Monmouth Univ. - MONMOUTH CO, NJ	340250005	95	94	84	82
Chester - MORRIS CO, NJ	340273001	95	92	84	81
Ramapo - PASSAIC CO, NJ	340315001	86	84	77	75
Botanical Garden - BRONX CO, NY	360050083	83	79	78	74
Queens College - QUEENS CO, NY*	360810124	83	83	74	74
Susan Wagner - RICHMOND CO, NY	360850067	93	91	84	82
Babylon - SUFFOLK CO, NY	361030002	93	90	85	82
Holtsville - SUFFOLK CO, NY	361030009	97	94	89	87
Riverhead - SUFFOLK CO, NY	361030004	83	81	74	72
White Plains - WESTCHESTER CO, NY	361192004	91	88	85	82
Danbury - FAIRFIELD CO, CT	90011123	95	93	85	83
Greenwich - FAIRFIELD CO, CT	90010017	95	91	87	83
Stratford - FAIRFIELD CO, CT	90013007	98	95	90	87
Westport - FAIRFIELD CO, CT	90019003	94	91	85	82
Middletown - MIDDLESEX CO, CT	90070007	95	93	84	82
Hamden - NEW HAVEN CO, CT*	90099005	93	93	85	84
Madison - NEW HAVEN CO, CT	90093002	98	94	88	85
SNJ/Phila. Nonattainment Area					
Fairhill - CECIL CO, MD	240150003	97	97	81	80
Brandywine Creek - NEW CASTLE CO, DE	100031010	92	90	81	78
Bellefonte - NEW CASTLE CO, DE*	100031013	90	85	78	74
Killens Pond - KENT CO, DE	100010002	88	87	78	77
Lewes - SUSSEX CO, DE	100051003	87	85	77	75
Lums Pond - NEW CASTLE CO, DE	100031007	94	88	79	74
Seaford - SUSSEX CO, DE	100051002	90	89	75	75
Bristol - BUCKS CO, PA	420170012	99	96	88	86
West Chester - CHESTER CO, PA*	420290050	95	95	82	82
New Garden - CHESTER CO, PA*	420290100	94	94	79	78
Chester - DELAWARE CO, PA	420450002	91	90	81	79
Norristown - MONTGOMERY CO, PA	420910013	92	92	81	81
Elmwood - PHILADELPHIA CO, PA	421010136	83	81	75	73
Lab - PHILADELPHIA CO, PA	421010004	71	69	64	62
Roxborough - PHILADELPHIA CO, PA	421010014	90	88	82	80
Northeast Airport - PHILADELPHIA CO, PA	421010024	96	94	87	84
Colliers Mills - OCEAN CO, NJ	340290006	106	104	92	90
Rider - MERCER CO, NJ	340210005	97	95	86	84
Ancora State Hospital - CAMDEN CO, NJ	340071001	100	99	87	86
Camden - CAMDEN CO, NJ	340070003	98	94	88	84
Clarksboro - GLOUCESTER CO, NJ	340155001	98	97	88	87
Millville - CUMBERLAND CO, NJ	340110007	95	94	81	79
Nacote Creek - ATLANTIC CO, NJ	340010005	89	87	77	76

Note: 2002 Modeling Alternate Baseline Design Value calculated using the average of less than 5 years of monitoring data.

NOTE: Highlighted sites are the monitor in each nonattainment area with the highest ozone design value, e.g. the controlling monitor.

The 2009 modeled design values calculated using the alternate 2002 modeling baseline design value are lower than the 2009 modeled values by an average 2 ppb. For the Northern New Jersey/New York/Connecticut nonattainment area, 9 monitors showed 2009 modeled design values greater than 84 ppb using the USEPA baseline methodology but only 3 monitors showed 2009 modeled design values greater than 84 ppb (87, 87 and 85 ppb) using the alternate baseline methodology. For the Southern New Jersey/ Philadelphia nonattainment area, 7 monitors showed 2009 modeled design values greater than 84 ppb using the USEPA baseline methodology but only 3 monitors showed 2009 modeled design values greater than 84 ppb (90, 86 and 86 ppb) using the alternate baseline methodology. Use of this alternative baseline design value calculation method removes the excessive use of unusual meteorological influence of the 2002 ozone season and results in lower 2009 modeled design values.

5.4.3 Using a Different Model Relative Response Factor

The 2009 modeled ozone design values were calculated by multiplying the modeling baseline design values, based on monitored data, with a Relative Response Factor (RRF). (RRF is discussed in detail in Section 5.2.4) The USEPA method uses the RRF associated with the maximum 8-hour ozone concentration in the grid cell associated with a monitoring site (i.e. maximum concentration of 9 grid cells - the monitoring grid cell plus the 8 grid cells surrounding the monitoring grid cell) averaged over a certain number of days when the ozone NAAQS is exceeded.

The use of an average response RRF to calculate the 2009 modeled ozone design values shows air quality improvements that are already being measured in the air monitors in 2006. Therefore, use of a maximum response[55] RRF might provide 2009 modeled zone design values that are more likely to be experienced in 2009. Therefore, the maximum response RRF for each of the New Jersey associated multi-state nonattainment areas (see Table 5.9) was applied to the model results for all the monitors in the nonattainment area and the 2009 modeled ozone design values were recalculated.

Table 5.9: Relative Response Factors for the Northern New Jersey/ New York/Connecticut and Southern New Jersey/Philadelphia Nonattainment Areas*

Nonattainment Area	Maximum Response	Minimum Response	Average Response
Northern New Jersey/ New York/Connecticut	0.874	0.939	0.905
Southern New Jersey/Philadelphia	0.831	0.911	0.878

*The values in this table are the minimum, maximum and average response RRFs from the 2009 BOTW modeling run for the ozone monitors in the entire nonattainment area.

The 2009 modeled design values were recalculated using the 2002 Modeled Alternate Baseline Design Value and the maximum response RRF (DV_{Falt-r}) for the Northern New

[55] If a 9 cell maximum ozone value of 90 ppb was multiplied by the average response RRF value, 0.878, the result would be 79 ppb. If a 9 cell maximum ozone value of 90 ppb was multiplied by the maximum response RRF value, 0.831, the result would be 75 ppb. Therefore, a maximum response RRF reflects a larger air quality response and thus lower ozone concentrations.

Jersey/New York/Connecticut and Southern New Jersey /Philadelphia nonattainment areas, respectively. (see Table 5.10) These calculations are more fully described in Appendix D12.

Table 5.10: 2009 Modeled Design Values Using Alternate Baseline Design Value and Alternate RRF for the Northern New Jersey/New York/Connecticut and Southern New Jersey/Philadelphia Nonattainment Areas

Site Name - County, State	Site Number	Air Monitoring Data		Modeling Results	
		2002 Modeling Baseline (DV_B) (ppb)	2002 Modeling Alternate Baseline (DV_{Balt}) (ppb)	2009 Modeled Results (DV_F) (ppb)	2009 Modeled Results using Alternate Baseline and RRF (DV_{Falt-r}) (ppb)
NNJ/NY/CT Nonattainment Area					
Teaneck - BERGEN CO, NJ	340030005	91	88	85	76
Bayonne - HUDSON, NJ	340170006	84	84	77	73
Flemington - HUNTERDON, NJ	340190001	95	94	83	82
Rutgers Univ. - MIDDLESEX CO, NJ	340230011	96	94	83	82
Monmouth Univ. - MONMOUTH CO, NJ	340250005	95	94	84	82
Chester - MORRIS CO, NJ	340273001	95	92	84	80
Ramapo - PASSAIC CO, NJ	340315001	86	84	77	73
Botanical Garden - BRONX CO, NY	360050083	83	79	78	69
Queens College - QUEENS CO, NY*	360810124	83	83	74	73
Susan Wagner - RICHMOND CO, NY	360850067	93	91	84	79
Babylon - SUFFOLK CO, NY	361030002	93	90	85	78
Holtsville - SUFFOLK CO, NY	361030009	97	94	89	82
Riverhead - SUFFOLK CO, NY	361030004	83	81	74	70
White Plains - WESTCHESTER CO, NY	361192004	91	88	85	76
Danbury - FAIRFIELD CO, CT	90011123	95	93	85	81
Greenwich - FAIRFIELD CO, CT	90010017	95	91	87	79
Stratford - FAIRFIELD CO, CT	90013007	98	95	90	83
Westport - FAIRFIELD CO, CT	90019003	94	91	85	79
Middletown - MIDDLESEX CO, CT	90070007	95	93	84	81
Hamden - NEW HAVEN CO, CT*	90099005	93	93	85	81
Madison - NEW HAVEN CO, CT	90093002	98	94	88	82
SNJ/Phila. Nonattainment Area					
Fairhill - CECIL CO, MD	240150003	97	97	81	80
Brandywine Creek - NEW CASTLE CO, DE	100031010	92	90	81	74
Bellefonte - NEW CASTLE CO, DE*	100031013	90	85	78	71
Killens Pond - KENT CO, DE	100010002	88	87	78	72
Lewes - SUSSEX CO, DE	100051003	87	85	77	70
Lums Pond - NEW CASTLE CO, DE	100031007	94	88	79	73
Seaford - SUSSEX CO, DE	100051002	90	89	75	73
Bristol - BUCKS CO, PA	420170012	99	96	88	79
West Chester - CHESTER CO, PA*	420290050	95	95	82	79
New Garden - CHESTER CO, PA*	420290100	94	94	79	78
Chester - DELAWARE CO, PA	420450002	91	90	81	74
Norristown - MONTGOMERY CO, PA	420910013	92	92	81	76
Elmwood - PHILADELPHIA CO, PA	421010136	83	81	75	67
Lab - PHILADELPHIA CO, PA	421010004	71	69	64	57
Roxborough - PHILADELPHIA CO, PA	421010014	90	88	82	73
Northeast Airport - PHILADELPHIA CO, PA	421010024	96	94	87	78
Colliers Mills - OCEAN CO, NJ	340290006	106	104	92	86
Rider - MERCER CO, NJ	340210005	97	95	86	78
Ancora State Hospital - CAMDEN CO, NJ	340071001	100	99	87	82
Camden - CAMDEN CO, NJ	340070003	98	94	88	78
Clarksboro - GLOUCESTER CO, NJ	340155001	98	97	88	80
Millville - CUMBERLAND CO, NJ	340110007	95	94	81	78
Nacote Creek - ATLANTIC CO, NJ	340010005	89	87	77	72

Note: 2002 Modeling Alternate Baseline Design Value calculated using the average of less than 5 years of monitoring data.
For the Southern New Jersey/Philadelphia nonattainment area, the RRF_{min} = 0.831; for the Northern New Jersey/New York/Connecticut nonattainment area, the RRF_{min} = 0.874.

NOTE: Highlighted sites are the monitor in each nonattainment area with the highest ozone design value, e.g. the controlling monitor.

The 2009 modeled design values calculated using the alternate baseline and RRF values are lower by an average 5 ppb. Use of this alternative baseline design value calculation method removes the unusual meteorological influence of the 2002 ozone season and uses an RRF applying the maximum response to emission reductions within the nonattainment area. This calculation results in 2009 modeled design values within the range of the 2009 modeled design value ranges adjusted for transport. For example, the 2009 modeled design value range adjusted for transport for Colliers Mills is 81-88 ppb. The 2009 modeled design value is 92 ppb. And the 2009 modeled design value using the alternate 2002 modeling baseline value and maximum response RRF value is 86 ppb. This results in a modeled value, using the 2009 modeled design value (the USEPA's traditional approach), that falls within the range of design values adjusted for transport, therefore, further supporting New Jersey's demonstration of attainment.

5.4.4 Additional Measures Not Included in the 2009 Attainment Modeling

5.4.4.1 Introduction

New Jersey is working to propose and implement a number of additional control measures that were not included in the attainment demonstration modeling. These additional measures were the result of the efforts of the Ozone Transport Commission, the MARAMA, New Jersey's reasonably available control technology analysis, or other New Jersey initiatives to identify measures that would improve air quality. The purpose of this section is to:

- outline the methodology for making the conversion from emission reductions to air quality benefits, and
- provide the total air quality benefit (in ppb) that New Jersey estimates from the implementation of these additional measures, or refinements to the modeled measures.

5.4.4.2 Additional Quantifiable Measures

Table 5.11 lists the additional control measures and refinements that New Jersey is planning to propose by no later than November 2007, and adopt by May 2008, in accordance with the New Jersey Administrative Procedures Act (APA) (N.J.S.A. 52:14B-1 et. seq.) and the Air Pollution Control Act (APCA) (N.J.S.A. 26:2C-1 et. seq.). While these additional measures and refinements were finalized too late to be included in the 2009 BOTW modeling, they will provide additional emission reductions by 2009. As such, they provide additional evidence to support New Jersey's conclusion that both of its associated nonattainment areas will attain the 8-hour ozone standard by their required attainment dates. The remainder of this section outlines the methodology for making the conversion from emission reductions to air quality benefits.

Table 5.11: Additional Quantifiable Measures Not Included in the 2009 BOTW Modeling

Pre-2002 with benefits achieved Post-2002 - On the Books
New Jersey
New Source Review (NSR)
Post-2002 - On the Books
New Jersey Measures Done Through a Regional Effort
Additional Benefits from Modeled Measures
NO_x RACT rule 2006 (includes distributed generation)
Portable Fuel Containers 2005
Post-2002 - Beyond on the Way
New Jersey Measures Done Through a Regional Effort
Portable Fuel Containers 2009 Amendments
Certain Categories of ICI Boilers
Refinery rules[a]
High Electric Demand Day Program
New Jersey Only Measures
Petroleum Storage Tank Measures
USEPA CTGs (5 categories)
Case by case VOC and NO_x determinations (FSELs/AELs)
Municipal Waste Combustor Measures
Diesel Idling[b]
Diesel Inspection and Maintenance
Case by case VOC and NOx Emission Limit Determinations
Municipal Waste Combustors Rule Effort
Petroleum Storage Tank Measures[c]
Revisions to meet requirements of new CTGs[d]
Federal
National Aerosol Coatings Rule
New nonroad engine standards

[a] The Diesel Idling Rule changes were adopted in June 2007

[b] Includes proposed requirements for process heaters, flares, FCCs/FCUs and leak detection and repair

[c] Includes proposed requirements for floating roof top sleeves, degassing, cleaning and landing losses

[d] Includes state review and action on four new CTGs covering five categories, including flexible packaging printing materials, lithographic printing materials, letterpress printing materials, industrial cleaning solvents, and flat wood paneling coatings.

5.4.4.3 Methodology for Converting Emission Reductions to Air Quality Benefits

In calculating the shortfalls for 1-hour ozone SIPs, the USEPA established a simple method to estimate a change in ozone due to a change in emissions.[56] In general, this methodology compares the actual emission inventory and an estimated future year emission inventory for VOC and NO_x to monitoring data for those same time periods. This approach was updated to incorporate the latest inventory and 8-hour ozone air quality data and is used here to estimate a change in ozone. From this method, New Jersey was able to express the VOC and NO_x benefits for the additional emission reductions as decreases in ozone concentrations. For a more detailed description of this conversion methodology, see Appendix D13.

5.4.4.4 Results

When added together, all the control measures and refinements listed in Table 5.11 result in an additional 9 tons per day (tpd) reduction in VOC and 27 tpd reduction in NO_x in the Northern New Jersey/New York/ Connecticut nonattainment area, and 2 tpd reduction in VOC and 14 tpd reduction in NO_x in Southern New Jersey/Philadelphia nonattainment area.[57] In order to relate these emission reductions to the modeled attainment results discussed in Section 5.3, they need to be converted to air quality benefits, i.e. ozone concentrations in ppb.

Using the USEPA conversion methodology, reductions in ozone concentrations can be estimated based on the implementation of control measures and refinements not included in the modeling. If the measures described in Table 5.11 are implemented in New Jersey and for HEDD, regionally, the estimated air quality benefits are 0.3 – 2 ppb in the Northern New Jersey/New York/Connecticut nonattainment area and 0.2 – 5 ppb in the Southern New Jersey/Philadelphia nonattainment area.

These estimated air quality benefits further reduce the uncertainty associated with the 2009 modeled design value ranges adjusted for transport and supports New Jersey's plausible demonstration of attainment of the 8-hour ozone NAAQS in its two multi-state nonattainment areas.

The comprehensive regional modeling assessment discussed in Section 5.3 demonstrates that the New Jersey-associated nonattainment areas demonstrate plausible attainment of the 8-hour ozone NAAQS by their designated attainment date. Therefore, New Jersey is not relying on these additional measures as part of the attainment demonstration. Nor are

[56] USEPA Region II. Technical Support Document: Modeling for the Trenton, New Jersey Portion of the Philadelphia Ozone Nonattainment Area. United States Environmental Protection Agency (USEPA), Region II, December 14, 1999

[57] These are approximate emission reduction totals as the additional control measures and refinements need to be proposed by November 2007 and adopted by May 2008, in accordance with New Jersey Administrative Procedures Act (N.J.S.A. 52:14B-1 et. seq.) and the Air Pollution Control Act (N.J.S.A. 26:2C-1 et. seq.).

these control measures and refinements being considered as “bundled measures” for this SIP proposal.[58] Rather, this evaluation of emission reductions expected from these additional control measures and refinements provides further confidence that New Jersey will attain the 8-hour ozone standard by 2010, and gives the State an abundance of additional emission reductions to rely upon in the event of exceedance. The benefits of these measures and refinements will be reflected in the ambient air monitors. These measures are discussed further as part of the State’s contingency measure strategy for attainment in Chapter 8.

5.4.5 Non-Quantifiable Emission Reductions Which Improve Air Quality

Unlike the quantitative measures discussed, some measures were purposely not included in the photochemical modeling exercise. While there are numerous reasons why certain emission control measures were not including in a modeling scenario, the two most significant are:

- The preparatory work needed to run these models is resource-intensive, making it neither practical nor reasonable to model every possible control measure.
- The uncertainty in calculating emission reduction benefits from certain types of control measures is acknowledged by the USEPA in its guidance for emerging measures, or measures that are difficult to accurately quantify.[59]

This final reason is critical, as there are numerous programs that have been/are/will be implemented where it is simply impractical to quantify an air quality benefit. For example, tree planting or replacing roofs with reflective material helps to decrease the high temperatures in an urban area that result from the ‘heat island effect’ which will indirectly impact ozone concentrations. However, a method for accurately quantifying the benefits from these measures is not available at this time. Therefore, emission reductions of these air pollution control strategies were not included in the scenarios utilized in the modeling analysis, as a quantified benefit is needed for each control measure that is used in photochemical modeling.

New Jersey is aware that these control measures do and will continue to improve the State’s overall air quality by indirectly decreasing ground-level ozone concentrations. As such, these strategies will result in actual air quality benefits that will be reflected in the monitoring data in both the Northern New Jersey/New York/Connecticut and Southern New Jersey/Philadelphia nonattainment areas in the years leading up to 2010. New Jersey

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[58] USEPA. Incorporating Bundled Measures in a State Implementation Plan (SIP). United States Environmental Protection Agency (USEPA), Office of Air and Radiation, Air Quality Strategies and Standards Division, Office of Air Quality Planning and Standards, and Office of Transportation and Air Quality, Transportation and Regional Programs Division, Research Triangle Park, NC, August 2005.

[59] USEPA. Incorporating Emerging and Voluntary Measures in a State Implementation Plan (SIP). United States Environmental Protection Agency (USEPA), Office of Air and Radiation, Air Quality Strategies and Standards Division, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 2004.

promotes and supports these measures, within state funding limits, but is not relying upon them to demonstrate attainment.

The non-quantifiable strategies can be grouped into five categories:

Voluntary Strategies

The strategies in this category are/will be implemented on a voluntary basis. Companies and organizations commit to various initiatives that reduce ozone precursors. Examples of these strategies include state-level programs for days with high levels of ozone, a federal campaign that targets reducing raw material usage, reusing waste products, and decreasing waste production, and a tool to help permit writers, enforcement officers, and the regulated community identify and employ pollution prevention methods to reduce or eliminate releases of hazardous materials to the environment.

Energy Savings and Alternative Energy Strategies

The strategies in this category are also implemented on a voluntary basis but are specific to reducing energy consumption and utilizing alternative energy sources. Examples of strategies in this category include New Jersey's Clean Energy Program[60], fuel cells, and USEPA's Green Power Partnership. While reductions in electrical use will likely decrease emissions from a specific generator, collectively the generator emissions are capped currently by the NO_x SIP Call and by the CAIR beginning in 2009 cap and trade programs. Thus, no benefits may actually be achieved. To remedy this situation, the New Jersey NO_x Budget Program and the CAIR allow for the retirement of emission benefits from such measures.

Mobile Strategies

The strategies in this category focus on reducing vehicle miles traveled and fuel consumption, and increasing the use of alternative fuel sources. Mobile strategies target onroad and nonroad vehicles and equipment. Examples of strategies in this category include Carpool Makes $ense Program (Governor Corzine's Initiative), the USEPA's SmartWay Transport Partnership, and the Northeast Diesel Collaborative.

Particulate Matter Strategies with Benefits to Reduce Ozone

The strategies in this category serve to primarily reduce particulate matter but have co-benefits of reducing ozone precursors. This category includes various federal and State retrofit programs such as the USEPA's Voluntary Diesel Retrofit Program and projects under New Jersey's Diesel Risk Reduction Program.

[60] It should be noted that even though New Jersey is adopting new rules for the CAIR NO_x Trading Program in the summer of 2007 (see Chapter 4), the allowances from some of these measures cannot be retired until after 2009 and are not yet quantified. This means that the emission reductions achieved from the New Jersey Board of Public Utility's Clean Energy Program cannot be credited in this proposed SIP revision.

While New Jersey did not attempt to quantify these “hard to quantify” emission reduction strategies, the University of Maryland conducted two studies in an attempt to quantify measures that are normally considered to be non-quantifiable. These studies offer a glimpse at the magnitude of air quality benefits that can occur from difficult to quantify measures.

The first study supports the importance of large-scale tree planting programs to maintain tree cover and prevent increases in ozone due to loss of tree cover.[61] Tree cover in urban areas helps to decrease surface temperatures, thus resulting in an ozone reduction. Results from the University of Maryland study suggest that decreases in ground level ozone concentrations on the order of 1-3 ppb could be realized with an increase in urban tree cover ranging from 20 – 40 percent, using the Baltimore nonattainment area as a model. The second study focused on the implementation of a regional Code Orange telecommuting program for the Baltimore, Washington D.C., and Southern New Jersey/Philadelphia nonattainment areas on the worst ozone days.[62] Changes in emissions were implemented as a flat 40% reduction in vehicle miles traveled in each county of the three non-attainment areas. No attempt was made to determine areas where workers were more or less likely to telecommute. The largest benefits from such a program occurred at the most problematic monitoring locations in Washington, D.C. nonattainment area (Arlington County, 3 ppb) and Southern New Jersey/Philadelphia nonattainment area (Colliers Mills, 3 ppb). These studies support New Jersey’s contention that these types of strategies do provide additional air quality benefits and supports New Jersey's argument that 2009 design values will be lower than those modeled with CMAQ.

5.4.6 2012 Photochemical Modeling Results

The NYSDEC performed a BOTW 2012 CMAQ model run. The 2012 model run incorporated the control measures in the 2009 BOTW run plus new control measures that are expected to be implemented in time to reduce emissions in 2012. The CMAQ simulation was performed with 2012 BOTW emissions in the OTC States and the remainder of the modeling domain. All modeling assumptions (meteorology, horizontal and vertical grid size etc.) for the 2012 modeling run, other than the actual control measures considered, were the same as those considered for the 2009 BOTW run, and are discussed in detail in Section 5.2. Transport adjusted 2012 design value ranges support New Jersey's plausible demonstration of attainment by 2009 while insuring that additional measures will already be in place to maintain that attainment status post-2009.

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[61]Maryland Department of the Environment. Appendix G-13: The Relationship between Urban Tree Cover and Ground Level Ozone, Cecil County, Maryland, 8-Hour Ozone State Implementation Plan and Base Year Inventory: SIP Revision 07-05. Maryland Department of the Environment, June 15, 2007.
[62] Maryland Department of the Environment. Appendix G-14: Air Quality Benefits of an Aggressive Telecommute Strategy, Cecil County, Maryland, 8-Hour Ozone State Implementation Plan and Base Year Inventory: SIP Revision 07-05. Maryland Department of the Environment, June 15, 2007.

5.4.6.1 Control Measures

Table 5.12 lists all of the control measures included for New Jersey in the projected 2012 BOTW CMAQ modeling run. Each of these control measures is discussed in detail in Chapter 4. As shown in the table, control measures for asphalt production, glass manufacturing, and industrial/combustion/institutional boilers (area sources) are in addition to those modeled as part of the 2009 attainment run.

Table 5.12: Control Measures Included in the 2012 BOTW Model Run

Pre-2002 with benefits achieved Post-2002- On the Books
Federal
Residential Woodstove NSPS
Onboard Refueling Vapor Recovery (ORVR) beyond Stage II
Tier 1 Vehicle Program
National Low Emission Vehicle Program (NLEV)
Tier 2 Vehicle Program/low sulfur fuels
HDDV Defeat Device Settlement
HDDV Engine Standards
Nonroad diesel engines
Large industrial spark-ignition engines over 19 kilowatts
Recreational Vehicles (includes snowmobiles, off-highway motorcycles and all-terrain vehicles)
Diesel Marine Engines over 37 kilowatts
Phase 2 standards for small spark-ignition handheld engines at or below 19 kilowatts
Phase 2 standards for new nonroad spark-ignition nonhandheld engines at or below 19 kilowatts
Post-2002 - On the Books
New Jersey Measures Done Through a Regional Effort
Consumer Products 2005
Architectural Coatings 2005
Portable Fuel Containers 2005
Mobile Equipment Repair and Refinishing
Solvent Cleaning
NO_x RACT rule 2006 (including distributed generation)
Stage I and Stage II - Gasoline Transfer Operations
On-Board Diagnostics – I/M
New Jersey Heavy Duty Diesel Rules Including "Not-To-Exceed" (NTE) Requirements
Federal
USEPA MACT Standards including Industrial Boiler/Process Heater MACT
CAIR
Refinery Enforcement Initiative

Post-2002 - Beyond on the Way
New Jersey Measures Done Through a Regional Effort
Consumer Products 2009 Amendments
Portable Fuel Containers 2009 Amendments
Asphalt Paving
Asphalt Production
Glass Manufacturing
Adhesives and Sealants
Certain Categories of ICI Boilers (additional sources)

***** Highlighted control measures are in addition to those modeled as part of the 2009 attainment run

The 2012 CMAQ model run also includes emissions reductions for other states in the Ozone Transport Region. Table 5.13 lists which BOTW measures each state in the Ozone Transport Region believed would be implemented in time to achieve benefits in 2012.

<u>Table 5.13</u>: Ozone Transport Region-Wide Modeling Assumptions for the 2012 BOTW Model Run

	Consumer Products 2005/2009	PFC 2005/2009	Asphalt Paving	Adhesives & Sealants	ICI Boilers - Area Sources			ICI Boilers - Non-EGU Point Sources					Cement Kilns	Glass Furnances	Asphalt Plants
					< 25 mmBtu/hr	25-50 mmBtu/hr	50-100 mmBtu/hr	< 25 mmBtu/hr	25-50 mmBtu/hr	50-100 mmBtu/hr	100-250 mmBtu/hr	>250 mmBtu/hr			
<u>NY NAA</u>															
Connecticut	x	x	x	x	x	x	x	x	x	x	x				x
New Jersey	x	x	x	x	x	x	x	x	x	x	x			x	x
New York	x	x	x	x	x	x	x	x	x	x	x		x	x	x
<u>Phila. NAA</u>															
Delaware	x	x		x							x				
Maryland	x	x	x	x							x		x	x	
New Jersey	x	x	x	x	x	x	x	x	x	x	x			x	x
Pennsylvania	x	x	x	x									x	x	
<u>Other States</u>															
Maine	x	x		x									x		
New Hampshire	x	x	x	x					x	x	x				
Vermont															
Massachusetts	x	x	x	x										x	
Rhode Island	x	x	x	x											
DC	x	x	x	x											x

*Source: MACTEC. Development of Emission Projections for 2009, 2012, and 2018 for NonEGU Point, Area, and Nonroad Sources in the MANE-VU Region, Final TSD. Prepared for the Mid-Atlantic Regional Air Management Association by MACTEC Federal Programs, Inc., February 28, 2007.

5.4.6.2 2012 Modeling Results

The CMAQ outputs from the 2012 model simulation were processed using RRFs (calculated using the USEPA method) as with the 2009 CMAQ outputs as discussed in Section 5.2. Table 5.14 shows the 2012 modeled design values. As shown in this table, New Jersey's continued efforts beyond 2009, as well as the efforts from the rest of the Ozone Transport Region states and the USEPA, show a marked improvement in air quality by 2012. The 2012 modeled design values for the controlling monitors, in both multi-state associated nonattainment areas, at Colliers Mills, NJ and Stratford, CT are both 86 ppb.

Also shown in Table 5.14 are the 2012 modeled design values adjusted for transport, as outlined in Section 5.3. The 2012 transport adjusted modeled design value ranges at the controlling monitors show substantial decreases in ozone; Colliers Mills, NJ 79-72 ppb and Stratford, CT 82-76 ppb. The 2012 transport adjusted modeled design value ranges provide further confidence that future ozone values will be considerably lower than those modeled.

It should be noted that while New Jersey is confident that this comprehensive analysis provides a plausible demonstration of attainment for its two multi-state 8-hour ozone nonattainment areas, New York State has chosen to demonstrate attainment for the Northern New Jersey/New York nonattainment area for 2012. However, New York State has indicated that they are not precluding the possibility that the area will attain by its USEPA mandated 2010 attainment date.

Table 5.14: Comparison of 2002 Observed Design Values to 2012 Modeled Design Values and 2012 Modeled Design Value Ranges Adjusted for Transport for the Northern New Jersey/New York/Connecticut and Southern New Jersey/Philadelphia Nonattainment Areas

Site Name - County, State	Site Number	Air Monitoring Data	Modeling Results	Modeling Results Adjusted for Transport			
		2002 Modeling Baseline (DV_B) (ppb)	2012 Modeled Results (DV_F) (ppb)	2012 DV_{AT} (ppb)	Upper and Lower Bound of 2012 DV_{AT} (ppb)		
NNJ/NY/CT Nonattainment Area							
Teaneck - BERGEN CO, NJ	340030005	91	81	75	78	-	72
Bayonne - HUDSON, NJ	340170006	84	75	70	73	-	67
Flemington - HUNTERDON, NJ	340190001	95	78	69	72	-	66
Rutgers Univ. - MIDDLESEX CO, NJ	340230011	96	79	70	73	-	67
Monmouth Univ. - MONMOUTH CO, NJ	340250005	95	80	72	75	-	69
Chester - MORRIS CO, NJ	340273001	95	79	70	73	-	67
Ramapo - PASSAIC CO, NJ	340315001	86	73	66	69	-	63
Botanical Garden - BRONX CO, NY	360050083	83	75	70	73	-	67
Queens College - QUEENS CO, NY	360810124	83	71	65	68	-	61
Susan Wagner - RICHMOND CO, NY	360850067	93	80	73	76	-	70
Babylon - SUFFOLK CO, NY	361030002	93	82	76	79	-	73
Holtsville - SUFFOLK CO, NY	361030009	97	86	80	83	-	77
Riverhead - SUFFOLK CO, NY	361030004	83	70	63	66	-	60
White Plains - WESTCHESTER CO, NY	361192004	91	82	77	80	-	74
Danbury - FAIRFIELD CO, CT	90011123	95	81	73	76	-	70
Greenwich - FAIRFIELD CO, CT	90010017	95	83	76	79	-	73
Stratford - FAIRFIELD CO, CT	90013007	98	86	79	82	-	76
Westport - FAIRFIELD CO, CT	90019003	94	81	74	77	-	71
Middletown - MIDDLESEX CO, CT	90070007	95	80	72	75	-	69
Hamden - NEW HAVEN CO, CT	90099005	93	81	74	77	-	71
Madison - NEW HAVEN CO, CT	90093002	98	83	75	78	-	72
SNJ/Phila. Nonattainment Area							
Fairhill - CECIL CO, MD	240150003	97	75	63	66	-	60
Brandywine Creek - NEW CASTLE CO, DE	100031010	92	76	67	70	-	64
Bellefonte - NEW CASTLE CO, DE	100031013	90	74	65	68	-	62
Killens Pond - KENT CO, DE	100010002	88	74	66	69	-	63
Lewes - SUSSEX CO, DE	100051003	87	74	67	70	-	64
Lums Pond - NEW CASTLE CO, DE	100031007	94	74	63	66	-	60
Seaford - SUSSEX CO, DE	100051002	90	70	60	63	-	56
Bristol - BUCKS CO, PA	420170012	99	84	76	79	-	73
West Chester - CHESTER CO, PA	420290050	95	77	68	71	-	64
New Garden - CHESTER CO, PA	420290100	94	73	62	65	-	59
Chester - DELAWARE CO, PA	420450002	91	77	69	72	-	66
Norristown - MONTGOMERY CO, PA	420910013	92	77	69	72	-	66
Elmwood - PHILADELPHIA CO, PA	421010136	83	71	65	68	-	61
Lab - PHILADELPHIA CO, PA	421010004	71	61	55	58	-	52
Roxborough - PHILADELPHIA CO, PA	421010014	90	78	71	74	-	68
Northeast Airport - PHILADELPHIA CO, PA	421010024	96	82	74	77	-	71
Colliers Mills - OCEAN CO, NJ	340290006	106	86	76	79	-	72
Rider - MERCER CO, NJ	340210005	97	81	73	76	-	69
Ancora State Hospital - CAMDEN CO, NJ	340071001	100	82	72	75	-	69
Camden - CAMDEN CO, NJ	340070003	98	83	75	78	-	72
Clarksboro - GLOUCESTER CO, NJ	340155001	98	83	75	78	-	72
Millville - CUMBERLAND CO, NJ	340110007	95	75	64	67	-	61
Nacote Creek - ATLANTIC CO, NJ	340010005	89	73	65	68	-	61

NOTE: Highlighted sites are the monitor in each nonattainment area with the highest ozone design value, e.g. the controlling monitor.

5.5 Unmonitored Area Analysis

The USEPA's modeling guidance requires an unmonitored area analysis:

> "The unmonitored area analysis for a particular nonattainment area is intended to address potential problems within or near that nonattainment area. The analysis should include, at a minimum, all nonattainment counties and counties surrounding the nonattainment area (located within the State)."[63]

All New Jersey counties are designated as nonattainment of the 8-hour ozone standard. Therefore, all modeling grid cells containing a monitor and the 8 adjoining grid cells were analyzed in New Jersey's attainment demonstrations. The extent of geographic coverage that results from this approach is shown in Figure 5.10. This map shows that there are very few grid cells within New Jersey, or located along New Jersey's borders, that were not specifically analyzed in the attainment demonstrations. Note, on this map, areas covered solely by New Jersey's monitoring stations are colored in orange (in black & white - lightly shaded) and areas covered by either New Jersey's monitoring stations or by those in another bordering State are shaded in red (in black & white - darker shaded).

The NJDEP staff reviewed the unmonitored area analyses performed by some of the other states with which New Jersey shares a nonattainment area. Both NYSDEC[64] and Delaware Department of Natural Resources and Environmental Control [65] performed their unmonitored area analyses using the USEPA's recently released Modeled Attainment Test Software to show that all areas of maximum ozone concentration in the ozone nonattainment areas associated with New Jersey are adequately reflected by the monitoring locations and the modeling performed (see Appendix D14). New Jersey is covered by both of these analyses (Northern New Jersey by the NYSDEC analysis and Southern New Jersey by the Delaware Department of Natural Resources and Environmental Control analysis).

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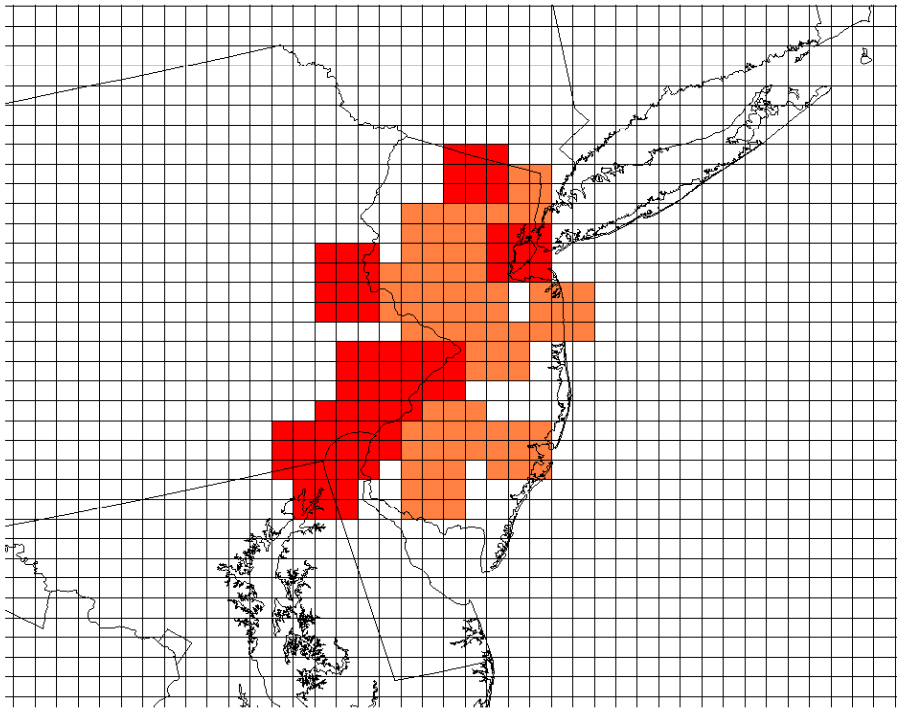
[63] USEPA. Guidance on the Use of Models and Other Related Analyses in Attainment Demonstrations for the 8-Hour Ozone NAAQS. United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Emissions, Monitoring, and Analysis Division, Air Quality Modeling Group, Research Triangle Park, NC, EPA-454/R-05-002, October 2005.

[64] From personal e-mail communication: Dr. Gopal Sisla, NYSDEC to Ray Papalski, NJDEP, May 8, 2007- entitled "Unmonitored Area Analysis – draft."

[65] Delaware Department of Natural Resources and Environmental Control. Draft Proposed Delaware State Implementation Plan For Attainment of the 8-Hour Ozone National Ambient Air Quality Standard - Reasonable Further Progress and Attainment Demonstration. Delaware Department of Natural Resources and Environmental Control, May 2007.

<u>Figure 5.10</u>: Map of Grid Cells Used in Photochemical Modeling Associated with New Jersey Ozone Monitors[66]



5.6 Conclusions

While the USEPA modeling guidance emphasizes the use of a single design value from a single modeling simulation as the core of an attainment demonstration, they also support utilizing multiple analyses to identify and account for uncertainty and biases in the model results. Therefore, New Jersey applied a comprehensive approach to demonstrating attainment for the Northern New Jersey/New York/Connecticut and Southern New Jersey/Philadelphia multi-state nonattainment areas. A variety of data was assessed and analyzed to determine whether or not attainment would occur, rather than primarily basing attainment on the results of only a single model run.

The following analyses highlighted why it is important that air quality models represent ozone transport mechanisms correctly and why the models may not quite capture the mechanisms correctly.

1) An analysis of the westerly transport of the upper level ozone reservoir showed that when morning mixing begins, ozone from the reservoir has a significant contribution

[66] Ibid.

to the daily ozone concentrations in New Jersey. In the case of August 13, 2005, this was a contribution of approximately 55 ppb.

2) Results of a cluster analysis revealed that when the greatest cluster trajectory density lay over the Ohio River Valley, transport accounted for a significant fraction of afternoon ozone concentrations in the Baltimore area. Since New Jersey is downwind of the Baltimore area, this result is also likely true for New Jersey.

3) Results of an ozone apportionment modeling analysis showed that out-of-state contributions to Ocean County, New Jersey are 82 percent of the projected 2010 8-hour ozone levels at that site.

4) Examination of the Colliers Mills, New Jersey and Stratford, CT monitor locations showed that ozone concentrations at these monitors were most likely susceptible to a local scale sea/bay breeze circulation effect. This effect likely exacerbates peak ozone concentrations not only during regional scale high ozone episodes, but also during periods when local scale circulation is more significant than regional transport. This type of transport mechanism is likely not reflected accurately in the air quality model.

The following analyses compared actual ozone measurements and model results in an attempt to quantify the model's under prediction of transport and ozone changes due to emission reductions.

1) Analyses suggest that CMAQ over predicts ozone concentrations in the lower atmosphere (surface to about 500 meters) and under predicts ozone concentrations in the upper atmosphere (~600-2600meters). This low bias aloft is an indicator of under prediction of ozone transport.

2) The August 2003 Northeast Blackout offered an unexpected opportunity to examine the air quality benefits associated with significant emission reductions. When the ozone levels on the blackout day were compared to a day with similar meteorology, it was shown that the blackout caused a drop of at least 7 ppb ozone, and likely considerably more. However, a modeling study of the same event using CMAQ predicted only a 2 ppb change. These results seem to demonstrate that CMAQ under predicts transport and changes in ozone due to emission reductions, perhaps by a factor of approximately 3.

3) The USEPA is currently concluding a CMAQ simulation of 2002 and 2004 summertime air quality to determine the benefits of the NO_x SIP Call. The yet unpublished results suggest that although observed median 8-hour ozone levels changed by about 18 ppb, the CMAQ model only simulated a change of about 8 ppb. Therefore, these preliminary results suggest that the CMAQ model under predicted changes in ozone, especially power plant emissions, by at least a factor of 2.

4) The State of Maryland calculated reasonable estimates of uncertainty based on easily quantifiable factors, namely how representative the modeling base year design values are as indicators of current air quality and how the model responds to changes in emissions. The results of these analyses were combined to give a conservative estimate of the uncertainty in future year design values of +/- 3.1 ppb.

In order to account for CMAQ's under prediction of transport and emission reduction benefits, the 2009 model results were adjusted. To be conservative, it was assumed that CMAQ under predicted emission reduction benefits by a factor of 1.5, instead of 2 or 3. The simplified uncertainty factor (+/- 3.1) was applied, resulting in a range of design values. Based on the 2009 design values ranges adjusted for transport, all monitors in the Northern New Jersey/New York/Connecticut and Southern New Jersey/Philadelphia nonattainment areas show plausible attainment of the 8-hour ozone standard in 2010.

The following supporting analyses were presented to address the uncertainty in the 2009 modeled design values.

1) It was shown that average 2009 modeled design values were being met in 2006, as demonstrated by the 2006 monitored design values. Additional emission reductions due to CAIR, motor vehicle fleet turnover and other new and continuing programs from 2006 to 2009 are expected to lower monitored design values below their 2006 values.

2) It was shown that using an alternate modeling baseline design value which neutralizes the effect of a severe meteorological year (e.g. 2002) would result in a lower modeling baseline design values, on average 2 ppb, and thus would result in lower 2009 modeled ozone concentrations.

3) It was shown that using a nonattainment area maximum relative response factor (RRF), instead of the average RRF, in calculating the 2009 modeled design values may better approximate the effect that additional control measures would have on future year ozone concentrations, since predicted 2009 ozone concentrations are already being monitored. Use of the maximum response RRF plus the alternate modeling baseline design value reduces 2009 modeled design values by an average 5 ppb.

4) It was shown that additional quantifiable measures are being implemented or are expected to be implemented by 2009, in New Jersey's two multi-state nonattainment areas that were not included in the modeling. These measures should provide an additional 0.3 – 2 ppb ozone reduction in the Northern New Jersey/New York/Connecticut nonattainment area and 0.2 – 5 ppb ozone reduction in the Southern New Jersey/Philadelphia nonattainment by 2009.

5) It was shown that there are numerous air quality control strategies being implemented that are difficult to quantify and therefore were not included in the modeling.

However, these measures will provide air quality benefits that will be reflected in the monitored ozone concentrations.

6) Transport adjusted 2012 design value ranges support New Jersey's plausible demonstration of attainment by 2009 while insuring that additional measures will already be in place to maintain that attainment status post-2009.

A summary of the attainment modeling results and supporting analyses is presented in Table 5.15. Regarding the attainment modeling results, the 2009 modeled design value ranges adjusted for transport show plausible attainment in the two multi-state nonattainment areas. Application of estimated air quality benefits associated with quantifiable control measures not included in the modeling reduces the uncertainty of the demonstration.

Regarding the supporting analyses, when the 2009 modeled design values are recalculated using an alternate baseline design value and nonattainment area maximum response RRF, the results fall within the ranges of the attainment modeling results. Inclusion of the air quality benefits associated with quantifiable control measures not included in the modeling reduces the uncertainty and thus supports New Jersey's plausible demonstration of attainment of the 8-hour ozone standard by 2010 in the Northern New Jersey/New York/Connecticut and Southern New Jersey/Philadelphia nonattainment areas.

Table 5.15: Summary of Attainment Modeling Results and Supporting Analyses

Site Name - County, State	Site Number	Starting Point: 2009 Modeled Results (DV_F) (ppb)	Attainment Modeling Results: 2009 Modeled Results Adjusted for Transport (DV_{AT}) (ppb)	Attainment Modeling Results: **Upper and Lower Bound of 2009 DV_{AT} (ppb)**			2009 Modeled Results Adjusted for Transport and Taking Additional Quantifiable Measures Not Modeled into Account			Supporting Analyses: 2009 Modeled Results (DV_F) (ppb)	Supporting Analyses: 2009 Modeled Results using Alternate Baseline (DV_{Falt}) (ppb)	Supporting Analyses: **2009 Modeled Results using Alternate Baseline and RRF (DV_{Falt-r}) (ppb)**	2009 Modeled Results using Alternate Baseline and RRF and Taking Additional Quantifiable Measures Not Modeled into Account		
NNJ/NY/CT Nonattainment Area															
Teaneck - BERGEN CO, NJ	340030005	85	81	**84**	**-**	**78**	84	-	76	85	81	**76**	76	-	74
Bayonne - HUDSON, NJ	340170006	77	73	**76**	**-**	**70**	76	-	68	77	76	**73**	73	-	71
Flemington - HUNTERDON, NJ	340190001	83	76	**79**	**-**	**73**	79	-	71	83	82	**82**	82	-	80
Rutgers Univ. - MIDDLESEX CO, NJ	340230011	83	76	**79**	**-**	**73**	79	-	71	83	82	**82**	82	-	80
Monmouth Univ. - MONMOUTH CO, NJ	340250005	84	78	**81**	**-**	**75**	81	-	73	84	82	**82**	82	-	80
Chester - MORRIS CO, NJ	340273001	84	78	**81**	**-**	**75**	81	-	73	84	81	**80**	80	-	78
Ramapo - PASSAIC CO, NJ	340315001	77	72	**75**	**-**	**69**	75	-	67	77	75	**73**	73	-	71
Botanical Garden - BRONX CO, NY	360050083	78	75	**78**	**-**	**72**	78	-	70	78	74	**69**	69	-	67
Queens College - QUEENS CO, NY	360810124	74	69	**72**	**-**	**66**	72	-	64	74	74	**73**	73	-	71
Susan Wagner - RICHMOND CO, NY	360850067	84	79	**82**	**-**	**76**	82	-	74	84	82	**79**	79	-	77
Babylon - SUFFOLK CO, NY	361030002	85	80	**83**	**-**	**77**	83	-	75	85	82	**78**	78	-	76
Holtsville - SUFFOLK CO, NY	361030009	89	85	**88**	**-**	**81**	88	-	79	89	87	**82**	82	-	80
Riverhead - SUFFOLK CO, NY	361030004	74	69	**72**	**-**	**66**	72	-	64	74	72	**70**	70	-	68
White Plains - WESTCHESTER CO, NY	361192004	85	81	**84**	**-**	**78**	84	-	76	85	82	**76**	76	-	74
Danbury - FAIRFIELD CO, CT	90011123	85	79	**82**	**-**	**76**	82	-	74	85	83	**81**	81	-	79
Greenwich - FAIRFIELD CO, CT	90010017	87	82	**85**	**-**	**79**	85	-	77	87	83	**79**	79	-	77
Stratford - FAIRFIELD CO, CT	90013007	90	85	**88**	**-**	**82**	88	-	80	90	87	**83**	83	-	81
Westport - FAIRFIELD CO, CT	90019003	85	80	**83**	**-**	**77**	83	-	75	85	82	**79**	79	-	77
Middletown - MIDDLESEX CO, CT	90070007	84	78	**81**	**-**	**75**	81	-	73	84	82	**81**	81	-	79
Hamden - NEW HAVEN CO, CT	90099005	85	80	**83**	**-**	**77**	83	-	75	85	84	**81**	81	-	79
Madison - NEW HAVEN CO, CT	90093002	88	82	**85**	**-**	**79**	85	-	77	88	85	**82**	82	-	80
SNJ/Phila. Nonattainment Area															
Fairhill - CECIL CO, MD	240150003	81	72	**75**	**-**	**69**	75	-	64	81	80	**80**	80	-	75
Brandywine Creek - NEW CASTLE CO, DE	100031010	81	75	**78**	**-**	**72**	78	-	67	81	78	**74**	74	-	69
Bellefonte - NEW CASTLE CO, DE	100031013	78	71	**74**	**-**	**68**	74	-	63	78	74	**71**	71	-	66
Killens Pond - KENT CO, DE	100010002	78	72	**75**	**-**	**69**	75	-	64	78	77	**72**	72	-	67
Lewes - SUSSEX CO, DE	100051003	77	72	**75**	**-**	**68**	75	-	63	77	75	**70**	70	-	65
Lums Pond - NEW CASTLE CO, DE	100031007	79	71	**74**	**-**	**68**	74	-	63	79	74	**73**	73	-	68
Seaford - SUSSEX CO, DE	100051002	75	67	**70**	**-**	**64**	70	-	59	75	75	**73**	73	-	68
Bristol - BUCKS CO, PA	420170012	88	82	**85**	**-**	**79**	85	-	74	88	86	**79**	79	-	74
West Chester - CHESTER CO, PA	420290050	82	75	**78**	**-**	**72**	78	-	67	82	82	**79**	79	-	74
New Garden - CHESTER CO, PA	420290100	79	71	**74**	**-**	**68**	74	-	63	79	78	**78**	78	-	73
Chester - DELAWARE CO, PA	420450002	81	75	**78**	**-**	**72**	78	-	67	81	79	**74**	74	-	69
Norristown - MONTGOMERY CO, PA	420910013	81	75	**78**	**-**	**72**	78	-	67	81	81	**76**	76	-	71
Elmwood - PHILADELPHIA CO, PA	421010136	75	71	**74**	**-**	**67**	74	-	62	75	73	**67**	67	-	62
Lab - PHILADELPHIA CO, PA	421010004	64	60	**63**	**-**	**57**	63	-	52	64	62	**57**	57	-	52
Roxborough - PHILADELPHIA CO, PA	421010014	82	77	**80**	**-**	**74**	80	-	69	82	80	**73**	73	-	68
Northeast Airport - PHILADELPHIA CO, PA	421010024	87	82	**85**	**-**	**79**	85	-	74	87	84	**78**	78	-	73
Colliers Mills - OCEAN CO, NJ	340290006	92	85	**88**	**-**	**81**	88	-	76	92	90	**86**	86	-	81
Rider - MERCER CO, NJ	340210005	86	80	**83**	**-**	**77**	83	-	72	86	84	**78**	78	-	73
Ancora State Hospital - CAMDEN CO, NJ	340071001	87	80	**83**	**-**	**77**	83	-	72	87	86	**82**	82	-	77
Camden - CAMDEN CO, NJ	340070003	88	82	**85**	**-**	**79**	85	-	74	88	84	**78**	78	-	73
Clarksboro - GLOUCESTER CO, NJ	340155001	88	82	**85**	**-**	**79**	85	-	74	88	87	**80**	80	-	75
Millville - CUMBERLAND CO, NJ	340110007	81	73	**76**	**-**	**70**	76	-	65	81	79	**78**	78	-	73
Nacote Creek - ATLANTIC CO, NJ	340010005	77	71	**74**	**-**	**67**	74	-	62	77	76	**72**	72	-	67

Note: There are additional non-quantifiable measures that will produce air quality benefits and further reduce these values.
Highlighted sites are the monitor in each nonattainment area with the highest ozone design value, e.g. the controlling monitor.

6.0 REASONABLE FURTHER PROGRESS (RFP)

6.1 RFP Introduction, Goals, and Objectives

The Clean Air Act, (42 U.S.C. §7511a(c)(2)(B), §182(c)(2)(B)), has required nonattainment areas to demonstrate continued progress to attain the ozone standard. The United States Environmental Protection Agency (USEPA) defined rate-of-progress (ROP) as the progress required to attain the 1-hour ozone standard. Reasonable further progress (RFP) refers to the progress required toward attaining the 8-hour ozone standard. During the period from 1990-1996, areas that were classified as moderate for the 1-hour ozone standard were required to reduce volatile organic compound (VOC) emissions by 15 percent.[1] After 1996, these areas were required to demonstrate a 9 percent ROP every three years until their attainment date.[2]

The USEPA's final implementation rule (November 29, 2005)[3] and a USEPA follow-up memo titled, "8-hour Ozone National Ambient Air Quality Standards Implementation-Reasonable Further Progress (RFP)," dated August 15, 2006,[4] contain guidance on how to demonstrate RFP under different situations.

The RFP demonstration for the Northern New Jersey/New York/Connecticut (NNJ/NY/CT) nonattainment area and the Southern New Jersey/Philadelphia (SNJ/Phila.) nonattainment area[5] must show an emission reduction of VOC and/or oxides of nitrogen (NO_x) of 15 percent from 2002 to 2008 and all additional reductions from 2008 to 2009 necessary for attainment.

The Clean Air Act and the USEPA guidance also include restrictions on the use of control measures to meet the RFP requirements.[6] Reductions in ozone precursors resulting from four types of federal and state regulations can not be used to meet RFP target. These four types of programs are:

(1) Federal Motor Vehicle Control Program (FMVCP) tailpipe and evaporative standards applicable as of January 1, 1990

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[1] USEPA. Guidance on the Adjusted Base Year Emissions Inventory and the 1996 Target for the 15 percent Rate of Progress Plans. United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, EPA-452/R-92-005, October 1992.
[2] USEPA. Guidance on the Post-1996 Rate-of-Progress Plan and the Attainment Demonstration. United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, EPA-452/R-93-015, January 1994, Corrected Version as of February 18, 1994.
[3] 40 C.F.R. 51.910(a), 70 Fed. Reg. 71612 (November 29, 2005).
[4] USEPA Memorandum from William T. Harnett, USEPA, Office of Air Quality Planning and Standards, Research Triangle Park, NC, "8-hour Ozone National Ambient Air Quality Standard (NAAQS) Implementation – Reasonable Further Progress (RFP)," August 15, 2006.
[5] op. cit., note 3
[6] USEPA. Guidance on the Post-1996 Rate-of-Progress Plan and the Attainment Demonstration. United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, EPA-452/R-93-015, January 1994, Corrected Version as of February 18, 1994.

(2) Federal regulations limiting the Reid Vapor Pressure (RVP) of gasoline in ozone nonattainment areas applicable as of June 15, 1990
(3) State regulations correcting deficiencies in reasonably available control technology (RACT) rules and
(4) State regulations establishing or correcting inspection and maintenance (I/M) programs for onroad vehicles.

The basic procedures for developing target levels for the 15 percent plan are described in the USEPA's October 1992 guidance.[7] For the purposes of the 8-hour ozone RFP requirements, this guidance was updated by the USEPA in November 2005 [8,9] and August 2006.[10]

This chapter describes the methodologies and calculations used to estimate future year inventories and RFP targets for 2008 and 2009, utilizing a base year inventory of 2002.

6.2 2002 Base Inventory

The starting inventory year for the RFP demonstration and inventory projections is 2002 (emission inventories for ozone season emissions in tons per day for VOC and NO_x).[11] Section 42 U.S.C. §7511a(c)(2)(B) subsection (b)(1)(B) of the Clean Air Act defines baseline emissions as the total amount of actual VOC and NO_x emissions from all anthropogenic sources in the area, excluding certain pre-1990 reductions. In accordance with the Clean Air Act, the emission target levels in future years for ROP/RFP plans are based on an adjusted baseline emission inventory. New Jersey's inventory shows actual 2002 emissions, not including biogenics, adjusted to exclude the benefits from any program not credible toward the targets.

6.3 Projection Inventories

6.3.1 Introduction

In order to determine RFP it is necessary to first grow the base year 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. As discussed in Section 6.2, the starting inventory for the projections is the New Jersey 2002 emission inventories

[7] op. cit., note 1
[8] op. cit., note 3
[9] ibid., "Appendix A to Preamble—Methods to Account for Non-Creditable Reductions When Calculating ROP Targets for the 2008 and Later ROP Milestone Years."
[10] op. cit., note 4
[11] "The State of New Jersey Department of Environmental Protection 2002 Periodic Emission Inventory May 2006" submitted to the USEPA as Appendix D of the "The State of New Jersey NJDEP of Environmental Protection State Implementation Plan (SIP) Revisions for the Attainment and Maintenance of the 8-Hour Carbon Monoxide National Ambient Air Quality Standard, 1-Hour Ozone National Ambient Air Quality Standard, and Fine Particulate Matter National Ambient Air Quality Standard; and the 2002 Periodic Emission Inventory May 2006." The USEPA approved the 2002 Emission Inventory effective July 10, 2006.

for ozone season (summer) emissions in tons per day for VOC and NO_x. The projected emission inventories are "grown" from the 2002 actual emission inventory and then "controlled." Controlled means that appropriate emission reductions are then applied to the grown inventory to determine a projection of actual emissions.

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. The difference in the controlled and uncontrolled emissions provides the emission reductions (benefits) associated with the instituted control measures.

6.3.2 Inventory - Overview

The projected emission inventories were calculated by first estimating growth in each source category. As appropriate, the 2002 actual emission inventories were used as the base for applying factors to account for inventory growth. For the point source category, a 2005 inventory was calculated. The USEPA preferred approach for projecting emissions growth incorporates locality-specific estimates such as population, employment, historical averaging, or other category specific activity such as fuel consumption and product output.

Annual growth rates were evaluated for each of the emission categories, in each of the four emission sectors (point, area, nonroad, onroad). Point source growth factors were calculated utilizing information from the USEPA Economic Growth Analysis System (EGAS) [12] computer program and the U.S. Department of Energy (USDOE) projection data. Area source growth was predicted using the USDOE projection data and other activity indicators specific to each category.

Nonroad growth was projected utilizing the USEPA National Nonroad Emissions Model (NNEM) and other federal and state specific data. Some of the projected nonroad emissions with growth and without post-2002 benefits (uncontrolled) are lower than the 2002 emissions even though equipment activity levels are greater for the projection years. These 2008 and 2009 uncontrolled nonroad NO_x emissions indicate negative growth because of how the USEPA NNEM operates when it is run for a future year with no post 2002 controls. The nonroad sector is associated with equipment that is used for many years. In 2002, the nonroad fleet was populated with many older engines that operated without many of the controls phased in by the end of 2002. By 2008/9 many of these uncontrolled older nonroad engines had been replaced with newer ones that incorporated the controls phased in by the end of 2002. Therefore, the equipment turnover from 2002 to 2008/9 of 2002 technology engines can result in what appears to be negative growth because the 2002 emission standards are lower than the engines they are replacing.

[12] Pechan. Economic Growth Analysis System Version 4.0 Reference Manual. E.H. Pechan & Associates, Inc., January 26, 2001.

Onroad growth was projected using travel demand models provided by the Metropolitan Planning Organizations. One of the Metropolitan Planning Organizations, the North Jersey Transportation Planning Authority (NJTPA), replaced their travel demand model between the time that the 2002 inventory was finalized and prior to the development of the 2008 and 2009 inventories. Activity data from the new travel demand model predicts generally lower levels of VOC and NO_x emissions than the previous model. A result of this is that some of the projected onroad emissions with growth and without post-2002 benefits (uncontrolled) are lower than the 2002 emissions even though vehicle miles traveled are greater for the projection years. To investigate the impact of this on the RFP analysis, a sensitivity case was considered. The sensitivity case adjusted the 2008 and 2009 onroad emissions upward by multiplying the ratio of a hypothetical uncontrolled case and the uncontrolled case using the new model. The hypothetical uncontrolled case was grown from 2002 to 2008/9 by the same growth rates predicted for the non-NJTPA counties. The result of the RFP sensitivity case was that the 2002 to 2008 VOC reduction went from 24% to 21% for the Northern New Jersey/New York/Connecticut nonattainment area and from 21% to 20% for the Southern New Jersey/Philadelphia nonattainment area. Therefore, impacts of using the new NJTPA travel demand model for the projection year emission estimates are not significant enough to change the conclusions of the RFP analysis.

Growth factors are discussed and presented in more detail in Appendix E.

6.3.3 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 apply the emission reduction benefits from those control measures at that time. Once the grown emissions are “controlled,” the emissions in total that are expected with each and every control measure in place are compared to RFP 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 RFP requirements.

Post-2002 control measure benefits (including benefits from pre-2002 and post-2002 rules) were applied to each emission sector as appropriate. When all the benefits are summed and subtracted from uncontrolled emission levels, the result is the projected “controlled” inventory.

The control measures included in the projections, the years the RFP plans were affected by them, and the emission benefits are shown in Tables 6.1, 6.2, and 6.3 for the State and the New Jersey portions of the Northern New Jersey/New York/Connecticut nonattainment area, the Southern New Jersey/Philadelphia nonattainment area, respectively. The control measures are described in Chapter 4.

More details regarding the benefits from control measures for each sector are provided in Appendix E.

Table 6.1: Projected Emissions and Control Measure Benefits Statewide

		2002		2008		2009	
		Inventory		Projected		Projected	
		VOC	NOx	VOC	NOx	VOC	NOx
		tpd	tpd	tpd	tpd	tpd	tpd
POINT SOURCES							
Point Source Emissions, with growth and without post-2002 benefits (from pre- and post-2002 controls)		**113.5**	**280.4**	**78.5**	**203.3**	**79.0**	**208.8**
Point Source Control Measures Benefits, post-2002							
Pre-2002 State OTB	NOx Budget Program	NA	NA	0.0	79.6	0.0	0.0
Post-2002 State OTB	NOx RACT rule 2006	NA	NA	0.0	6.8	0.0	6.8
Post-2002 Federal OTB	CAIR	NA	NA	0.0	0.0	0.0	64.0
Post-2002 Federal OTB	USEPA MACT Standards	NA	NA	0.0	0.0	2.7	1.4
Post-2002 State BOTW	Certain Categories of ICI Boilers	NA	NA	0.0	0.0	0.0	6.8
Post-2002 Federal	ACO - PSEG	NA	NA	0.0	48.4	0.0	48.5
Post-2002 Federal	Refinery Enforcement Initiative	NA	NA	0.0	0.0	1.2	1.9
Total Point Source Benefits, post-2002		**0.0**	**0.0**	**0.0**	**134.8**	**4.0**	**129.4**
Point Source Emissions Grown and Controlled		**113.5**	**280.4**	**78.5**	**68.5**	**75.0**	**79.4**
AREA SOURCES							
Area Source Emissions, with growth and without post-2002 benefits (from pre- and post-2002 controls)		**369.8**	**35.9**	**383.0**	**36.4**	**384.9**	**36.7**
Area Source Control Measures Benefits, From Uncontrolled							
Post-2002 State OTB	Architectural Surface Coatings 2005	NA	NA	22.0	0.0	22.1	0.0
Post-2002 State OTB	Mobile Equipment Repair and Refinishing (Autobody)	NA	NA	2.0	0.0	2.0	0.0
Post-2002 State OTB	Solvent Cleaning (Degreasing)	NA	NA	3.2	0.0	3.2	0.0
Post-2002 State OTB	Consumer Products 2005	NA	NA	9.8	0.0	9.8	0.0
Post-2002 State BOTW	Consumer Products 2009 Amendments	NA	NA	0.0	0.0	1.2	0.0
Post-2002 State OTB & BOTW	Portable Fuel Containers (2005 + 2009)	NA	NA	3.9	0.0	6.1	0.0
Post-2002 State OTB	Stage I (Gasoline Transfer Operations) (Balanced Submerged Filling)	NA	NA	8.8	0.0	8.8	0.0
Post-2002 State OTB	NOx RACT rule 2006	NA	NA	0.0	4.1	0.0	4.1
Pre-2002 Federal OTB	Residential Woodstove NSPS	NA	NA	0.1	0.0	0.1	0.0
Post-2002 State BOTW	Adhesives and Sealants	NA	NA	0.0	0.0	6.9	0.0
Post-2002 State BOTW	Asphalt Paving (Cutback and Emulsified Asphalt)	NA	NA	0.0	0.0	3.6	0.0
Total Area Source Benefits, post-2002		**0.0**	**0.0**	**49.6**	**4.1**	**63.7**	**4.1**
Area Source Emissions Grown and Controlled		**369.8**	**35.9**	**333.4**	**32.3**	**321.2**	**32.6**
ONROAD SOURCES							
Onroad Source Emissions with growth and without post-2002 benefits (from pre and post-2002 controls) *		**274.7**	**558.7**	**271.2**	**489.4**	**275.1**	**497.7**
Onroad Source Control Measures Benefits, post-2002							
Post-2002 State OTB	Stage II (Gasoline Transfer Operations)	NA	NA	2.2	0.0	1.8	0.0
Post-2002 State OTB	On-board Diagnostics (OBD) - I/M	NA	NA	4.1	6.5	4.9	7.3
Post-2002 Federal OTB	Total Federal control measure benefits in MOBILE model	NA	NA	130.6	220.1	143.9	250.9
Post-2002 State BOTW	NJLEV	NA	NA	0.0	0.0	0.1	0.2
Total Onroad Source Benefits, post-2002		**0.0**	**0.0**	**136.9**	**226.6**	**150.7**	**258.4**
Onroad Source Emissions, Grown and Controlled		**274.7**	**558.7**	**134.3**	**262.8**	**124.4**	**239.3**
NONROAD SOURCES							
Nonroad Source Emissions, with growth and without post-2002 benefits (from post-2002 controls) *		**220.6**	**231.6**	**238.8**	**215.9**	**240.4**	**219.1**
Nonroad Source Control Measure Benefits, post-2002							
Post-2002 State OTB	Portable Fuel Containers 2005	NA	NA	1.4	0.0	1.9	0.0
Post-2002 Federal OTB	Total Federal Control Measure Benefits/Nonroad model	NA	NA	69.4	31.8	79.7	39.9
Post-2002 State BOTW	Portable Fuel Container 2009 Amendments	NA	NA	0.0	0.0	0.3	0.0
Total Nonroad Source Benefits, post-2002		**0.0**	**0.0**	**70.8**	**31.8**	**81.9**	**39.9**
Nonroad Source Emissions, Grown and Controlled		**220.6**	**231.6**	**168.0**	**184.1**	**158.4**	**179.3**
TOTALS							
TOTAL EMISSIONS, with growth and without post-2002 controls		977.1	1008.9	971.4	945.0	979.3	962.2
TOTAL BENEFITS, post-2002		0.0	0.0	257.2	397.3	300.3	431.7
TOTAL EMISSIONS, Grown and Controlled		**978.7**	**1106.5**	**714.2**	**547.7**	**679.0**	**530.5**
NOTES: * See Section 6.3.2 for description of emissions							

Table 6.2: Projected Emissions and Control Measure Benefits New Jersey Portion of Northern New Jersey/New York/Connecticut Nonattainment Area

		2002		2008		2009	
		Inventory		Projected		Projected	
		VOC	NOx	VOC	NOx	VOC	NOx
		tpd	tpd	tpd	tpd	tpd	tpd
POINT SOURCES							
Point Source Emissions, with growth and without post-2002 benefits (from pre- and post-2002 controls)		**68.2**	**152.7**	**50.5**	**110.9**	**50.9**	**113.8**
Point Source Control Measures Benefits, post-2002							
Pre-2002 State OTB	NOx Budget Program	NA	NA	0.0	44.0	0.0	0.0
Post-2002 State OTB	NOx RACT rule 2006	NA	NA	0.0	4.5	0.0	4.5
Post-2002 Federal OTB	CAIR	NA	NA	0.0	0.0	0.0	37.0
Post-2002 Federal OTB	EPA MACT Standards	NA	NA	0.0	0.0	1.6	0.8
Post-2002 State BOTW	Certain Categories of ICI Boilers	NA	NA	0.0	0.0	0.0	4.8
Post-2002 Federal	ACO - PSEG	NA	NA	0.0	11.1	0.0	11.3
Post-2002 Federal	Refinery Enforcement Initiative	NA	NA	0.0	0.0	0.4	1.6
Total Point Source Benefits, post-2002		**0.0**	**0.0**	**0.0**	**59.6**	**2.0**	**60.0**
Point Source Emissions Grown and Controlled		**68.2**	**152.7**	**50.5**	**51.3**	**48.9**	**53.8**
AREA SOURCES							
Area Source Emissions, with growth and without post-2002 benefits (from pre- and post-2002 controls)		**243.5**	**24.4**	**252.7**	**24.7**	**254.1**	**24.9**
Area Source Control Measures Benefits, From Uncontrolled							
Post-2002 State OTB	Architectural Surface Coatings 2005	NA	NA	15.0	0.0	15.0	0.0
Post-2002 State OTB	Mobile Equipment Repair and Refinishing (Autobody)	NA	NA	1.5	0.0	1.5	0.0
Post-2002 State OTB	Solvent Cleaning (Degreasing)	NA	NA	2.4	0.0	2.4	0.0
Post-2002 State OTB	Consumer Products 2005	NA	NA	6.7	0.0	6.7	0.0
Post-2002 State BOTW	Consumer Products 2009 Amendments	NA	NA	0.0	0.0	0.9	0.0
Post-2002 State OTB & BOTW	Portable Fuel Containers (2005 + 2009)	NA	NA	2.6	0.0	4.0	0.0
Post-2002 State OTB	Stage I (Gasoline Transfer Operations) (Balanced Submerged Filling)	NA	NA	5.9	0.0	5.9	0.0
Post-2002 State OTB	NOx RACT rule 2006	NA	NA	0.0	2.9	0.0	2.9
Pre-2002 Federal OTB	Residential Woodstove NSPS	NA	NA	0.0	0.0	0.0	
Post-2002 State BOTW	Adhesives and Sealants	NA	NA	0.0	0.0	4.8	0.0
Post-2002 State BOTW	Asphalt Paving (Cutback and Emulsified Asphalt)	NA	NA	0.0	0.0	2.1	0.0
Total Area Source Benefits, post-2002		**0.0**	**0.0**	**34.0**	**2.9**	**43.3**	**2.9**
Area Source Emissions Grown and Controlled		**243.5**	**24.4**	**218.7**	**21.8**	**210.8**	**22.0**
ONROAD SOURCES							
Onroad Source Emissions with growth and without post-2002 benefits (from pre and post-2002 controls) *		**183.0**	**378.9**	**172.0**	**287.3**	**174.4**	**292.2**
Onroad Source Control Measures Benefits, post-2002							
Post-2002 State OTB	Stage II (Gasoline Transfer Operations)	NA	NA	1.3	0.0	1.1	0.0
Post-2002 State OTB	On-board Diagnostics (OBD) - I/M	NA	NA	2.9	4.2	3.2	4.7
Post-2002 Federal OTB	Total Federal control measure benefits in MOBILE model	NA	NA	82.6	136.5	91.0	153.9
Post-2002 State BOTW	NJLEV	NA	NA	0.0	0.0	0.1	0.1
Total Onroad Source Benefits, post-2002		**0.0**	**0.0**	**86.8**	**140.7**	**95.4**	**158.7**
Onroad Source Emissions, Grown and Controlled		**183.0**	**378.9**	**85.2**	**146.6**	**79.0**	**133.5**
NONROAD SOURCES							
Nonroad Source Emissions, with growth and without post-2002 benefits (from post-2002 controls) *		**121.6**	**161.0**	**134.0**	**144.9**	**135.6**	**147.1**
Nonroad Source Control Measure Benefits, post-2002							
Post-2002 State OTB	Portable Fuel Containers 2005	NA	NA	1.0	0.0	1.3	0.0
Post-2002 Federal OTB	Total Federal Control Measure Benefits -Nonroad model	0.0	0.0	45.0	24.0	51.9	29.9
Post-2002 State BOTW	Portable Fuel Container 2009 Amendments	NA	NA	0.0	0.0	0.2	0.0
Total Nonroad Source Benefits, post-2002		**0.0**	**0.0**	**46.0**	**24.0**	**53.5**	**29.9**
Nonroad Source Emissions, Grown and Controlled		**121.6**	**161.0**	**87.9**	**120.8**	**82.2**	**117.1**
TOTALS							
TOTAL EMISSIONS, with growth and without post-2002 controls		613.2	636.3	609.2	567.8	615.0	578.0
TOTAL BENEFITS, post-2002		0.0	0.0	166.8	227.2	194.2	251.5
TOTAL EMISSIONS, Grown and Controlled		**616.2**	**717.0**	**442.3**	**340.6**	**420.9**	**326.5**
NOTES: * See Section 6.3.2 for description of emissions							

Table 6.3: Projected Emissions and Control Measure Benefits
New Jersey Portion of Southern New Jersey/Philadelphia Nonattainment Area

		2002		2008		2009	
		Inventory		Projected		Projected	
		VOC	NOx	VOC	NOx	VOC	NOx
		tpd	tpd	tpd	tpd	tpd	tpd
POINT SOURCES							
Point Source Emissions, with growth and without post-2002 benefits (from pre- and post-2002 controls)		**45.4**	**127.7**	**28.0**	**92.5**	**28.0**	**95.0**
Point Source Control Measures Benefits, post-2002							
Pre-2002 State OTB	NOx Budget Program	NA	NA	0.0	35.6	0.0	0.0
Post-2002 State OTB	NOx RACT rule 2006	NA	NA	0.0	2.1	0.0	2.1
Post-2002 Federal OTB	CAIR	NA	NA	0.0	0.0	0.0	27.0
Post-2002 Federal OTB	EPA MACT Standards	NA	NA	0.0	0.0	1.1	0.5
Post-2002 State BOTW	Certain Categories of ICI Boilers	NA	NA	0.0	0.0	0.0	2.0
Post-2002 Federal	ACO - PSEG	NA	NA	0.0	37.3	0.0	37.2
Post-2002 Federal	Refinery Enforcement Initiative	NA	NA	0.0	0.0	0.9	0.3
Total Point Source Benefits, post-2002		**0.0**	**0.0**	**0.0**	**75.0**	**2.0**	**69.2**
Point Source Emissions Grown and Controlled		**45.4**	**127.7**	**28.0**	**17.4**	**26.1**	**25.8**
AREA SOURCES							
Area Source Emissions, with growth and without post-2002 benefits (from pre- and post-2002 controls)		**126.4**	**11.5**	**130.3**	**11.7**	**130.8**	**11.8**
Area Source Control Measures Benefits, From Uncontrolled							
Post-2002 State OTB	Architectural Surface Coatings 2005	NA	NA	7.0	0.0	7.1	0.0
Post-2002 State OTB	Mobile Equipment Repair and Refinishing (Autobody)	NA	NA	0.5	0.0	0.5	0.0
Post-2002 State OTB	Solvent Cleaning (Degreasing)	NA	NA	0.8	0.0	0.8	0.0
Post-2002 State OTB	Consumer Products 2005	NA	NA	3.0	0.0	3.0	0.0
Post-2002 State BOTW	Consumer Products 2009 Amendments	NA	NA	0.0	0.0	0.4	0.0
Post-2002 State OTB & BOTW	Portable Fuel Containers (2005 + 2009)	NA	NA	1.3	0.0	2.1	0.0
Post-2002 State OTB	Stage I (Gasoline Transfer Operations) (Balanced Submerged Filling)	NA	NA	2.9	0.0	2.9	0.0
Post-2002 State OTB	NOx RACT rule 2006	NA	NA	0.0	1.2	0.0	1.2
Pre-2002 Federal OTB	Residential Woodstove NSPS	NA	NA	0.0	0.0	0.0	
Post-2002 State BOTW	Adhesives and Sealants	NA	NA	0.0	0.0	2.2	0.0
Post-2002 State BOTW	Asphalt Paving (Cutback and Emulsified Asphalt)	NA	NA	0.0	0.0	1.5	0.0
Total Area Source Benefits, post-2002		**0.0**	**0.0**	**15.6**	**1.2**	**20.4**	**1.2**
Area Source Emissions Grown and Controlled		**126.4**	**11.5**	**114.7**	**10.5**	**110.4**	**10.6**
ONROAD SOURCES							
Onroad Source Emissions with growth and without post-2002 benefits (from pre and post-2002 controls)		**91.8**	**179.8**	**99.2**	**202.1**	**100.8**	**205.5**
Onroad Source Control Measures Benefits, post-2002							
Post-2002 State OTB	Stage II (Gasoline Transfer Operations)	NA	NA	0.8	0.0	0.7	0.0
Post-2002 State OTB	On-board Diagnostics (OBD) - I/M	NA	NA	1.6	2.3	1.7	2.6
Post-2002 Federal OTB	Total Federal control measure benefits in MOBILE model	NA	NA	48.0	83.6	52.9	96.9
Post-2002 State BOTW	NJLEV	NA	NA	0.0	0.0	0.1	0.1
Total Onroad Source Benefits, post-2002		**0.0**	**0.0**	**50.4**	**85.9**	**55.4**	**99.6**
Onroad Source Emissions, Grown and Controlled		**91.8**	**179.8**	**48.8**	**116.2**	**45.4**	**105.9**
NONROAD SOURCES							
Nonroad Source Emissions, with growth and without post-2002 benefits (from post-2002 controls)		**99.0**	**70.6**	**104.8**	**70.98**	**104.7**	**72.03**
Nonroad Source Control Measure Benefits, post-2002							
Post-2002 State OTB	Portable Fuel Containers 2005	NA	NA	0.4		0.5	
Post-2002 Federal OTB	Total Federal Control Measure Benefits -Nonroad model	0.0	0.0	24.3	7.7	27.9	9.9
Post-2002 State BOTW	Portable Fuel Container 2009 Amendments	NA	NA	0.0	0.0	0.1	0.0
Total Nonroad Source Benefits, post-2002		**0.0**	**0.0**	**24.7**	**7.8**	**27.9**	**9.9**
Nonroad Source Emissions, Grown and Controlled		**99.0**	**70.6**	**80.1**	**63.3**	**76.2**	**62.1**
TOTALS							
TOTAL EMISSIONS, with growth and without post-2002 controls		363.9	372.6	362.3	377.2	364.4	384.3
TOTAL BENEFITS, post-2002		0.0	0.0	90.7	169.9	105.6	179.9
TOTAL EMISSIONS, Grown and Controlled		**362.5**	**389.6**	**271.6**	**207.4**	**258.2**	**204.4**
NOTES: This category may contain area sources also, estimate includes all sources.							

6.3.4 Projected Inventories by Sector and Area

This section presents the controlled emission level results for each year of interest by emission sector and nonattainment area. A more detailed discussion of the projection inventories is found in Appendix E.

6.3.4.1 Point Sources

The 2005 actual emissions were used to project the State's point source inventory to 2009. This was done to decrease the level of uncertainty with growth factors for the 2002-2005 time period. By doing so, the error was decreased by including more recent data. Table 6.4 shows projected and actual NO_x and VOC emissions in tons/day for 2005. The actual NO_x emissions were less than the projected emissions for 2005, when compared to the 2002 inventory. Phase III, known as NO_x SIP Call began in 2003 with a reduction of the base emission budget along with additional add-on controls by a number of the utility companies in the state explains the decrease in NO_x emissions. VOC emissions decreased largely due to the fact that two- (2) automobile manufacturer ceased operations in the state. Other facilities tightened controls on their operations adding to the decrease in VOC emissions.

Table 6.4: Projected vs. Actual Statewide 2005 Point Source Inventory

Pollutant	Actual 2002 tpd	Projected 2005 tpd	Actual 2005 tpd
NO_x	280.36	270.36	208.25
VOC	113.15	117.54	76.73

Tables 6.5 and 6.6 summarize the 2002 actual point source emission inventories and projected inventories by pollutant for years 2002, 2008 and 2009, for VOCs and NO_x, presented by nonattainment area, and statewide. The detailed point source projected inventories by source classification code (SCC) for each county, nonattainment area and the entire state can be found in Appendix E, Attachment 1.

Table 6.5: VOC 2002 Actual and Future Year Projected Inventories Point Sources

Area-New Jersey Portion	Controlled Emissions Summer (tpd)			
	2002 Actual	2005 Actual	2008	2009
NNJ/NY/CT NAA	68.2	49.4	50.5	48.9
SNJ/Phila. NAA	45.4	27.4	28.0	26.1
Statewide	113.5	76.7	78.5	75.0

Table 6.6: NO_x 2002 Actual and Future Year Projected Inventories Point Sources

Area-New Jersey Portion	Controlled Emissions Summer (tpd)			
	2002 Actual	2005 Actual	2008	2009
NNJ/NY/CT NAA	152.7	116.1	51.3	53.8
SNJ/Phila. NAA	127.7	92.1	17.4	25.8
Statewide	280.4	208.2	68.5	79.4

6.3.4.2 Area Sources

Tables 6.7 and 6.8 summarize the 2002 actual area emission inventories and projected inventories by pollutant for years 2002, 2008 and 2009, for VOCs and NO_x, presented by nonattainment area, and statewide. The detailed area source projected inventories by SCC for each county, nonattainment area and the entire State is found in Appendix E, Attachment 2-1.

Table 6.7: VOC 2002 Actual and Future Year Projected Inventories Area Sources

Area-New Jersey Portion	Controlled Emissions Summer (tpd)		
	2002 Actual	2008	2009
NNJ/NY/CT NAA	243.5	218.7	210.8
SNJ/Phila. NAA	126.4	114.7	110.4
Statewide	369.8	333.4	321.2

Table 6.8: NO_x 2002 Actual and Future Year Projected Inventories
Area Sources

Area-New Jersey Portion	Controlled Emissions Summer (tpd)		
	2002 Actual	2008	2009
NNJ/NY/CT NAA	24.4	21.8	22.0
SNJ/Phila. NAA	11.5	10.5	10.6
Statewide	35.9	32.3	32.6

6.3.4.3 Nonroad Sources

Tables 6.9 and 6.10 summarize the 2002 actual nonroad emission inventories and projected inventories by pollutant for years 2002, 2008 and 2009 for VOCs and NO_x, presented by nonattainment area, and statewide. The detailed nonroad projected inventories by SCC for each county, nonattainment area and the entire state is found in Appendix E, Attachment 3-1.

Table 6.9: VOC 2002 Actual and Future Year Projected Inventories
Nonroad Sources

Area-New Jersey Portion	Controlled Emissions Summer (tpd)		
	2002 Actual	2008	2009
NNJ/NY/CT NAA	121.6	87.9	82.2
SNJ/Phila. NAA	99.0	80.1	76.2
Statewide	220.6	168.0	158.4

Table 6.10: NO_x 2002 Actual and Future Year Projected Inventories
Nonroad Sources

Area-New Jersey Portion	Controlled Emissions Summer (tpd)		
	2002 Actual	2008	2009
NNJ/NY/CT NAA	161.0	120.8	117.1
SNJ/Phila. NAA	70.6	63.3	62.1
Statewide	231.6	184.1	179.3

6.3.4.4 Onroad Sources

Tables 6.11 and 6.12 summarize the 2002 actual onroad emission inventories and projected inventories by pollutant for years 2002, 2008 and 2009, for VOCs and NO_x, presented by nonattainment area, and statewide. The detailed onroad source projected inventories by SCC for each county, nonattainment area and the entire state is found in Appendix E, Attachment 4-1.

Table 6.11: VOC 2002 Actual and Future Year Projected Inventories Onroad Sources

Area-New Jersey Portion	Controlled Emissions Summer (tpd)		
	2002 Actual	2008	2009
NNJ/NY/CT NAA	183.0	85.2	79.0
SNJ/Phila. NAA	91.8	48.8	45.5
Statewide	274.7	134.0	124.5

Table 6.12: NO_x 2002 Actual and Future Year Projected Inventories Onroad Sources

Area-New Jersey Portion	Controlled Emissions Summer (tpd)		
	2002 Actual	2008	2009
NNJ/NY/CT NAA	378.9	146.6	133.4
SNJ/Phila. NAA	179.8	116.2	105.9
Statewide	558.7	262.8	239.3

6.3.4.5 Overall Projection Emissions Summary

Tables 6.13 and 6.14 and Figures 6.1 and 6.2 summarize the 2002 actual total emission inventory and projected inventories by pollutant for years 2002, 2008 and 2009, for VOCs and NO_x, presented by nonattainment area, and statewide. The detailed projected inventories by SCC for each county, nonattainment area and the entire state can be found in Appendix E.

Table 6.13: VOC 2002 Actual and Future Year Projected Inventories All Emission Sectors

Area-New Jersey Portion	Controlled Emissions Summer (tpd)		
	2002 Actual	2008	2009
NNJ/NY/CT NAA	616.2	442.3	420.9
SNJ/Phila. NAA	362.5	271.6	258.2
Statewide	978.7	713.9	679.1

Table 6.14: NO_x 2002 Actual and Future Year Projected Inventories All Emission Sectors

Area-New Jersey Portion	**Controlled Emissions Summer (tpd)**		
	2002 Actual	**2008**	**2009**
NNJ/NY/CT NAA	717.0	340.5	326.3
SNJ/PhilaNAA	389.6	207.4	204.4
Statewide	1106.5	547.6	530.6

<u>Figure 6.1</u>: Controlled VOC Emissions, OTB/OTW/BOTW Statewide

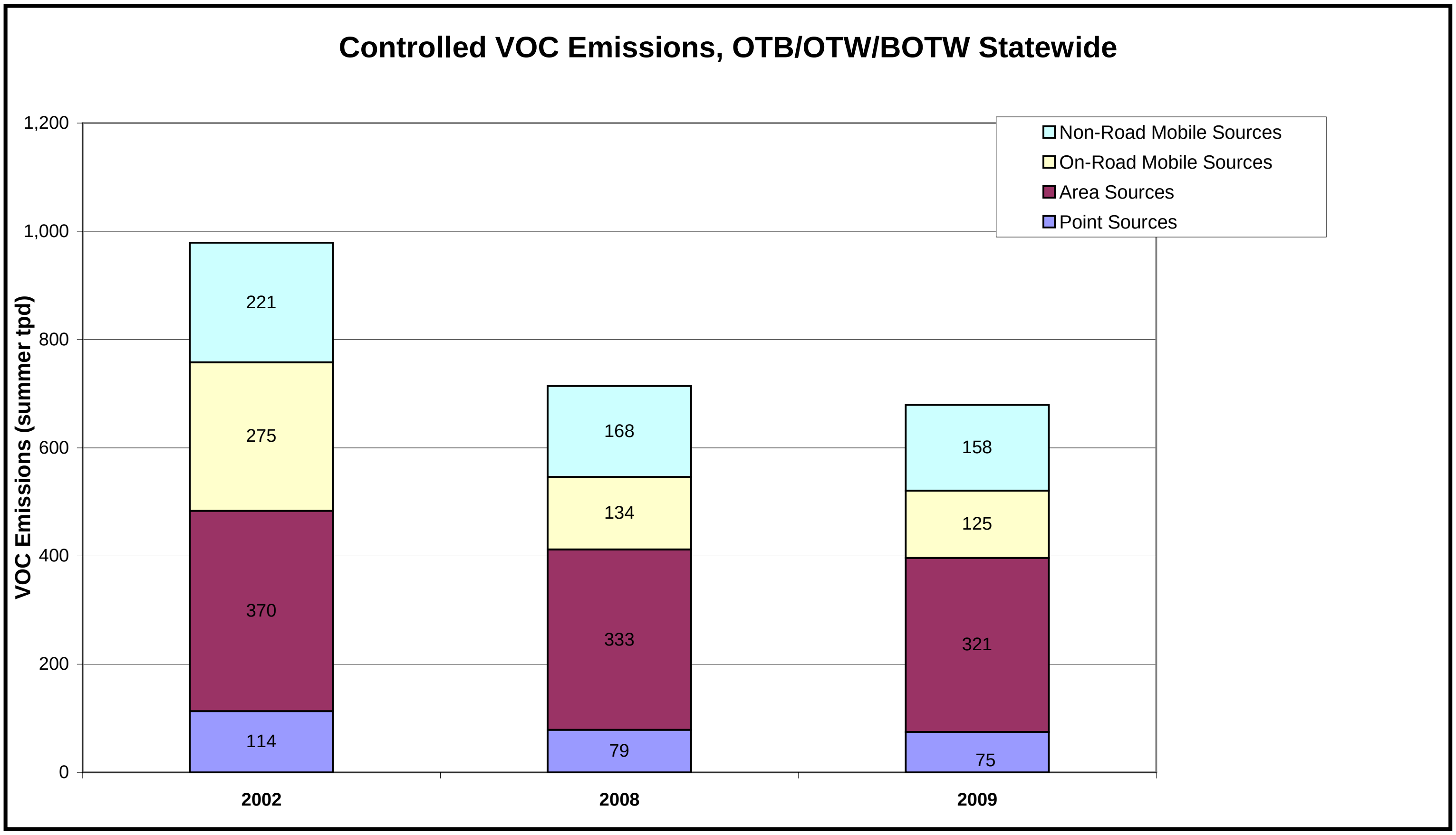
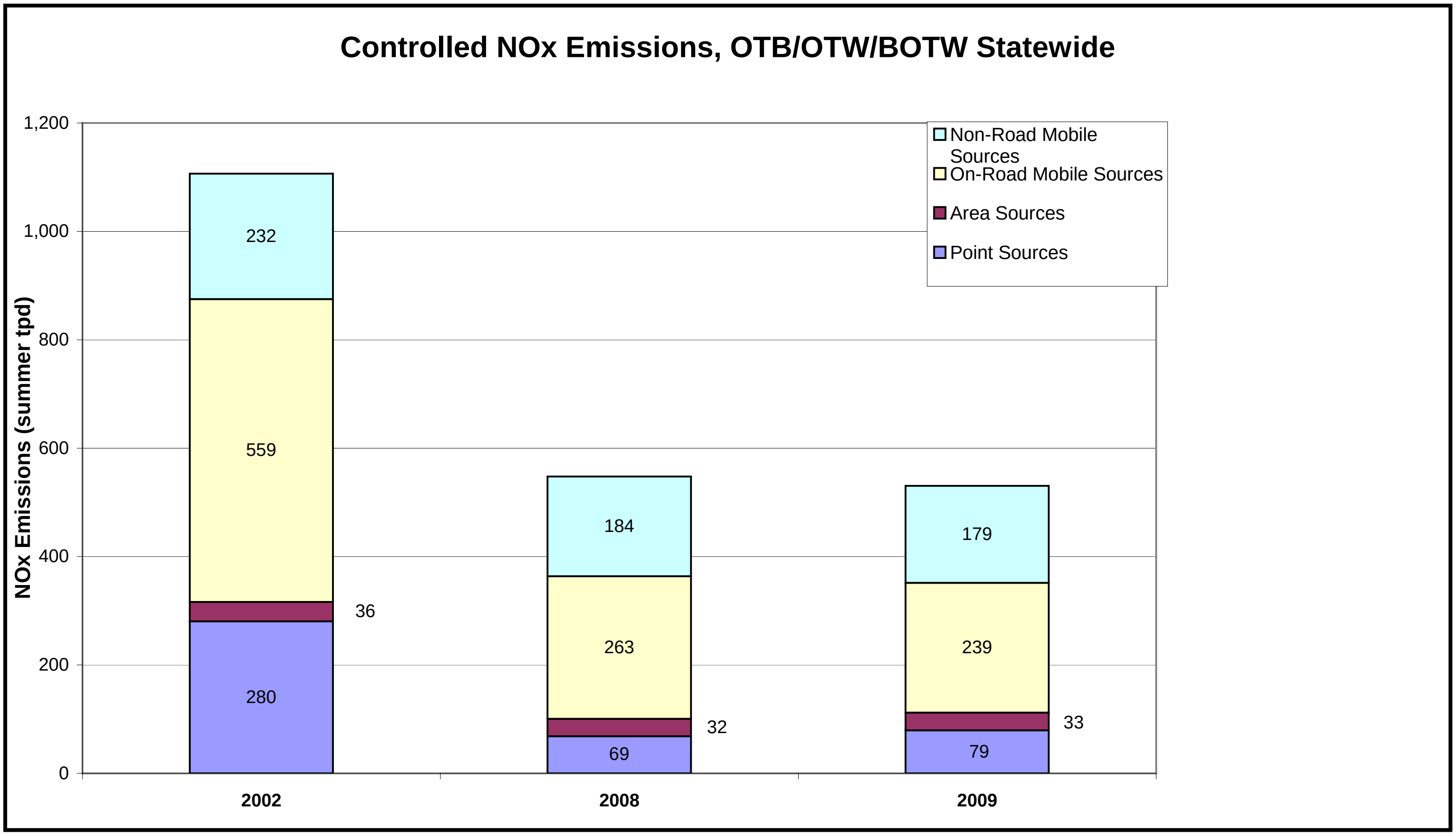


Figure 6.2: Controlled NO_x Emissions, OTB/OTW/BOTW Statewide



6.4 RFP Target Calculations

This section describes the emission reduction calculations performed to determine compliance with RFP requirements. The RFP calculations and projected emission reductions in percent and tons per summer day, are shown in Tables 6.15 and 6.16 for the New Jersey portion of the Northern New Jersey/New York/Connecticut nonattainment area and the New Jersey portion of the Southern New Jersey/Philadelphia nonattainment area, respectively. The steps described below correspond with the rows in Tables 6.15 and 6.16**.**

Step 1: Calculate a 2002 base year emission inventory. This inventory does not include biogenic emissions. The base year inventory is developed as discussed in Section 6.2 of this Chapter.

Step 2: 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 3: Adjust the 2002 base year inventory by subtracting the benefits achieved from the FMVCP, since these reductions are not creditable towards the reduction requirement. The resulting inventory is hereafter referred to as the "adjusted baseline inventory".

Step 4: Calculate the RFP reduction required. As discussed above in Section 6.1, NJDEP is required to reduce VOC emissions from the 2002 adjusted baseline emissions by 15 percent from 2002 to 2008. By definition, the 2008-2009 reduction target is the amount necessary for attainment.

Step 5: Show RFP required VOC emission target levels for each year of interest (2008) by reducing the 2002 adjusted baseline emissions by the reduction amount in Step 4.

Steps 6 through 10: The projected (grown and controlled) VOC and NO_x inventories for 2008 and 2009 are presented by emission sector in rows 6 through 9 and totaled in Row 10. The inventories are derived as discussed in Section 6.3.

Steps 11 and 12: The contingency measure requirement is presented in Row 11 and added to the total controlled emissions in Row 10 to show RFP controlled emissions in Row 12, without contingency measures. Contingency measures are discussed in more detail in Chapter 8.

Steps 13 and 14: The VOC and NO_x emission reductions from the 2002 adjusted baseline inventory (Row 3-Row 12) are presented in tons per ozone season day in Row 13 and as a percentage of the 2002 adjusted baseline inventory ((Row 3-Row 12)/Row 3) in Row 14.

Table 6.15: Rate of Further Progress
New Jersey Portion of
Northern New Jersey/New York/Connecticut Nonattainment Area

Row		2002 Inventory		2008 Projected		2009 Projected	
		VOC tpd*	NOx tpd*	VOC tpd*	NOx tpd*	VOC tpd*	NOx tpd*
1	2002 Base year Emissions	616.2	717.0	616.2	717.0	616.2	717.0
2	Pre-1990 Non-Creditable Reductions (FMVCP Program)	0.0	0.0	13.3	6.9	13.4	7.0
3	2002 Adjusted Baseline Emissions	616.2	717.0	602.9	710.1	602.8	710.1
4	RFP % Reduction Required From 2002 Adjusted Baseline			**15%**			
5	RFP Required VOC Emission Target Levels			**512.5**			
6	Controlled Point Emissions	68.2	152.7	50.5	51.3	48.9	53.8
7	Controlled Area Emissions	243.5	24.4	218.7	21.8	210.8	22.0
8	Controlled Onroad Emissions	183.0	378.9	85.2	146.6	79.0	133.4
9	Controlled Nonroad Emissions	121.6	161.0	87.9	120.8	82.2	117.1
10	Controlled Total Emission Levels	**616.2**	**717.0**	**442.3**	**340.5**	**420.9**	**326.3**
11	Contingency Measures Requirement (3% VOC)			**18.1**			
12	RFP Controlled Emissions (without contingency measures	**616.2**	**717.0**	**460.4**	**340.5**	**420.9**	**326.3**
13	Emission Reduction From 2002 Baseline	0.0	0.0	142.5	369.6	181.9	383.8
14	% Reduction From 2002 Baseline	**0%**	**0%**	**24%**	**52%**	**30%**	**54%**

*Unless otherwise noted

<u>Table 6.16</u>: Rate of Further Progress
New Jersey Portion of
Southern New Jersey/Philadelphia Nonattainment Area

Row		2002 Inventory		2008 Projected		2009 Projected	
		VOC tpd*	NOx tpd*	VOC tpd*	NOx tpd*	VOC tpd*	NOx tpd*
1	2002 Base year Emissions	362.5	389.6	362.5	389.6	362.5	389.6
2	Pre-1990 Non-Creditable Reductions (FMVCP Program)	0.0	0.0	6.9	3.9	7.2	4.0
3	2002 Adjusted Baseline Emissions	362.5	389.6	355.6	385.7	355.3	385.6
4	RFP % Reduction Required From 2002 Adjusted Baseline			15%			
5	RFP Required VOC Emission Target Levels			302.2			
6	Controlled Point Emissions	45.4	127.7	28.0	17.4	26.1	25.8
7	Controlled Area Emissions	126.4	11.5	114.7	10.5	110.4	10.6
8	Controlled Onroad Emissions	91.8	179.8	48.8	116.2	45.5	105.9
9	Controlled Nonroad Emissions	99.0	70.6	80.1	63.3	76.2	62.1
10	Controlled Total Emission Levels	362.5	389.6	271.6	207.4	258.2	204.4
11	Contingency Measures Requirement (3% VOC)			10.7			
12	RFP Controlled Emissions (without contingency measures	362.5	389.6	282.3	207.4	258.2	204.4
13	Emission Reduction From 2002 Baseline	0.0	0.0	73.3	178.3	97.1	181.2
14	% Reduction From 2002 Baseline	0%	0%	21%	46%	27%	47%

* Unless otherwise noted

6.5 RFP Summary and Conclusions

The RFP calculations and projected emission reductions in percent and tons per summer day, are shown in Tables 6.15 and 6.16, the New Jersey portion of the Northern New Jersey/New York/Connecticut nonattainment area and the New Jersey portion of the Southern New Jersey/Philadelphia nonattainment area, respectively.

For the New Jersey portion of the Northern New Jersey/New York/Connecticut nonattainment area, as shown in Table 6.15, the projected percent reduction of VOC from the 2002 baseline is 24 percent in 2008, which exceeds the required 15 percent.

For the Southern New Jersey/Philadelphia nonattainment area, as shown in Table 6.16, the projected percent reduction of VOC from the 2002 baseline is 21 percent in 2008, which exceeds the required 15 percent.

Both of the New Jersey portions of the multi-state nonattainment areas meet the 2008 and 2009 RFP requirement.

7.0 REASONABLY AVAILABLE CONTROL MEASURE (RACM) ANALYSIS

This section provides an analysis of both potential transportation control measures (TCMs) for onroad mobile sources and non-TCM potential control measures for point, area, off-road and onroad source categories in order to determine whether or not any of these measures could be considered reasonably available control measures (RACM) and would advance the attainment date. The analysis will determine if any RACM are available for inclusion in the 8-hour ozone attainment demonstration plans for the New Jersey portions of the Northern New Jersey/New York/Connecticut and Southern New Jersey/Philadelphia moderate 8-hour ozone nonattainment areas.

In accordance with Section 172(c)(1) of the Clean Air Act, states, as part of their effort to attain National Ambient Air Quality Standards (NAAQS), such as those established for ozone, are required to implement all RACMs as expeditiously as practicable. Specifically, 42 U.S.C. §7502(c)(1) states the following:

> "In general – Such plan provisions shall provide for the implementation of all reasonably available control measures as expeditiously as practicable (including such reductions in emissions from existing sources in the area as may be obtained through the adoption, at a minimum, of reasonably available control technology) and shall provide for attainment of the national primary ambient air quality standards."

Furthermore, in the Final Rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard – Phase 2[1], the USEPA describes how States must include with their attainment demonstration a RACM analysis. The purpose of the RACM analysis is to determine whether or not reasonably available control measures exist that would advance the attainment date for nonattainment areas. Control measures that would advance the attainment date are considered RACMs that must be included in the SIP. RACMs are necessary to ensure that the attainment date is achieved "as expeditious as practicable".

7.1 What is a RACM?

A Reasonably Available Control Measure (RACM) is defined by the USEPA as any potential control measure for application to point[2], area, onroad and nonroad emission source categories that meets the following criteria:

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[1] 70 Fed. Reg. 71701 (November 29, 2005)

[2] RACM applies only to those point sources not already addressed as part of the Reasonably Available Control Technology (RACT) analysis. New Jersey proposed its RACT analysis for 8-hour ozone on February 2, 2007. As a part of the RACT analysis, the State plans to amend various subchapters of New Jersey Administrative Code, Title 7, Chapter 27 (N.J.A.C. 7:27) to implement RACT. The changes primarily impact Subchapter 16, "Control of Air Pollution by Volatile Organic Compounds," and Subchapter 19, "Control and Prohibition of Air Pollution from Oxides of Nitrogen." The State has committed to propose all ozone RACT rules by November 2007, and adopt by May 2008, subject to public comment and in accordance with the New Jersey Administrative Procedures Act (APA) (N.J.S.A. 52:14B-1 et. seq.) and the Air Pollution Control Act (APCA) (N.J.S.A. 26:2C-1 et. seq.).

- The control measure is technologically feasible
- The control measure is economically feasible
- The control measure does not cause “substantial widespread and long-term adverse impacts”
- The control measure is not “absurd, unenforceable, or impracticable”
- The control measure can advance the attainment date by at least one year

Each of these criteria is more fully discussed in Section 7.2.

The USEPA has documented guidance regarding completion of a RACM analysis. These guidance documents are listed in Table 7.1.

Table 7.1: USEPA RACM Guidance Documents

Guidance Document Title	Description
Federal Register/Vol. 44, No. 66/April 4, 1979/General Preamble for Proposed Rulemaking	Guidance on the Need to Include All RACM in the SIP
Federal Register/Vol. 57, No. 74/April 16, 1992/Proposed Rules/General Preamble	Guidance on What the USEPA Does Not Consider RACM
EPA Memorandum, “Guidance on the RACM Requirement and Attainment Demonstration Submissions for Ozone Nonattainment Areas”, from John S. Seitz, EPA Director Office of Air Quality Planning and Standards to the EPA Regional Air Division Directors Regions I-IX, dated November, 1999.	Guidance on Justification for Not Including Measures in the SIP
EPA Memorandum, “Additional Submission on RACM From States With Severe 1-hour Ozone Nonattainment Area SIPs”, from John S. Seitz, EPA Director office of Air Quality Planning and Standards and Marge Oge, EPA Director Office of Transportation and Air Quality to Regional Air Division Directors, Regions I, II, III, V and VI, December 14, 2000.	Guidance on Justification for Not Including Measures in the SIP
Federal Register/Vol. 66, No. 2/January 3, 2001/Final Rule for Approval and Promulgation of Air Quality Implementation Plans; Connecticut; One-Hour Ozone Attainment Demonstration and Attainment Date Extension for the Greater Connecticut Ozone Nonattainment Area	Guidance on Advancing the Attainment Date

7.2 Methodology

The 8-hour ozone RACM analysis involved a review of potential control measures for mobile (both onroad and nonroad), stationary area, and stationary/point (not already subject to ozone RACT requirements) emission source categories in order to document whether or not there are measures which would meet the reasonably available control measures criteria as defined in Section 7.1. The New Jersey Department of Transportation (NJDOT) conducted the RACM analysis for Transportation Control Measures (TCMs). In so much as VOC and NO_x also contribute to the formation of $PM_{2.5}$, any identified control measures from New Jersey's ozone RACM analysis for these pollutants would also result in $PM_{2.5}$ and regional haze benefits. As such, this ozone RACM analysis also serves as the $PM_{2.5}$ RACM analysis for those precursors.

The evaluation criteria used for the analysis are discussed in detail below:

1. **Technological Feasibility** – This criterion is an evaluation of the following to determine feasibility of timely implementation:

    - Manufacturing processes, operating procedures, availability of raw materials and the physical layout of the plant (if applicable). Relevant technology must exist or be reasonably expected to exist within the schedule allotted, be sufficiently available, and be applied to achieve a stated result.

    - Other adverse environmental impacts such as water pollution, waste disposal issues, and energy requirements.

    - Technological changes to vehicles, fuels, necessary infrastructure and similar considerations (for transportation measures).

2. **Economic Feasibility –** This criterion considers an evaluation of the following to determine feasibility of timely implementation:

    - The cost of reducing emissions (cost per ton of emission reduced), capital costs and operating costs. The costs associated with a measure must be justifiable relative to benefits, and compare favorably with other potential emissions control measures (of all types on all emissions sources). Operating costs include both direct or variable costs and indirect or fixed costs.

    - The NJDEP has determined the following about the economic feasibility of RACM measures[3]:

        - Control measures with cost-effectiveness ratios below the local RACT amount[4] are *presumptively* feasible from an economic standpoint.

        - Control measures with cost-effectiveness ratios above the RACT level but below $5,000/ton (the San Joaquin and Houston-Galveston low-end cutoffs) are *probably* economically feasible.

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[3] "Economic Feasibility and Reasonably Available Control Measures (RACM)". Internal NJDEP Communication prepared by the NJDEP Division of Science, Research, and Technology, August 3, 2006.
[4] According to the NO_x SIP Call (63 Fed. Reg. 57400 (10/27/98)), the RACT limit is $2,000/ton. The USEPA cutoff for de minimis exemption from RACT is $1,300/ton.

- Control measures with ratios between $5,000/ton and $25,000 or $50,000/ton (the values cited by the Transportation Research Board (TRB) for Congestion Mitigation and Air Quality program (CMAQ)-funded TCMs) *may* be economically feasible but require further analysis.

- Control measures with ratios above $25,000 or $50,000/ton are *probably not* economically feasible.

- In the absence of general rules, RACM feasibility decisions must continue to be made and justified on a case by case basis.

3. **Other local considerations including measures that do not cause "substantial widespread and long-term adverse impacts" and measures that are not "absurd, unenforceable, or impracticable**" **–** These criteria will be evaluated based on the following to determine feasibility of implementation:

   - Considerations such as disruption of fuel supplies, discrimination among various population groups, critical reduction in mobility, and other similar concerns.

   - Must be legally enforceable, and legal under federal and state law.

   - Must be practical, realistic, and have a strong potential to achieve estimated emissions reductions.

   - Must be capable of being implemented and producing the anticipated emissions reductions in the required timeframe. This includes consideration of the schedule for planning, regulatory action, implementation and time to achieve the targeted results.

4. **Advancement of the Attainment Date –** This criterion requires that selected measures advance the attainment date by at least one year.

   According to USEPA guidance,[5] areas that have an attainment date of no later than June 15, 2010 must implement the emission reductions needed for attainment no later than the beginning of the 2009 ozone season (June 2009). Otherwise the emission reductions will not affect the monitored ozone in 2009 which is the last ozone season before the attainment date of June 15, 2010. In order to advance the attainment date by one year, the potential RACM measures would have to achieve the emission reductions needed for attainment by June 2008.[6]

[5] USEPA. Guidance on the Use of Models and Other Related Analyses in Attainment Demonstrations for the 8-Hour Ozone NAAQS. United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Emissions, Monitoring, and Analysis Division, Air Quality Modeling Group, Research Triangle Park, NC, EPA-454/R-05-002, October 2005.
[6] In order to assess the level of emission reductions required to advance the attainment date for each area it was necessary to quantify the VOC and NO_x reductions expected in the year prior to the attainment year.

7.2.1 Potential Control Measure Evaluation for Non-Transportation Control Measures

Step I - Identification of Potential Control Measures

A list of 457 original potential non-transportation control measures (TCMs) was compiled through review of various sources, including Regional Planning Organizations (RPOs), other State Organizations, existing NJDEP documents, USEPA regions, and Early Action documents.

The initial list of potential control measures was reviewed to eliminate any measures that did not address a top VOC or NO_x emitting category in the 2002 inventory or in the regional inventory. However, measures that had the potential to achieve high emission reductions were not excluded, regardless of whether or not they addressed a top inventory category (either state or regional). The top 15 VOC and NO_x emitting categories in the New Jersey 2002 Periodic Emission Inventory are included in Figures 7.1 and 7.2.

Measures that are already in place in New Jersey or are more stringently addressed at the Federal level were also eliminated from the analysis at this time.

Finally, measures whose potential emission reduction benefit was not quantifiable and measures that had no net emission reduction benefit in New Jersey were eliminated from the analysis.

One year is used as the advancement time since ozone attainment is based on measurements taken during a 5 month ozone season each year.

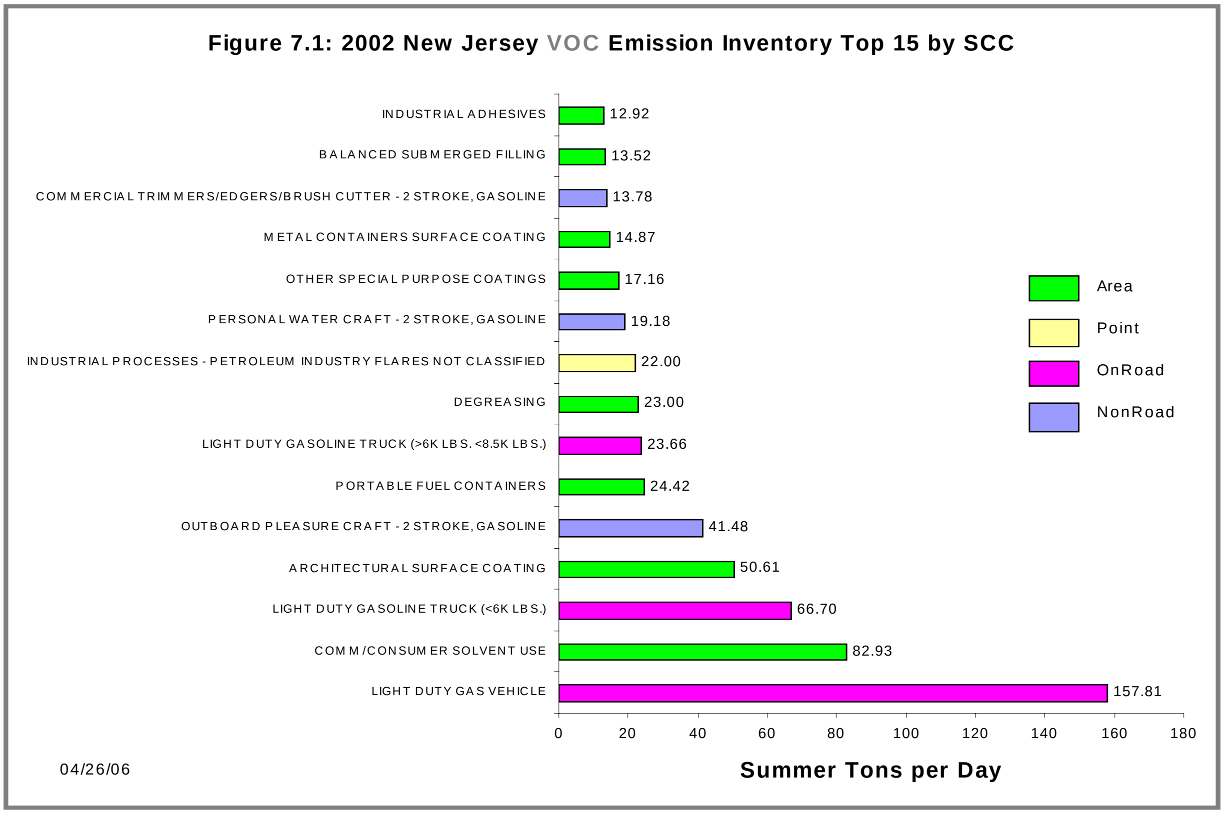


Figure 7.1: 2002 New Jersey VOC Emission Inventory Top 15 by SCC
INDUSTRIAL ADHESIVES
BALANCED SUBMERGED FILLING
COMMERCIAL TRIMMERS/EDGERS/BRUSH CUTTER - 2 STROKE, GASOLINE
METAL CONTAINERS SURFACE COATING
OTHER SPECIAL PURPOSE COATINGS
PERSONAL WATER CRAFT - 2 STROKE, GASOLINE
INDUSTRIAL PROCESSES - PETROLEUM INDUSTRY FLARES NOT CLASSIFIED
DEGREASING
LIGHT DUTY GASOLINE TRUCK (>6K LBS. <8.5K LBS.)
PORTABLE FUEL CONTAINERS
OUTBOARD PLEASURE CRAFT - 2 STROKE, GASOLINE
ARCHITECTURAL SURFACE COATING
LIGHT DUTY GASOLINE TRUCK (<6K LBS.)
COMM/CONSUMER SOLVENT USE
LIGHT DUTY GAS VEHICLE
12.92
13.52
13.78
14.87
17.16
19.18
22.00
23.00
23.66
24.42
41.48
50.61
66.70
82.93
157.81
Area
Point
OnRoad
NonRoad
0
20
40
60
80
100
120
140
160
180
04/26/06
Summer Tons per Day

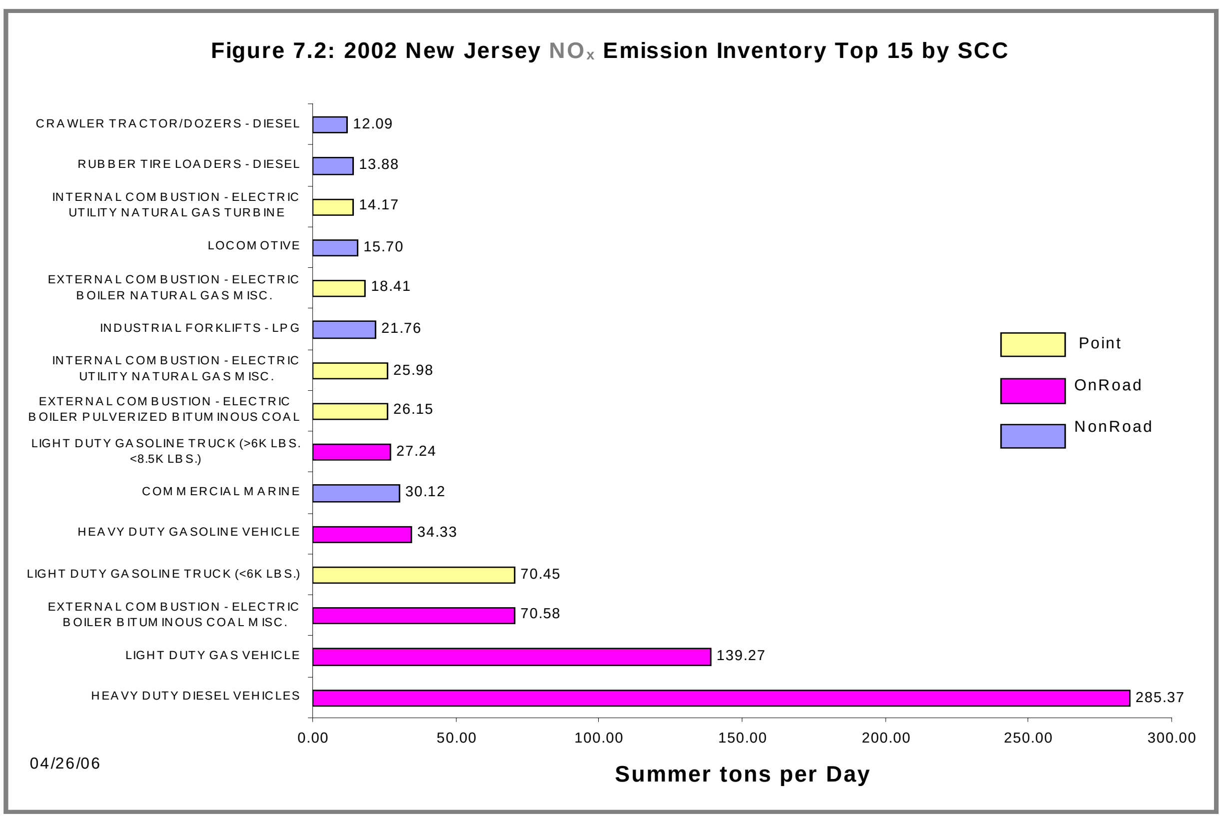


Figure 7.2: 2002 New Jersey NOx Emission Inventory Top 15 by SCC
CRAWLER TRACTOR/DOZERS - DIESEL
RUBBER TIRE LOADERS - DIESEL
INTERNAL COMBUSTION - ELECTRIC UTILITY NATURAL GAS TURBINE
LOCOMOTIVE
EXTERNAL COMBUSTION - ELECTRIC BOILER NATURAL GAS MISC.
INDUSTRIAL FORKLIFTS - LPG
INTERNAL COMBUSTION - ELECTRIC UTILITY NATURAL GAS MISC.
EXTERNAL COMBUSTION - ELECTRIC BOILER PULVERIZED BITUMINOUS COAL
LIGHT DUTY GASOLINE TRUCK (>6K LBS. <8.5K LBS.)
COMMERCIAL MARINE
HEAVY DUTY GASOLINE VEHICLE
LIGHT DUTY GASOLINE TRUCK (<6K LBS.)
EXTERNAL COMBUSTION - ELECTRIC BOILER BITUMINOUS COAL MISC.
LIGHT DUTY GAS VEHICLE
HEAVY DUTY DIESEL VEHICLES
12.09
13.88
14.17
15.70
18.41
21.76
25.98
26.15
27.24
30.12
34.33
70.45
70.58
139.27
285.37
Point
OnRoad
NonRoad
0.00
50.00
100.00
150.00
200.00
250.00
300.00
04/26/06
Summer tons per Day

All identical measures that remained in the analysis at this point were combined.

There were 81 potential non-TCM control measures that advanced to the next phase of the analysis, as shown in Table F2.1 in Appendix F2.

NJDEP Workgroup Efforts

The NJDEP organized the "Reducing Air Pollution Together Initiative", which began at a public workshop on June 29, 2005. This workshop served to initiate a dialogue between the NJDEP and interested and affected parties about reducing emissions in order to improve air quality in New Jersey. Over 200 persons representing various industries, environmental and civic groups attended the initial workshop.

At the workshop, six workgroups were formed to focus on key sources of emissions resulting in nonattainment of federal air quality standards and to recommend control strategies to reduce these emissions.

The goals of each workgroup were to:

- Identify strategies to achieve emission reductions
- Prioritize reasonable and effective control measures
- Identify implementation issues and potential solutions
- Identify additional sources of data to enhance the state's future emissions inventories

Table 7.2 lists the six workgroups and their mission.

<u>Table 7.2</u>: Reducing Air Pollution Together Initiative Workgroups

Workgroup	Workgroup Mission
Diesel Initiatives (DI)	To recommend potential ways to control and/or reduce emissions from diesel engines. Topics include vehicles (all categories – Light Duty Diesel Vehicles (LDDVs), Medium Duty Diesel Vehicles (MDDVs) and Heavy Duty Diesel Vehicles (HDDVs), nonroad equipment (e.g. construction equipment), commercial marine vessels (ships), locomotives and stationary diesel engines. Discussion topics include use of fuels that would reduce emissions, as well as retrofit technologies and idling strategies.
Gasoline Cars and Trucks (C&T)	To recommend potential ways to control and/or reduce emissions from gasoline-fueled motor vehicles and trucks (including SUVs and heavier trucks) and their use. This includes inspection and maintenance as well as transportation control measures.
Homes and Restaurants (HR)	To recommend potential ways to control and/or reduce emissions from the varied sources of combustion used by homeowners and restaurants. Topics include wood burning, space heating, energy efficiency, and emissions from restaurant operations.
Non-Automobile Gasoline Engines (NA)	To recommend potential ways to control and/or reduce emissions from gasoline engines other than those used in cars and trucks. Topics include engines used on outboard pleasure craft and in lawnmowers.
Stationary Combustion Sources (SCS)	To recommend potential ways to control and/or reduce emissions from facilities identified as stationary sources of combustion, including both Electric Generating Units (EGUs) and non-EGUs. The focus will be on NO_x, SO_2, VOC and particulate emissions.
Volatile Organic Compounds from Processes and Consumer Products (VOC)	To recommend potential ways to control and/or reduce VOC emissions from various chemical products and/or processes. Topics include all consumer products (from paints and deodorants to gas cans) as well as industrial processes.

The workgroups met during the summer of 2005 and developed potential air emission control strategies. Reports containing their recommendations for further consideration were submitted to the NJDEP on October 31, 2005. A total of 250 potential control measures (See Table F2.2 in Appendix F2) were submitted to NJDEP. The members of the workgroup ranked the measures from highest to lowest potential.

The workgroup process is discussed in further detail in Section 4 of this SIP document.

<u>White Paper Measures</u>

After the workgroup reports were submitted, the 250 workgroup measures were further evaluated by NJDEP and ranked (High, Medium, Low, Not Ranked) so that every measure could be compared equally. Each workgroup state team worked with the NJDEP Air Quality Management Team to determine which of the workgroup recommended strategies should be further evaluated for possible inclusion in the SIP and/or implementation. The final list of measures to be further evaluated was provided to the workgroup members. Sixty draft white papers were developed by the NJDEP staff.

The draft white papers were presented to the public at a workshop on May 17, 2006.[7] The NJDEP accepted public comments on the white papers and updated the white papers, as appropriate.

The 60 white papers were evaluated to identify additional potential control measures for the RACM analysis. After this evaluation, 21 white papers were added to the RACM analysis and were fully evaluated according to RACM criteria (3 of the 21 white papers overlapped with regional control measures and 3 overlapped with existing potential RACM measures). A total of 9 white paper control measures passed all of the RACM criteria. The 21 white paper measures that were added to the RACM analysis are included in Table 7.3 along with measures suggested by the Ozone Transport Commission (OTC).

The remaining 39 white papers were not considered as part of the RACM analysis for one of the following reasons: the measure addressed in the white paper was subject to RACT, the white paper addressed a PM control measure, emission reduction benefits could not be quantified for the measure, or the white paper did not address one specific control measure.

Ozone Transport Commission (OTC) Identified Measures

New Jersey worked with other states in the Ozone Transport Region to explore reasonable control measures for potentially significant reductions to attain the 8-hour ozone NAAQS and to achieve regional haze goals. The OTC staff and member states formed workgroups to: review stationary point and area source categories, electric generating units, and mobile sources; identify candidate emission units; and consider potential control strategies to reduce NO_x, VOC and SO_2 emissions. The workgroups were made up of staff from OTC member states.

The NJDEP incorporated the OTC potential candidate measures into New Jersey's RACM analysis. The OTC potential candidate measures were analyzed according to the RACM criteria discussed in Section 7.2. There were 4 OTC measures that fit the RACM criteria. Three of these measures overlapped with NJDEP white paper measures. Measures identified by the OTC regional effort, in addition to measures identified by NJDEP workgroup efforts that were added to the RACM analysis are included in Table 7.3.

[7] A complete list of white papers, as well as links to these white papers, can be found at http://www.nj.gov/dep/airworkgroups/docs/wp_summary_table_web.xls.

Table 7.3: Measures Identified from NJDEP Workgroup and OTC Regional Efforts

New Jersey Identifier	Measure Name	NJDEP White Paper Identifier/OTC Regional Measure Source
Area		
2	Consumer Products	OTC, VOC001
3	Portable Fuel Containers	OTC, VOC002
4	Adhesives and Sealants (Industrial)	OTC, VOC011
5	Smoke Management Plan	GEN001
6	Vapor Recovery Systems at Gasoline Service Stations	VOC003
7	Architectural and Industrial Maintenance Coatings	VOC010
Onroad		
30	Diesel Engine Chip Reflash	OTC
31	Efficient Vehicle Purchase Incentives/Disincentives	CT004
32	Onroad Vehicle Idling	DI001
33	Early Retirement Program for Heavy Duty Diesel Vehicles	DI009
34	Opacity Cutpoint Revision	DI011
35	Light Duty Diesel Vehicle Inspection	DI012
36	Medium Duty Vehicle Inspection	DI013
46	Low Income Vehicle Repair Assistance Program (LIRAP)	CT002
Nonroad		
74	Nonroad Idling	DI002
75	Idling Reduction for Train Engines	DI003
76	Leveraging Airport Leases to Achieve Reductions from Ground Support Equipment	DI006
77	Increasing the Rate of Small Engine Turnovers and Portable Fuel Container Turnovers through the Use of Incentive-Based Initiatives	NA002 (& NA006)
78	Insure Proper Disposal of Fuel Samples After Daily Aircraft Pre-Flight Checks	NA005
79	Stage II Vapor Recovery Compatibility for Boat Fueling and Marina Gasoline Fueling Facilities	NA007
85	Providing Electric Power to Ships (Cold Ironing) at the Ports (Shoreside Power)	DI004
89	Graduated Registration Fees for Recreational Boats	NA008

Step II – RACM Criteria Analysis

Technological Feasibility Analysis:

The 103 identified non-TCM measures (81 from the sources discussed in Section 7.2.1, 21 from NJDEP white papers, and 1 OTC measure) were analyzed according to the RACM criterion discussed in Section 7.2 for technological feasibility. A total of 85 measures passed the technological feasibility criterion. Table F2.1 in Appendix F2 includes a list of all measures considered and the reasons that they passed or failed each RACM criterion. If sufficient information was not available for a technological feasibility determination to be made for a measure, the measure was evaluated for the remaining criteria, and a "N/A" determination was made for technological feasibility.

Only measures that passed the technological feasibility evaluation (or were N/A) moved on to the economic feasibility determination.

Economic Feasibility Analysis and Other Local Considerations:

The remaining 85 measures were analyzed according to the RACM criteria outlined in Section 7.2 for economic feasibility and other local considerations. Local considerations are those measures that do not cause “substantial widespread and long-term adverse impact” and measures that are not “absurd, unenforceable, and impracticable”. The analysis for these criteria was done simultaneously on all 85 measures. There were 27 measures eliminated solely because they could not be implemented by June 2008 (in order to advance the attainment date by one year, the potential RACM measures would have to achieve the emission reductions needed for attainment by June 2008). These measures will be further evaluated and considered by New Jersey for possible implementation in the future. A total of 17 viable measures listed in Table 7.4 advanced to the final stage of the analysis. Table F2.5 in Appendix F2 lists the determinations for each RACM criterion for all 103 identified measures.

Table 7.4: List of 17 Potential Non-TCM RACMs

Identifier	Measure Name
Area	
2	Consumer Products
3	Portable Fuel Containers
4	Adhesives and Sealants (Industrial)
5	Smoke Management Plan
18	Degreasing Controls
20	Tehama County: TCAPCD Rule 4.22: Industrial Use of Organic Solvents
25	Emission Reductions from Composting
26	Reformulation of Aerosol Coatings to CARB Tier 2 Standards
Onroad	
32	Onroad Vehicle Idling
34	Opacity Cutpoint Revision
36	Medium Duty Vehicle Inspection
63	Technology to Identify Smoking Vehicles
Nonroad	
74	Nonroad Idling
75	Idling Reduction for Train Engines
78	Insure Proper Disposal of Fuel Samples After Daily Aircraft Pre-Flight Checks
89	Graduated Registration Fees for Recreational Boats
97	Auxiliary Power Units (APUs) for Locomotives

7.2.2 NJDOT Potential Control Measure Analysis for Transportation Control Measures and Other Onroad Mobile Measures

Transportation Control Measures (TCMs) are transportation strategies specific to onroad mobile sources, which reduce emissions by reducing the number and/or length of vehicle trips and/or improve traffic flow. After the passage of the Clean Air Act Amendments of 1990, New Jersey made a full-scale commitment to TCMs.[8] The State's transportation capital program continues to stress transit projects, system preservation, and systems management over the provision of new highway capacity. The NJDOT has continued to commit to the support and implementation of air quality-friendly transportation projects and programs.

Step I – Evaluation Criteria for Potential Transportation Control Measures

The TCMs considered for this RACM evaluation were identified by NJDOT in consultation with the NJDEP. Detailed summaries of each of the 26 measures identified by NJDOT (including TCMs and onroad mobile measures) are located in Appendix F1. Two of the 26 measures were combined with similar measures that were identified during the pre-screening analysis discussed in Section 7.2.1 and were eliminated from the analysis.

Step II – Identification of Potential Transportation Control Measures

The 26 TCMs and onroad mobile measures were evaluated based on the criteria outlined in Section 7.2. These criteria include technological and economic feasibility, other local considerations (measures that do not cause "substantial widespread and long-term adverse impact" and measures that are not "absurd, unenforceable, and impracticable"), and advancement of the attainment date. Emissions reductions must be sufficient to advance the attainment date in each 8-hour ozone nonattainment area from 2010 to 2009 (meaning reductions by summer 2008 instead of 2009).

The NJDOT performed a political feasibility analysis on the 26 measures and ranked the measures as "high", "medium", or "low". The political feasibility analysis is included in Appendix F3. The NJDEP evaluated the rationale for measures that were ranked "medium" or "low" for political feasibility by NJDOT against the RACM criteria described in Section 7.2. The results of this analysis are included in table F2.5 in Appendix F2. There were 11 measures that were ranked "high" for political feasibility by NJDOT. The 11 measures advanced to the final stage of the RACM analysis. These measures are included in Table 7.5.

[8] The State included 134 TCMs in the original 15% Rate of Progress SIP in 1993. While New Jersey has since opted not to include TCMs in the SIP, the New Jersey Department of Transportation (NJDOT) has continued to commit to the support and implementation of air quality friendly transportation projects and programs.

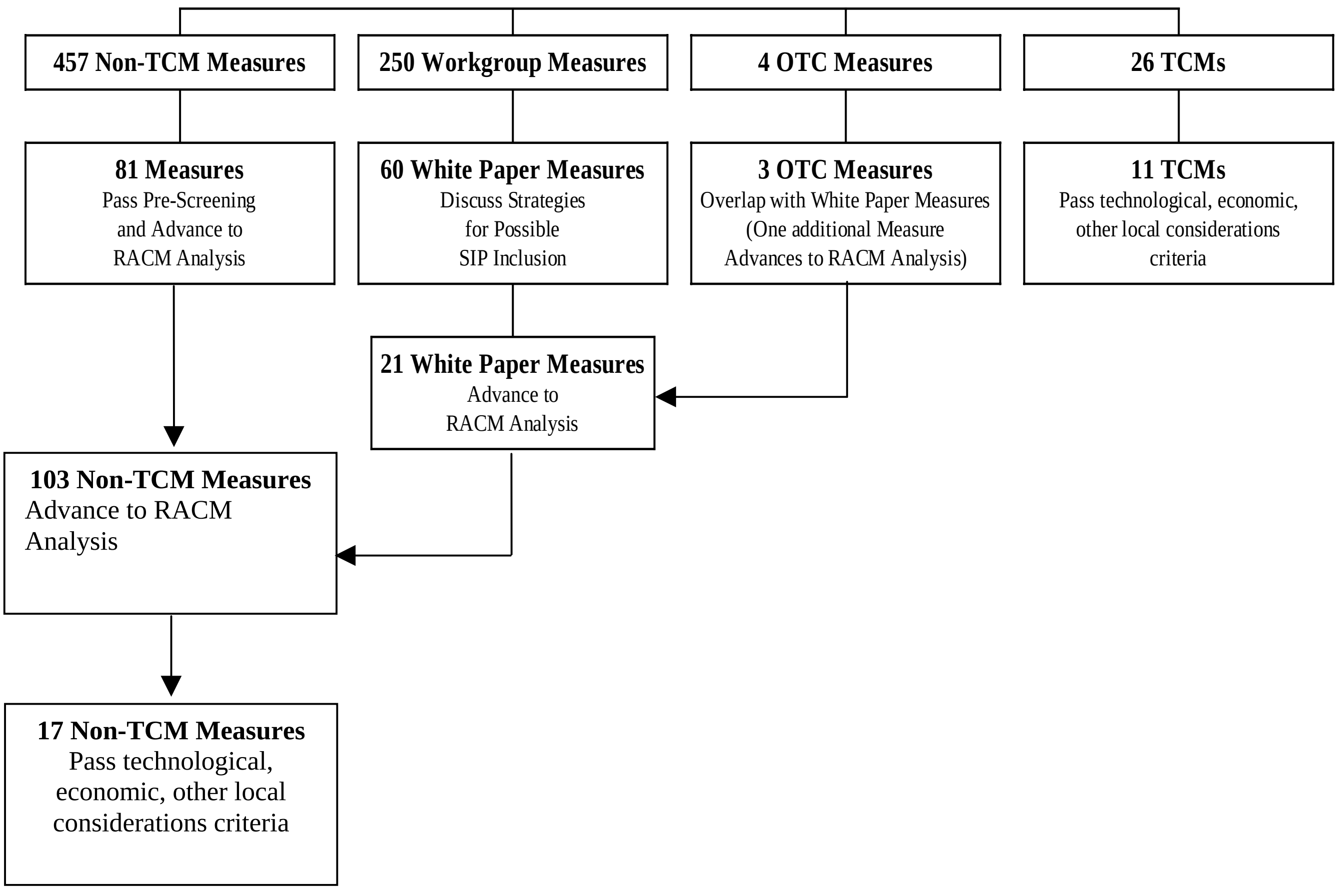
Table 7.5: Potential Transportation Control Measures (TCMs)

Identifier	Measure Name	Description
Onroad		
DOT8	Truck Idling Restrictions	Truck idling restrictions will be implemented statewide. It is assumed, in an effort to avoid fines and other negative repercussions resulting from continued idling, both fleet and individual truck owners will invest in idling reduction technology (auxiliary power units, diesel driven heating systems and automatic shut-down/start-up systems).
DOT9	Impact of Various Transit Projects	Encourage the use of transit through the completion of significant fixed guideway/rail projects
DOT11	Adoption of Smart Growth Land Use Policies	Analysis of compact development in the NY-NJ-CT Region
DOT13	Clean Fleets Replacements	100 9 year old vehicles replaced with 100 hybrid vehicles in each county
DOT16	School Bus Replacements	Twenty percent (4,246) of all Model Year 2002 and older school buses are replaced by Model year 2007 diesel buses
DOT17	IdleAire Installations	A total of 210 parking spaces at truck stops would be equipped with IdleAire technology statewide.
DOT18	Transit Bus Replacements	All Model Year 2002 and older transit buses are replaced by Model Year 2007 diesel buses
DOT20	School Bus Retrofit	All Model Year 1992-2002 school buses will utilize retrofit technology
DOT22	Commercial Vehicle Information Systems and Networks (CVISN).	Analyzed as the adoption of high-speed weigh in motion devices to replace off-line weigh stations
DOT23	Implementation of Express E-Z Pass Toll Collection	Analysis includes the impacts of adding high speed, no toll booth EZ-Pass lanes to the Union, Essex and Barnaget toll plazas
Nonroad		
DOT3	Retrofit Construction Equipment	Assume 10% of total inventory of equipment will be used on state contracted projects and that 20% of those vehicles must use a combination of ULSD and retrofit technology

7.3 Potential Measures Identified

A total of 28 measures (11 TCM and 17 Non-TCM) passed the technological feasibility, economic feasibility, and "other local considerations" RACM criteria (as shown in Figure 7.3)

Figure 7.3: Identification of Potential Control Measures



New Jersey specific potential emission reductions were estimated for the 28 measures. The potential New Jersey specific emission reduction benefits for the area source measures were estimated by using population ratios. Population data for the year 2002 was obtained online from the U.S. Census Bureau.[9] Daily Vehicle Miles Traveled (DVMT) was used to allocate the New Jersey specific emission reduction benefit for the onroad mobile measures. The DVMT data was obtained from the Federal Highway Administration[10] and the New Jersey 2002 Periodic Emission Inventory.[11]

[9] United States Census Bureau (http://www.census.gov).

[10] US Department of Transportation Federal Highway Administration – "Selected Measures for Identifying Peer States" (http://www.fhwa.dot.gov/policy/ohim/hs02/ps1.htm).

The measures were then ranked by potential statewide VOC reductions and NO_x reductions (see Table F2.3 and F2.4 in Appendix F2). It is unlikely that control measures that provide emission benefits of less than one ton per day would be significant enough, alone or in aggregate, to advance the attainment date.[12] Therefore, only control measures that provide emission benefits greater than one ton per day are considered for this analysis. There were four measures that had a potential VOC reduction greater than 1 tpd. There were also four measures that had a potential NO_x reduction 1 tpd or greater. These measures are listed in Tables 7.6 and 7.7. A potential ozone benefit was also allocated for each of the measures. The ozone benefit was estimated as a simple sum of VOC and NOx benefits.

Table 7.6: Potential RACMs Ranked by Potential VOC Reduction (Top 4)

Rank*	Identifier	Measure Name	NJ Statewide Potential VOC Reduction (tpd)
1	4	Adhesives and Sealants (Industrial)**	9.2
2	26	Reformulation of Aerosol Coatings to CARB Tier 2 Standards	5.9
3	2	Consumer Products**	1.4
4	18	Degreasing Controls	1.1
Total Potential VOC Reduction			**17.6**

Table 7.7: Potential RACMs Ranked by Potential NO_x Reduction (Top 4)

Rank*	Identifier	Measure Name	NJ Statewide Potential NO_x Reduction (tpd)
1	DOT8	Truck idling restrictions	1.6
2	DOT17	IdleAire Installations	1.5
3	DOT11	Adoption of Smart Growth Land Use Policies	1.0
4	DOT22	Commercial Vehicle Information Systems and Networks (CVISN).	1.0
Total Potential NO_x Reduction			**5.1**

*Based on potential emission benefits

**New Jersey is in the process of proposing these measures

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[11] NJDEP. State Implementation Plan (SIP) Revisions for the Attainment and Maintenance of the 8-Hour Carbon Monoxide National Ambient Air Quality Standard, 1-Hour Ozone National Ambient Air Quality Standard, and Fine Particulate Matter National Ambient Air Quality Standard; and the 2002 Periodic Emission Inventory, Appendix D, Attachment 13. New Jersey Department of Environmental Protection, May 2006.

[12] NJDEP. State Implementation Plan (SIP) Revision for the Attainment and Maintenance of the 1-Hour Ozone National Ambient Air Quality Standard. Update to Meeting the Requirements of the Alternative Ozone Attainment Demonstration Policy: Additional Emission Reductions, Reasonably Available Control Measure Analysis, and Mid-Course Review. Appendix III: Reasonably Available Control Measures Analysis. New Jersey Department of Environmental Protection, September 12, 2001.

7.4 Advancement of the Attainment Date

The 28 TCMs and Non-TCMs that passed all previously discussed (technological, economic, social, legal) RACM criteria were analyzed to determine whether or not they had the potential to advance the attainment date. As stated in Section 7.2, in order to advance the attainment date in each 8-hour ozone nonattainment area from 2010 to 2009, the measures would have to, alone or collectively, achieve reduction benefits by June 2008 instead of June 2009. Although the 8 measures that pass the previously discussed RACM criteria have a potential reduction benefit of 15.5 tpd for the Northern New Jersey/New York/Connecticut nonattainment area and 7.4 tpd for the Southern New Jersey/Philadelphia nonattainment area, the measures do not show these benefits by June 2008. Table 7.8 includes a summary of the estimated potential 2009 benefits of the measures for each nonattainment area.

Table 7.8: Summary of the Potential RACMs

		Estimated 2009 Benefits (VOC tpd + NO_x tpd Combined)	
New Jersey Identifier	**Measure Name**	**NNJ/NY/CT NAA**	**SNJ/Phila. NAA**
4	Adhesives and Sealants (Industrial)	6.1	2.9
26	Reformulation of Aerosol Coatings to CARB Tier 2 Standards	3.9	1.8
2	Consumer Products	0.9	0.4
DOT11	Adoption of Smart Growth Land Use Policies	1.1	0.6
DOT8	Truck idling restrictions	1.1	0.5
DOT17	IdleAire Installations	1.0	0.5
DOT22	Commercial Vehicle Information Systems and Networks (CVISN).	0.7	0.4
18	Degreasing Controls	0.7	0.3
Total Benefit		**15.5**	**7.4**

7.5 RACM Conclusion

The State has reviewed all of the potential control measures to determine if they could meet the RACM criteria discussed in Section 7.2. Several measures are available that can provide moderate levels of emission reductions, however, none of these measures can provide benefits by the 2008 ozone season. Therefore, none of the potential control measures can be considered to be RACM and it is unnecessary to include any of these measures in the State's attainment plan.

8.0 CONTINGENCY MEASURES

8.1 Background

The Clean Air Act (42 U.S.C. §§7502(c)(9) and 7511a(c)(9)) and the United States Environmental Protection Agency's (USEPA's) final Phase 2 8-hour ozone implementation rule[1] require that the State Implementation Plans (SIPs) for all 8-hour ozone nonattainment areas include contingency measures. Contingency measures are additional controls needed to further reduce emissions in the event an area fails to meet a Reasonable Further Progress (RFP)[2] milestone or fails to attain by its attainment date. These contingency measures must be fully adopted rules or measures that are ready for implementation quickly without further action by the State or the USEPA upon failure to meet a RFP milestone or reach attainment.

The USEPA has provided guidance over time that defines the requirements for identifying RFP and attainment demonstration contingency measures. Specifically:

- Contingency measures are required for each milestone year. For nonattainment areas with 2010 8-hour ozone attainment dates, the only applicable RFP milestone is 2008 (reductions obtained between 2002 and 2008). The 8-hour ozone attainment milestone is defined as 2009 (to achieve reductions by the June 2010 attainment goal).
- Contingency measures, combined, must provide for a 3 percent reduction in the adjusted 2002 base year volatile organic compound (VOC) emissions inventory for both RFP and attainment.[3,4]
- Post-1996 RFP and attainment demonstration contingency measures may reduce emissions of either VOC or oxides of nitrogen (NO_x). However, in meeting the 3 percent reduction requirement, a minimum of 0.3 percent VOC must be included.[5]

The remainder of this chapter:

- discusses the contingency targets (needed total emission reductions) for both RFP and attainment;
- proposes measures as contingency measures for RFP and attainment; respectively, and
- demonstrates that the reductions expected from the proposed contingency measures meet the required contingency targets.

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[1] 70 Fed. Reg. 71612 (November 29, 2005).

[2] In general, the USEPA uses the term Reasonable Further Progress (RFP) as the more generic progress requirement, whereas it uses the term rate of progress (ROP) to denote the specific Subpart 2 (ozone specific) progress requirements that are defined as specific percent reductions from a baseline emissions inventory. As discussed in greater detail in Chapter 6, New Jersey has already fulfilled its ROP requirements, and is only subject to the more generic requirements of RFP.

[3] NJDEP. State Implementation Plan (SIP) Revision for the Attainment and Maintenance of the Ozone National Ambient Air Quality Standards (NAAQS) – New Jersey 1996 Actual Emission Inventory and Rate of Progress (ROP) Plans for 2002, 2005, and 2007. New Jersey Department of Environmental Protection, March 31, 2001.

[4] 57 Fed. Reg. 13498 (April 16, 1992).

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

The measures proposed here as contingency measures are described in detail in Chapter 4. The calculation methodologies used to quantify these measures are included in Appendices D12, E, and G.

8.2 Contingency Measures for the 2008 RFP Demonstration

As discussed in Section 8.1, the USEPA requires that the contingency measures account for one year of RFP reductions, or 3 percent of the adjusted baseline VOC emissions inventory for the particular projection year.[6] Thus, the contingency measures for the 2008 RFP must total 3 percent of the 2002 adjusted base year VOC emissions inventory. The USEPA also allows for substitution of NO_x reductions for VOC reductions in the contingency measure plans on a percentage basis.[7] However, the USEPA requires that at least 0.3 percent of the total 3 percent reduction be VOC emission reductions.[8] Furthermore, the USEPA allows the use of emission reductions from the early implementation of strategies to be used for contingency measure reduction.[9] Table 8.1 shows the calculation of the necessary reductions for RFP in 2008 (RFP contingency targets), as well as the proposed contingency measures and their associated emission reductions, for both of the New Jersey portions of its multi-state 8-hour ozone nonattainment areas.

As discussed in Chapter 6, New Jersey and Federal control measures implemented between 2002 and 2008 are estimated to result in emission reductions that far exceed the RFP target of 15 percent (see Tables 6.15 and 6.16). As such, New Jersey will utilize some of this RFP "surplus" to satisfy its RFP contingency requirements. New Jersey is demonstrating its plan to meet the 3 percent reduction RFP contingency requirement set by the USEPA using only VOC emission reductions in 2008. This requirement was calculated in Tables 6.15 and 6.16 for both nonattainment areas. Thus, New Jersey would need to reduce 18.1 tpd of VOC in its portion of the Northern New Jersey/New York/Connecticut nonattainment area and 10.7 tpd of VOC in its portion of the Southern New Jersey/Philadelphia nonattainment area should New Jersey fail to meet RFP. Specifically, New Jersey calculated a portion of its benefits from regulations for Architectural and Industrial Maintenance (AIM) Coatings, Consumer Products (2005), and Portable Fuel Containers (PFCs) (existing and proposed) as the benefits needed to meet the RFP contingency targets, and is proposing to use only that portion of those programs as contingency measures for 2008 RFP. The calculation methodologies used to quantify these measures are included in Chapter 6.

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[6] 57 Fed. Reg. 13498 (April 16, 1992).
[7] USEPA. NO_x Substitution Guidance. United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, December 1993.
[8] USEPA Memorandum from Michael H. Shapiro to Region Air Directors, "Guidance on Issues Related to 15 percent Rate-of-Progress Plans," August 23, 1993.
[9] USEPA Memorandum from Gary T. Helms, Chief, Ozone/Carbon Monoxide Branch, "Early Implementation of Contingency Measures for Ozone and Carbon Monoxide (CO) Nonattainment Areas," August 13, 1993.

Table 8.1: Calculation of VOC and NO_x Reductions for Reasonable Further Progress Contingency Measures for 2008 (Ozone Season tons per day)

	2008	
	VOC (tpd)	
New Jersey Portion of NNJ/NY/CT NAA		
Contingency Requirement: 3 percent VOC	**18.1**	
Contingency Measure 1: Architectural Coatings 2005		
Estimated Reductions	15	
Reductions Allocated for Contingency		15
Contingency Measure 2: Consumer Products 2005		
Estimated Reductions	6.7	
Reductions Allocated for Contingency*		3.1
Total Reductions Allocated for Contingency		**18.1**
New Jersey Portion of SNJ/Phila. NAA		
Contingency Requirement: 3 percent VOC	**10.7**	
Contingency Measure 1: Architectural Coatings 2005		
Estimated Reductions	7	
Reductions Allocated for Contingency		7
Contingency Measure 2: Consumer Products 2005		
Estimated Reductions	3	
Reductions Allocated for Contingency		3
Contingency Measures 3 and 4: Portable Fuel Containers 2005 and anticipated 2009 amendments		
Estimated Reductions	1.3	
Reductions Allocated for Contingency*		0.7
Total Reductions Allocated for Contingency		**10.7**

* Only this portion of the reductions from the measure are proposed as the contingency measure.

8.3 Contingency Measures for the Attainment Demonstration

New Jersey must identify contingency measures to be implemented in the event that the State does not attain the 8-hour ozone standard by 2010, determined by the 2009 ozone season design values. As with the contingency measure requirements for RFP discussed in Section 8.2, the contingency measures for the attainment demonstration must provide reductions of either VOC or NO_x that total 3 percent of the 2002 adjusted base year VOC emissions inventory. A minimum of 0.3 percent VOC must be included. Table 8.2 shows the calculation of the necessary reductions for attainment on June 15, 2010 (attainment contingency targets), as well as the proposed contingency measures and their associated emission reductions, for both the New Jersey portions of its 8-hour multi-state nonattainment areas.

New Jersey will primarily rely on the control measures presented in the supporting analyses section in Chapter 5 (Section 5.4.5) to fulfill the contingency requirement should either of the nonattainment areas associated with New Jersey fail to demonstrate attainment by 2009. The State and federal measures identified are:

1) Diesel idling rule changes,
2) Diesel cutpoint rule changes,
3) Municipal Waste Combustor measures,
4) Petroleum storage tank measures,
5) Refinery measures,
6) USEPA's National Aerosol Coatings Rule, and
7) Onroad Motor Vehicle Control Programs (Fleet turnover 2010).

As discussed in Section 5.4.5, these measures are not included in the attainment demonstration or the RFP demonstration, but instead provide additional evidence to support New Jersey's assertion that the Southern New Jersey/Philadelphia and Northern New Jersey/New York/Connecticut nonattainment areas will come into attainment by June 15, 2010. The State is meeting the 3 percent reduction attainment contingency requirement set by the USEPA using a combination of VOC (0.5 percent) and NO_x (2.5 percent) emission reductions in 2009.[10] This requirement was calculated using the 2002 adjusted baseline inventory in Tables 6.15 and 6.16 for both nonattainment areas. Thus, the State would need to reduce 3.0 tpd of VOC and 17.8 tpd of NO_x in the New Jersey portion of the Northern New Jersey/New York/Connecticut nonattainment area and 1.8 tpd of VOC and 9.6 tpd of NO_x in the New Jersey portion of the Southern New Jersey/Philadelphia nonattainment area should the State fail to attain the NAAQS. As with the contingency measures proposed for RFP, the State calculated only the portion of the benefits from some of its quantifiable measures needed to meet the attainment contingency targets. The portions of those programs are proposed as the contingency measures for 2009 attainment, in addition to the total benefits from other programs. The calculation methodologies used to quantify the emission reductions for the first six measures are included in Appendix D12.

[10] The USEPA allows contingency measures to range between all VOC emission reductions (i.e., 3 percent) to 0.3 percent VOC and 2.7 percent NO_x emission reductions.

Onroad Motor Vehicle Control Programs (Fleet turnover 2010)

The turnover of the onroad fleet of cars and trucks will result in additional VOC and NO_x emission benefits in 2009 and beyond because the new vehicles have significantly lower emission standards than the vehicles they are replacing. The new vehicle emission standards are lower primarily because of a number of Federal rules such as the Tier 2 standards for automobiles and light trucks and the 2007 Heavy Duty Diesel standards for large diesel highway trucks. A number of post-2002 New Jersey rules also contribute to the fleet turnover emission benefits such as the New Jersey Low Emission Vehicle (NJLEV) new vehicle program. In order to estimate the emission benefits for fleet turnover between mid-2009 and mid-2010 it was necessary to make a number of simplifying assumptions because activity (vehicle miles traveled (VMT), speeds, etc.) data obtained from the Metropolitan Planning Organization's (MPOs') travel demand models were not available for 2010. The 2010 emissions were estimated by performing MOBILE6 runs for 2010 using 2009 activity levels. The results from these runs were adjusted for VMT growth by assuming that the VMT growth rate between 2009 and 2010 was the same as the VMT growth rate between 2008 and 2009. The emission benefits for fleet turnover were calculated as the difference between the 2009 emissions and the 2010 emissions based on the estimated 2010 VMT. Calculation details and the MOBILE6 runs are provided in Appendix G.

Table 8.2: Calculation of VOC and NO_x Reductions for Attainment Contingency for 2009 (Ozone Season tons per day)

	2009			
	VOC (tpd)		NO_x (tpd)	
New Jersey Portion of NNJ/NY/CT NAA				
Contingency Requirement: 0.5 percent VOC, 2.5 percent NO_x	**3.0**		**17.8**	
Contingency Measure 1: Diesel Idling				
Estimated Reductions			3	
Reductions Allocated for Contingency				3
Contingency Measure 2: Diesel Inspection and Maintenance				
Estimated Reductions	0.3		0.1	
Reductions Allocated for Contingency*		0		0.1
Contingency Measure 3: Municipal Waste Combustor Measures				
Estimated Reductions			0.1	
Reductions Allocated for Contingency				0.1
Contingency Measure 4: Petroleum Storage Tank Measures				
Estimated Reductions	5.5			
Reductions Allocated for Contingency*		3.0		
Contingency Measure 5: Refinery Rules				
Estimated Reductions	0.02		2.1	
Reductions Allocated for Contingency*		0		2.1
Contingency Measure 6: National Aerosol Coatings Rule				
Estimated Reductions	0.8			
Reductions Allocated for Contingency**		0		
Contingency Measure 7: Fleet Turnover (2010)				
Estimated Reductions	6.2		14.2	
Reductions Allocated for Contingency*		0		12.5
Total Reductions Allocated for Contingency		**3.0**		**17.8**

	2009			
	VOC (tpd)		NO_x (tpd)	
New Jersey Portion of SNJ/Phila. NAA				
Contingency Requirement: **0.5 percent VOC, 2.5 percent NO_x**	**1.8**		**9.6**	
Contingency Measure 1: Diesel Idling				
Estimated Reductions			3	
Reductions Allocated for Contingency				3
Contingency Measure 2: Diesel Inspection and Maintenance				
Estimated Reductions	0.3		0.1	
Reductions Allocated for Contingency		0.3		0.1
Contingency Measure 3: Municipal Waste Combustor Measures				
Estimated Reductions			0.1	
Reductions Allocated for Contingency				0.1
Contingency Measure 4: Petroleum Storage Tank Measures				
Estimated Reductions	0.5			
Reductions Allocated for Contingency		0.5		
Contingency Measure 5: Refinery Rules				
Estimated Reductions	0.01		1.6	
Reductions Allocated for Contingency		0.01		1.6
Contingency Measure 6: National Aerosol Coatings Rule				
Estimated Reductions	0.4			
Reductions Allocated for Contingency**		0.4		
Contingency Measure 7: Fleet Turnover (2010)				
Estimated Reductions	3.3		11.1	
Reductions Allocated for Contingency*		0.59		4.8
Total Reductions Allocated for Contingency		**1.8**		**9.6**

* Only this portion of the reductions from the measure are proposed as the contingency measure.
** USEPA Memorandum from Stephan D. Page, Director, Office of Air Quality Planning and Standards, to Region Air Division Directors, “Emission Reduction Credit for Three Federal Rules

for Categories of Consumer and Commercial Products under Section 183(e) of the Clean Air Act," May 30, 2007.

New Jersey is achieving its 3 percent reduction requirement from the 2002 emissions baseline in the Northern New Jersey/New York/Connecticut and Southern New Jersey/Philadelphia nonattainment areas with the combination of VOC and NO_x benefits calculated in Table 8.2. As discussed in Section 8.3, the implementation schedule of contingency measures if the USEPA makes a finding of failure to attain the 8-hour NAAQS is one year. Thus, New Jersey does not anticipate that any contingency reductions would be needed until mid-2011. The measures in Table 8.2 will achieve even greater emission reductions than demonstrated in Table 8.2 by mid-2011.

There are several other future control measures that were not included in either the 2009 or 2012 BOTW modeling exercises that will provide additional air quality benefits. These include developing performance standards that provide additional emission reductions for Electric Generating Units, a rulemaking on autobody refinishing surface coatings, and a High Electrical Demand Day program. As discussed in Chapter 4, the regional High Electrical Demand Day program will address peak load emissions from the electrical generation sector on a seasonal basis on days when the demand for electricity is high. Therefore, the High Electrical Demand Day program provides reductions only on the days that are categorized with a high electrical demand and not daily. The High Electrical Demand Day measure is expected to provide significant emission reductions on the days they are most needed. Additionally, the USEPA has indicated that states can claim the benefits from its newly proposed Nonroad Engine rule[11] for contingency.[12] However, the USEPA has not released official guidance on the credit that states can claim for this proposed rulemaking. Finally, there are several measures included in the regional 2012 BOTW modeling (see Section 5.4.6) that provide further evidence of the State's continued commitment to reducing harmful emissions. The 2012 model results show that New Jersey, as well as the rest of the Ozone Transport Region, is continuing to improve air quality well beyond 2010. Additional measures from this modeling include additional controls for asphalt production and glass furnaces. These future actions will provide continued reductions toward attaining the current and future revisions to the 8-hour ozone NAAQS (see Chapter 12), and added public health and environmental protection to address adverse impacts of ozone below the current NAAQS.

8.3 Contingency Measure Implementation Schedule

Contingency reductions must occur on a timetable that is directly related to the RFP SIP schedule. States have no more than one year after notification by the USEPA of an RFP or attainment failure to achieve the contingency plan reductions. By following the USEPA's guidance that encourages early implementation of contingency measures and relying on measures already implemented or under development, New Jersey is ensuring

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[11] 72 Fed. Reg. 28098 (May 18, 2007).
[12] Personal email communication from Paul Truchan, USEPA Region 2 to Christine Schell, NJDEP, May 16, 2007.

that any contingency measures will not need to be backfilled, and is safeguarding itself against failure to meet the RFP milestone or attainment.

8.4 Conclusions

New Jersey demonstrates that it can meet its contingency requirements for both RFP and attainment, with two caveats:

- The emission benefits estimated for New Jersey's rule proposals (expected by no later than November 2007, with adoption by May 2008) may change in response to comment, in accordance with the New Jersey Administrative Procedures Act (APA) (N.J.S.A. 52:14B-1 et. seq.) and the Air Pollution Control Act (APCA) (N.J.S.A. 26:2C-1 et. seq.); and
- The USEPA must finalize its national rules and guidance to enable areas to claim credit for those rules, which the USEPA indicates is allowable.

9.0 TRANSPORT SECTION 110

9.1 Background

42 U.S.C. § 7410(a)(2)(D)(i) (CAA 110(a)(2)(D)(i)) (hereafter referred to as Section 110 (a)(2)(D)(i) and commonly referred to as the transport State Implementation Plan (SIP) requirement) requires that each state's SIP contain adequate provisions prohibiting any source, or other type of emissions activity, within the State from emitting any air pollutants in amounts that will:

1) Contribute significantly to nonattainment of the National Ambient Air Quality Standards (NAAQS) for areas in another state or interfere with the maintenance of the NAAQS by another state;
2) Interfere with measures required to meet the implementation plan for any other state related to Prevention of Significant Deterioration (PSD); or,
3) Interfere with measures required to meet the implementation plan for any other state related to Regional Haze and Visibility.

On April 25, 2005, the United States Environmental Protection Agency (USEPA) issued a finding[1] that all 50 states failed to submit SIPs to satisfy the requirements of Section 110 (a)(2)(D)(i). On August 11, 2006, the USEPA issued guidance[2] (hereafter referred to as the USEPA's transport guidance) on what states should submit in order to comply with Section 110 (a)(2)(D)(i). On December 22, 2006, the NJDEP sent the USEPA a letter outlining how New Jersey planned to address the requirements outlined in that guidance.[3] The remainder of this chapter reiterates that plan as it pertains to the 8-hour ozone NAAQS, and provides updates on the State's progress in addressing interstate transport of 8-hour ozone-related emissions.

9.2 Significant Contribution to Nonattainment, or Interference with Maintenance, of a NAAQS in Another State

The USEPA's analysis in support of the Clean Air Interstate Rule (CAIR)[4] shows that New Jersey significantly contributes to ozone nonattainment in the following states:

- Connecticut;
- New York;
- Pennsylvania; and,
- Rhode Island.

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[1] 70 Fed. Reg., 21147-21151, (April 25, 2005).
[2] USEPA. Guidance for State Plan Submission to Meet Current Outstanding Obligations Under Section 110(a)(2)(D)(i) for the 8-Hour Ozone and $PM_{2.5}$ National Ambient Air Quality Standards. United States Environmental Protection Agency, August 11, 2006.
[3] Letter from NJDEP Commissioner Lisa P. Jackson to USEPA Regional Administrator Steinberg dated December 22, 2006. The letter is posted on the NJDEP's website at http://www.state.nj.us/dep/baqp/sip/siprevs.htm.
[4] USEPA. Technical Support Document for the Final Clean Air Interstate Rule Air Quality Modeling, Air Quality Modeling Analyses -Appendix G, 8-Hour Contributions to Each Nonattainment County in 2010. United States Environmental Protection Agency Office of Air Quality Planning and Standards, Research Triangle Park, NC, March 2005.

The USEPA's transport guidance allows states that are subject to requirements of the CAIR to satisfy the requirements of Section 110 (a)(2)(D)(i) through submittal of a CAIR SIP or reliance of the CAIR Federal Implementation Plan (FIP).

New Jersey proposed an abbreviated CAIR SIP on February 5, 2007, that complies with CAIR requirements. As part of this proposal, New Jersey stated that the CAIR proposal also served to partially address the transport requirement, and took that action through the public process. Based on the USEPA's guidance, this action by New Jersey satisfies the first of the requirements of Section 110 (a)(2)(D)(i). However, New Jersey remains concerned that the implementation of CAIR alone will not be sufficient to address interstate transport issues, especially for the Northeastern and Mid-Atlantic United States. According to 2010 CAIR modeling, between 26 and 82 percent (depending on the county in question) of New Jersey's 8-hour ozone is attributed to transported emissions. In addition, CAIR focuses solely on Electric Generating Units (EGUs), and does not address interstate transport of emissions from other sectors (non-EGU, mobile, area).

In light of these concerns, New Jersey intends to implement additional strategies to address the transport of ozone precursor emissions both to and from New Jersey. As part of a regional effort, New Jersey commits to:

- Continue to meet its obligations under the NO_x SIP Call, while working to implement an allocation mechanism that encourage energy efficiency for New Jersey sources in the federal CAIR program;
- Develop multi-pollutant (oxides of nitrogen (NO_x), sulfur dioxide (SO_2) and particulate matter (PM)) performance standards providing additional emission reductions for Electric Generating Units;
- Update its Reasonably Available Control Technology (RACT) rules to address both 8-hour ozone and fine particulate matter ($PM_{2.5}$) precursors;
- Review the USEPA's revised and new Control Technique Guidelines (CTGs), as they are released, and update State rules where New Jersey has affected sources;
- Continue to implement the Low Emission Vehicle (LEV) program;
- Develop rules and/or other measures to address emissions on High Electrical Demand Days (HEDD); and,
- Propose additional requirements for consumer product formulations and portable fuel containers

All actions which New Jersey determines are necessary to attain and maintain the NAAQS in New Jersey, and to maintain the NAAQS in neighboring states, will be proposed and included as part of New Jersey's SIP. In accordance with the New Jersey Administrative Procedures Act (APA) (N.J.S.A. 52:14B-1 et. seq.) and the Air Pollution Control Act (APCA) (N.J.S.A. 26:2C-1 et. seq.), this proposal will be taken through public process at that time and New Jersey commits to propose the measures by no later than November 2007 and adopt by May 2008.

The USEPA's analysis in support of the CAIR further indicates that the following states significantly contribute to ozone nonattainment in New Jersey or in one of its associated multi-state nonattainment areas:

- Connecticut;
- Delaware;
- Maryland;
- Michigan;
- North Carolina;
- New York;
- Ohio;
- Pennsylvania;
- Virginia; and,
- West Virginia.

The emission reductions from large stationary sources through the NO_x SIP Call demonstrate significant progress in reducing the transport of ozone and its precursors in the eastern United States. The demonstration of attainment in Chapter 5 relies on the implementation of additional control measures by upwind states. These measures include new or additional regulations on adhesives and sealants, asphalt paving, asphalt production, cement kilns, consumer products, glass furnaces, Industrial/Commercial/Institutional (ICI) boilers, and portable fuel containers. Because New Jersey has demonstrated that it needs the emissions reductions from these other states in order to meet its attainment obligations, the State requests (see Section 13.3.2) that the USEPA, in reviewing the attainment demonstrations and all other SIP revisions from other states, take into consideration the other states' impact on New Jersey's attainment obligations, and insure that other states are doing what is needed for New Jersey's associated multi-state nonattainment areas to reach attainment as soon as practicable.

9.3 Prevention of Significant Deterioration/Nonattainment New Source Review (PSD/NNSR) Requirement

The USEPA's transport guidance requires states to confirm that major sources currently subject to PSD and NNSR permitting programs also apply to the 8-hour ozone standard. Since the entire State of New Jersey was designated as nonattainment for the 1-hour ozone NAAQS, New Jersey already has a NNSR permitting program addressing the ozone precursors (VOC and NO_x). Since the entire State continues to be in nonattainment for the 8-hour ozone NAAQS, the existing ozone NNSR program remains in effect and applies to the 8-hour ozone NAAQS for major stationary sources. Changes to New Jersey's NNSR rules are not necessary for ozone. New Jersey intends to retain the more stringent NNSR requirements developed for 1-hour ozone nonattainment. This will avoid backsliding and continue air quality improvement from NNSR.

On December 29, 2005, the NJDEP submitted an equivalency determination documenting the current New Jersey NNSR program is at least as stringent than the Federal program, including lower applicability levels and higher offset rates than the federal rules. These more stringent requirements are part of New Jersey's effort to reduce transported air pollution.

9.4 The Visibility Requirement

The ozone precursors, particularly NO_x, also contribute to the formation of fine particulate matter, the main component of regional haze. Therefore, the 8-hour ozone SIP impacts the visibility requirements of Section 110(a)(2)(D)(i). However, the USEPA's guidance relieves New Jersey of this Section 110(a)(2)(D)(i) requirement regarding visibility until such time as that New Jersey submits it Regional Haze SIP, due to the USEPA in December of 2007. New Jersey, in the context of setting the 2018 Reasonable Progress goal through a consultative process, will assess whether there is any interference by impacting states with measures in the implementation plan to prevent significant deterioration of air quality or to protect visibility at the Brigantine Wilderness Area in the Edwin B. Forsythe National Wildlife Refuge. As with all of New Jersey's SIP proposals, a public comment period on the Regional Haze SIP, including the Section 110(a)(2)(D) requirement portion, will allow interested parties to provide comment on the actions presented in the proposal.

9.5 Conclusion

Addressing transported emissions, both to and from the State, is critical for New Jersey's multistate nonattainment areas to attain and maintain the health-based ambient air quality standards. New Jersey is complying with the USEPA's guidance regarding interstate transport as it relates to the 8-hour ozone NAAQS and is doing more to insure that it is not inferring with the ability of its neighboring states to attain and maintain that standard. While many of New Jersey's existing requirement are already more stringent than the existing pollution control requirements in the neighboring upwind states, New Jersey further commits to consider any additional measures, beyond those already in place, implemented by the neighboring upwind states, if they are more stringent than our current actions. New Jersey also encourages the USEPA to take action where states are preempted from action. New Jersey relies on the USEPA to ensure sufficient progress in securing upwind emission reductions to provide for expeditious attainment of the 8-hour ozone NAAQS.

10.0 CONFORMITY

The Clean Air Act[1] requires that federal actions conform to a State's State Implementation Plan (SIP). Specifically the act requires the action/activity will not:

- Cause or contribute to any new violation of any standard in any area;
- Increase the frequency or severity of any existing violation of any standard in any area; or,
- Delay timely attainment of any standard or any required interim emission reductions or any other milestones in any area.

To implement this requirement the Clean Air Act directed the United States Environmental Protection Agency (USEPA) to issue rules that governed how conformity determinations would be conducted for two categories of actions/activities; a) those dealing with transportation plans, programs and projects (Transportation Conformity), and b) all other actions, e.g., projects requiring federal permits. This latter category is referred to as General Conformity.

10.1 Transportation Conformity

The Federal Transportation Conformity Rule (40 C.F.R. 93.100-160) provides the process by which the air quality impact of transportation plans, transportation improvement programs, and projects are analyzed. The agency preparing plans (twenty or more years), transportation improvement programs (at least four years), or approving a transportation project must analyze the emissions expected from such a proposal in accordance with the Transportation Conformity Rule.[2]

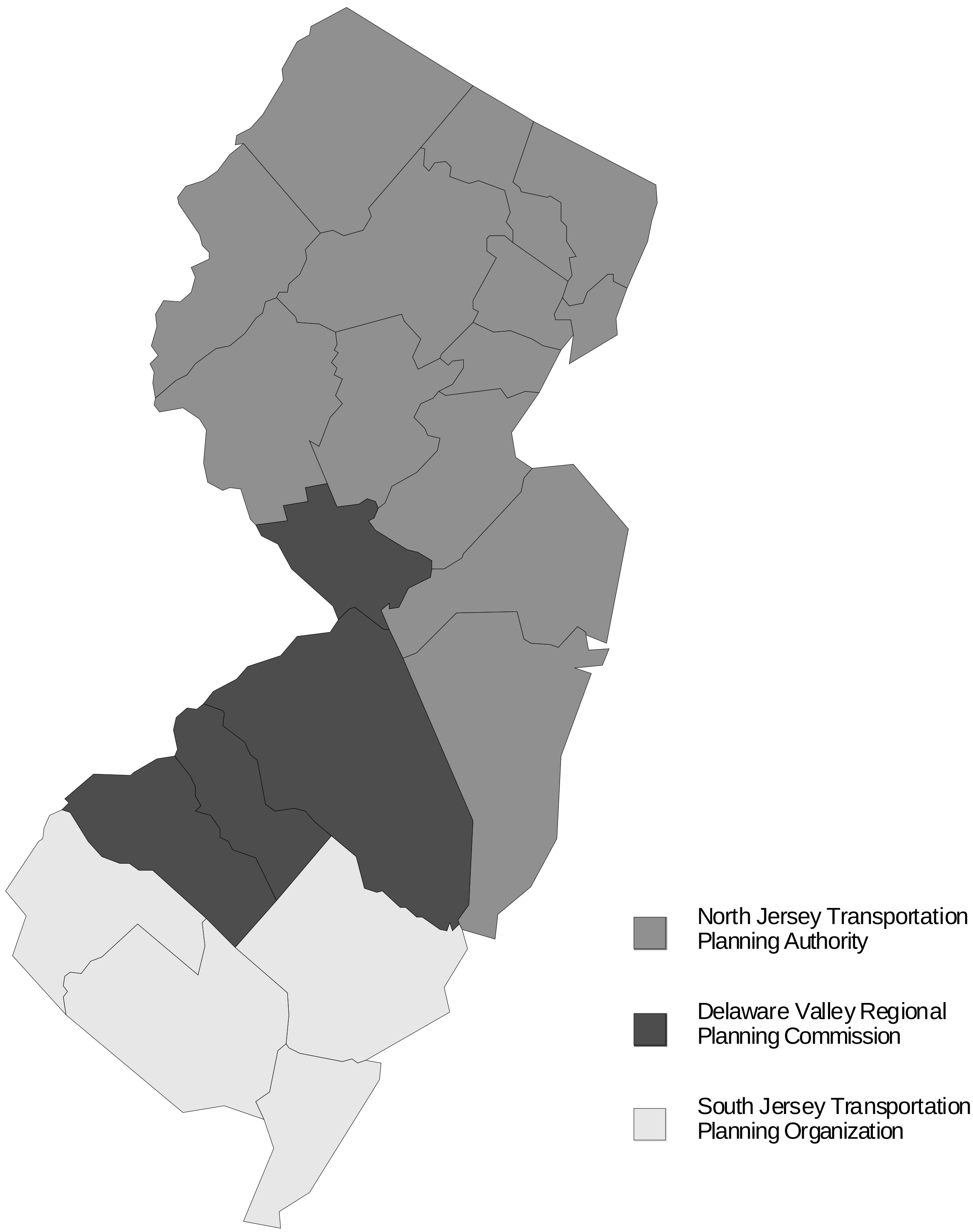
For the purposes of transportation conformity, the emission budget is essentially a cap on the total emissions allocated to onroad vehicles. The projected emissions from a transportation plan, transportation improvement program, or project, estimated in accordance with the Transportation Conformity Rule, may not exceed the motor vehicle emissions budget or cap contained in the appropriate SIP. Emissions in years for which no motor vehicle emissions budgets are specifically established must be less than or equal to the motor vehicle emissions budget established for the most recent prior year.

According to the USEPA's Phase 2 Implementation Rule,[3] 8-hour ozone transportation conformity budgets must be established for the RFP emission reduction milestone year of 2008 and the 8-hour ozone attainment period of 2010 (2009 ozone season). This section proposes 8-hour ozone transportation conformity emission budgets for the RFP year (2008) and the attainment year (2009) for each Metropolitan Planning Organization

[1] 42 U.S.C. §7506
[2] For New Jersey such plans are prepared by three Metropolitan Planning Organizations (North Jersey Transportation Planning Authority, South Jersey Transportation Planning Organization and Delaware Valley Regional Planning Commission).
[3] ibid.

(MPO) in New Jersey. As shown in Figure 10.1, New Jersey's twenty-one counties fall into one of three Metropolitan Planning Organizations.

<u>Figure 10.1</u>: Metropolitan Planning Organizations in New Jersey



Each Metropolitan Planning Organization is responsible for the transportation plans and transportation improvement programs for its designated area, and they each work in consultation with the United States Department of Transportation (USDOT), USEPA, New Jersey Department of Transportation (NJDOT), and New Jersey Department of Environmental Protection (NJDEP) to meet established transportation emission budgets for their area. The transportation conformity budgets are established for the entire Metropolitan Planning Organization area, which does not coincide with the nonattainment areas. For example, the North Jersey Transportation Planning Authority (NJTPA) Metropolitan Planning Organization includes the 13 northernmost counties in New Jersey; however, the Northern New Jersey/New York/Connecticut nonattainment area includes only 12 of these counties (Ocean county is part of the Southern New Jersey/Philadelphia nonattainment area). Budgets for a nonattainment area were calculated by adding the onroad emissions from individual counties.

New Jersey has two 8-hour ozone nonattainment areas, i.e., the Northern New Jersey/New York/Connecticut nonattainment area and the Southern New Jersey/Philadelphia nonattainment area. These two areas are each classified as “moderate” based on the severity of their ozone problem. Areas classified as moderate must demonstrate attainment by June 15, 2010 or the 2009 ozone season.

The control measures assumed in the development of the transportation conformity budgets are those used to estimate highway onroad emissions as described in Chapter 4. In addition, the State included updated data on vehicle age distributions and fractions of vehicle miles traveled by vehicle type in New Jersey into its MOBILE6 modeling runs for 2008, and 2009. The approach used to calculate the budgets is the same as that used to calculate the RFP emission inventories as described in detail in Appendix E Section 5.0. The onroad source emission projections are presented by Metropolitan Planning Organization in Table 10.1. These emission projections are being established as the proposed 8-hour ozone transportation conformity budgets.

Table 10.1: 8-Hour Ozone Transportation Conformity Budgets by Metropolitan Planning Organization

Transportation Planning Area	VOC Emissions (tons per day)		NO_x Emissions (tons per day)	
	2008	2009	2008	2009
North Jersey Transportation Planning Authority - 12 Counties Excluding Ocean County	85.24	79.00	146.63	133.39
North Jersey Transportation Planning Authority - Ocean County	6.91	6.45	13.61	12.65
South Jersey Transportation Planning Organization	14.14	13.04	32.93	29.64
Delaware Valley Regional Planning Commission	27.75	25.98	69.67	63.66

10.2 General Conformity

A. General Conformity - McGuire Air Force Base (McGuire AFB) and Lakehurst (Lakehurst NAS)

The purpose of this section is to establish emission budgets for McGuire AFB and Lakehurst NAS for oxides of nitrogen (NO_x) and volatile organic compounds (VOC) under the 8-hour ozone standard. Emission budgets are in effect for McGuire AFB for these pollutants under the 1-hour ozone standard.[4, 5] McGuire's 1-hour ozone budgets were established in order to address increased activity at the base as a result of the 1995 Base Realignment and Closure Act. Budgets were established for 1990, 1996, 1999 and were extended to 2002 and 2005. These budgets were established in consultation with the United States Air Force.

In 2005, Congress passed the 2005 Base Realignment and Closure Act Commission recommendations. These recommendations are expected to increase activity at McGuire AFB and Lakehurst NAS. In order to address the expected increases, the United States Air Force requested an extension of the 2005 General Conformity budget for 2008, 2009, 2010 and 2011. The Navy, which has no existing budget, requested a General

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

[5] NJDEP. State Implementation Plan Revision for the Attainment and Maintenance of the Ozone National Ambient Air Quality Standards, Phase Ozone SIP Submittal. New Jersey Department of Environmental Protection, 1996, p.123.

Conformity budget for 2008, 2009, 2010 and 2011. These proposed budgets were established in consultation with the United States Air Force and the Navy. These proposed budgets were established pursuant to 40 C.F.R. 93.158 of the General Conformity regulation. These proposed budgets would provide McGuire AFB and Lakehurst NAS the operational flexibility necessary to meet their missions and future missions of the Department of Defense and allow them to meet the requirements of the General Conformity regulation.

The proposed General Conformity budgets for McGuire and Lakehurst are provided below in Table 10.2.

Table 10.2: Emission Budgets for McGuire AFB and Lakehurst NAS

Base	**Year**	**VOC (Tons/Year)**	**NOx (Tons/Year)**
McGuire AFB			
	1990 Historic Baseline	1,112	1,038
	1996	1,186	1,107
	1999	1,223	1,142
	2002	1,405	1,142
	2005	730	1,534
	2008	730	1,534
	2009	730	1,534
	2010	730	1,534
	2011	730	1,534
Lakehurst NAS	2008	109	563
	2009	115	639
	2010	122	716
	2011	129	793

11.0 ADDRESSING 1-HOUR OZONE IN NEW JERSEY

New Jersey was part of four multi-state nonattainment areas for the 1-hour ozone National Ambient Air Quality Standard (NAAQS): Allentown-Bethlehem-Easton, PA-NJ, Atlantic City, Philadelphia-Wilmington-Trenton, PA-NJ-DE-MD, and New York-Northern New Jersey-Long Island, NY-NJ-CT nonattainment areas. The first three areas had attainment dates in 2005 or earlier. All three of these areas have ambient air quality levels that meet the 1-hour ozone NAAQS. New Jersey requests the USEPA find the area are meeting the 1-hour ozone NAAQS. Further New Jersey submits that this proposed State Implementation Plan (SIP) Revision (the proposed 2007 8-hour ozone attainment demonstration) serve as the 1-hour ozone maintenance plan for the three 1-hour ozone nonattainment areas. New Jersey's fourth 1-hour nonattainment area, the New York nonattainment area, has an attainment date of November 15, 2007. New Jersey is not requesting any action on this area at this time. Through 2006, the ambient air quality in this area does not meet the NAAQS.

11.1 Background

The entire State of New Jersey was divided into four nonattainment areas for the 1-hour ozone NAAQS.[1] Specifically:

- Warren County was associated with the Allentown-Bethlehem-Easton, PA-NJ nonattainment area, required to attain the standard by November 15, 1993;
- Atlantic and Cape May counties were associated with the Atlantic City nonattainment area, required to attain the standard by November 15, 1996;
- Southern New Jersey counties of Burlington, Camden, Cumberland, Gloucester, Mercer and Salem were associated with the Philadelphia-Wilmington-Trenton, PA-NJ-DE-MD nonattainment area (otherwise known as the Philadelphia nonattainment area), required to attain the standard by November 15, 2005; and
- Northern New Jersey counties of Bergen, Essex, Hudson, Hunterdon, Middlesex, Morris, Monmouth, Ocean, Passaic, Somerset, Sussex, and Union were associated with the New York-Northern New Jersey-Long Island, NY-NJ-CT nonattainment area (otherwise known as the New York City nonattainment area), required to attain the standard by November 15, 2007.

According to the USEPA, "[t]he standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 parts per million (235 $\mu g/m^3$) is equal to or less than 1."[2] Specifically, the number of exceedances at a monitoring site in one calendar year is averaged over three calendar years to determine if the average is equal to or less than one.[3] According to guidance issued by the USEPA, the average number of exceedances at a monitor over a three-year period is determined by the fourth highest hourly ozone concentration at a monitor during that three-year period, which is referred to as the design

[1] Nonattainment areas for 1-hour ozone and 8-hour ozone are different. See Chapter 1.
[2] 40 C.F.R. 50.9(a)
[3] 40 C.F.R. 50.9, Appendix H

value of that monitor.[4] The design value for a nonattainment area is the maximum monitor design value for all monitors for each three-year period.

The USEPA revoked the 1-hour ozone standard for all areas except the 8-hour ozone nonattainment Early Action Compact Areas (EAC) areas (which did not include any New Jersey-associated nonattainment areas) on June 15, 2005.[5] This revocation occurred prior to the attainment dates for the two severe 1-hour ozone nonattainment areas associated with Philadelphia (2005) and New York City (2007).

On December 22, 2006, the U.S. Court of Appeals for the D.C. Circuit Court ("Court") ruled that the USEPA "failed to heed the restrictions" in the Clean Air Act when it promulgated its Phase 1 8-Hour Ozone Implementation Rule. The Court decision remanded the matter back to the USEPA for further proceedings. As part of this ruling, the Court upheld the USEPA's solution for classifying 8-hour ozone Subpart 2 areas. However, the Court ruled that the USEPA had: 1) overstepped its authority in determining which areas were regulated under Subpart 1 of the Clean Air Act as opposed to Subpart 2; and 2) the USEPA inappropriately limited the scope of its interpretation of Section 172(e) of the Clean Air Act by concluding that certain control measures (i.e., New Source Review (NSR)) could be removed from a SIP without constituting backsliding. On March 22, 2007, the USEPA asked for a rehearing of the federal appeals court ruling, stating that the Court wrongfully limited the USEPA's discretion in determining how the rule should be implemented. On June 8, 2007 the Court reaffirmed its Subpart 2 ruling including its finding that the USEPA retrained the authority to revoke the 1-hour standard subject to antibacksliding limitations.

The decision does not significantly impact the New Jersey-associated 8-hour ozone nonattainment areas. This is because those areas were already classified under Subpart 2 (which was upheld by the Court), and many states in those areas (including New Jersey), given the severity of their ozone problems, did not relax any of their previously implemented control measures, as had been inappropriately allowed under the USEPA Phase 1 8-hour ozone rule. Considering that New Jersey would be subject to the antibacksliding provisions of the Clean Air Act, New Jersey requests that the USEPA take action to find that the Allentown-Bethlehem-Easton PA-NJ, Atlantic City, and Philadelphia 1-hour ozone nonattainment areas are currently meeting that standard. The remainder of this chapter outlines New Jersey's 1-hour nonattainment areas, and presents air quality data demonstrating that those nonattainment areas are currently meeting the 1-hour ozone standard.

11.2 Allentown-Bethlehem-Easton, Pennsylvania-New Jersey Nonattainment Area

The Allentown-Bethlehem-Easton, PA-NJ nonattainment area was originally classified as 'marginal' and was required to attain the 1-hour ozone standard on November 15, 1993.[6] The

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[4] USEPA Memorandum from William G. Laxton to Region Air Directors, "Ozone and Carbon Monoxide Design Value Calculations," United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, June 18, 1990.
[5] 40 C.F.R. 81, Subpart C
[6] 42 U.S.C. §7511(a)(1) - Table 1.

area attained the 1-hour ozone NAAQS in 1994, but no action was taken to have the area officially redesignated to attainment.

There are currently three ozone monitors operating in the Allentown-Bethlehem-Easton, PA-NJ nonattainment area (all located in the Pennsylvania portion of the nonattainment area). A total of six ozone monitors have been in operation at one time or another within the nonattainment area, although none have operated continuously since monitoring began in the late 1970s. The longest continuously operating monitor in the nonattainment area is the Allentown monitor (42-077-0004), which has operated since 1984. Table 11.1 demonstrates that the Allentown-Bethlehem-Easton PA-NJ nonattainment area continues to meet the 1-hour ozone standard. A violation of the 1-hour standard occurred in the 1999-2001 3-year period in which there were 4 exceedances of the 1-hour standard. No further violations are expected due to the implementation of additional control measures to reduce 8-hour ozone concentrations. New Jersey affirms its position that this 1-hour ozone nonattainment area is meeting the 1-hour ozone standard. New Jersey requests that the USEPA take action to find that the Allentown-Bethlehem-Easton, PA-NJ nonattainment area is meeting the 1-hour ozone standard, and should no longer be subject to any requirements, outside of requisite anti-backsliding measures, for the 1-hour ozone standard.

Table 11.1: 1-Hour Ozone Design Values (parts per million) for the Allentown-Bethlehem-Easton, PA-NJ Nonattainment Area

State	County	Location	1996-1998 DV (ppm)	2004-2006 DV (ppm)
PA	Lehigh	State Hospital	0.114	0.101
	Northampton	Washington and Cambria Sts.	N/A	0.102
	Northampton	17th and Spring Garden Streets	N/A	0.099
	Northampton	Coal St & Milton St.	0.111	N/A
	Northampton	East Market & Wood Sts.	N/A	N/A

11.3 Atlantic City Nonattainment Area

The Atlantic City nonattainment area (Atlantic and Cape May counties) was originally classified as 'moderate' and was required to attain the 1-hour ozone standard on November 15, 1996.[7] New Jersey contended, and the USEPA concurred, that the exceedances in the Atlantic City nonattainment area were the result of overwhelming transport from neighboring metropolitan areas, which deferred the time frame for a complete attainment demonstration. Subsequently, the area met the ozone standards in 1993, 1994, and 1995. On August 27, 1996, the USEPA indicated by letter from USEPA Regional Administrator, Jeanne M. Fox, that the area did not require a 15 percent volatile organic compound (VOC) reduction plan or an attainment demonstration.

[7] 42 U.S.C. §7511(a)(1) - Table 1.

As with the Allentown-Bethlehem-Easton, PA-NJ nonattainment area, the USEPA, on June 5, 1998, found that the entire Atlantic City nonattainment area was attaining the 1-hour ozone standard and that, therefore, the 1-hour ozone standard was no longer applicable to the counties in that area.[8]

The 1-hour ozone design values in the 1-hour ozone Atlantic City nonattainment area have declined approximately 31 percent from 1988 to 2006. There have been no monitored exceedances of the 1-hour ozone standard for the Atlantic City nonattainment area since 2003. Table 11.2 demonstrates that the Atlantic City nonattainment area continues to meet the 1-hour ozone standard. No violations of the 1-hour ozone standard have occurred in the Atlantic City nonattainment area since the USEPA's finding in 1998 that the area had attained that standard. New Jersey affirms that this 1-hour ozone nonattainment area is meeting the 1-hour ozone standard. New Jersey requests that the USEPA take action to find that the Atlantic City nonattainment area is meeting the 1-hour ozone standard, and should no longer be subject to any requirements, outside of requisite anti-backsliding measures, for the 1-hour ozone standard.

Table 11.2: 1-Hour Ozone Design Values (parts per million) for the Atlantic City Nonattainment Area

State	Location	1996-1998 DV (ppm)	2004-2006 DV (ppm)
NJ	Nacote Creek Research Station (Atlantic County)	0.124	0.099

11.4 Philadelphia Nonattainment Area

The Philadelphia nonattainment area was originally classified as 'severe' and was required to attain the 1-hour ozone standard by November 15, 2005.[9]

As shown by Table 11.3, monitoring data demonstrates that the 1-hour ozone Philadelphia nonattainment area is meeting the standard and came into attainment by its required attainment date. In the 1-hour ozone Philadelphia nonattainment area, all the 2003-2005 design values fall below 0.124 ppm (0.120 ppm standard allowed for rounding to 0.125 ppm), thereby demonstrating attainment of the standard by 2005. Table 11.3 also demonstrates that the Philadelphia nonattainment area continued to meet the 1-hour ozone standard through the 2006 ozone season. New Jersey affirms that this 1-hour ozone nonattainment area is meeting the 1-hour ozone standard. New Jersey requests that the USEPA take action to find that the Philadelphia nonattainment area is meeting the 1-hour ozone standard, and should no longer be subject to any requirements, outside of requisite anti-backsliding measures, for the 1-hour ozone standard.

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[8] 63 Fed. Reg. 31014 (June 5, 1998).
[9] 42 U.S.C. §7511(a)(1) - Table 1.

<u>Table 11.3</u>: 2005 and 2006 1-Hour Ozone Design Values (parts per million) for the Philadelphia Nonattainment Area

State	County	Location	2003-2005 DV (ppm)	2004-2006 DV (ppm)
NJ	Camden	Ancora S.H.	0.114	0.114
	Camden	Camden Lab	0.114	0.108
	Cumberland	Millville	0.113	0.111
	Gloucester	Clarksboro	0.117	0.113
	Mercer	Rider Univ.	0.110	0.110
PA	Bucks	Bristol	0.121	0.112
	Chester	New Garden Airport	0.113	0.109
	Delaware	Chester	0.118	0.109
	Montgomery	Norristown	0.107	0.104
	Philadelphia	AMS Lab	0.095	0.080
	Philadelphia	Roxy Water Pump Station	0.108	0.101
	Philadelphia	N.E. Airport	0.110	0.110
	Philadelphia	Amtrak	0.090	0.093
DE	Kent	384 State Road	0.107	0.101
	New Castle	Lums Pond St. Pk.	0.115	0.108
	New Castle	Brandywine Creek St. Pk.	0.109	0.105
	New Castle	Bellevue St. Pk.	0.109	0.101
MD	Cecil	Rte. 273	0.120	0.114

11.5 New York Nonattainment Area

The New York nonattainment area was originally classified as 'severe' and was not required to attain until November 15, 2007.[10] One-hour ozone design values (i.e., airshed maximum) in the New York nonattainment area from 1991-2006 have declined approximately 29 percent when compared to average design values from 1982-1990 (pre-1990 Clean Air Act Amendments).[11,12] Table 11.4 demonstrates the overall decreasing trend in 1-hour ozone design values for each current ozone monitor in the New York nonattainment area from 1991 to 2006. Through 2006, the ambient air quality levels in this nonattainment area do not meet the 1-hour NAAQS.

[10] 42 U.S.C. §7511(a)(2)
[11] NJDEP. Mid-Course Review for the New Jersey Portion of the Philadelphia-Southern New Jersey and New York-Northern New Jersey 1-Hour Ozone Nonattainment Areas. New Jersey Department of Environmental Protection, Bureau of Air Quality Planning, January 2005.
[12] USEPA. AirData: Access to Air Pollution Data, 2006. United States Environmental Protection Agency, http://www.epa.gov/air/data/, Accessed December 7, 2006.

Table 11.4: 1-Hour Ozone Design Values (parts per million) for the New York Nonattainment Area

State	County	Location	1989-1991* DV (ppm)	2004-2006 DV (ppm)
NJ	Hudson	Bayonne	0.160	0.114
	Morris	Chester	0.137	0.103
	Ocean	Colliers Mills	0.129 (1991-1993)	0.117
	Hunterdon	Flemington	0.131	0.109
	Monmouth	Monmouth Univ.	0.147 (1990-1992)	0.112
	Middlesex	Rutgers University	0.142	0.125
	Passaic	Ramapo	0.120 (1997-1999)	0.102
	Bergen	Teaneck	0.120 (1999-2001)	0.110
NY	Bronx	200th Street And Southern Blvd (Botanical Gardens)	0.123 (1995-1997)	0.106
	Bronx	E 156th St Bet Dawson And Kelly (IS52)	0.112 (2000-2002)	0.101
	Queens	14439 Gravett Road, 7096-14	0.123 (2001-2003)	0.111
	Queens	Queens, College Pt, 7096-09	0.098 (1998-2000)	No data for 2006
	Richmond	Staten Island, Susan Wagner HS, Brielle Ave.& Manor Rd.	0.141	0.117
	Suffolk	East Farmingdale Water Dist., Gazza Blvd., Babylon	0.152	0.128
	Suffolk	39 Sound Avenue, Riverhead	0.125 (1992-1994)	0.126
	Suffolk	57 Division Street, Holtsville, Monitor 2	0.139 (2000-2002)	0.127
	Westchester	White Plains Pump Station, Orchard Street	0.130	0.119
CT	Fairfield	Danbury	0.136	0.144
	Fairfield	Greenwich	0.150	0.128
	Fairfield	Stratford	0.165	0.135
	Fairfield	Westport	0.133 (1996-98)	0.130

*Not all current ozone monitors had data available for 1991 ozone design values. First available design value is indicated in parentheses.

11.6 Maintenance Plan for 1-Hour Ozone Nonattainment Areas

New Jersey requests that this proposed 2007 8-hour ozone attainment demonstration serve as the 1-hour ozone maintenance plan for the 1-hour ozone Allentown-Bethlehem-Easton, PA-NJ, Atlantic City, and Philadelphia nonattainment areas. The control measures in this proposed attainment demonstration and the contingency plan for 8-hour ozone are more than sufficient to maintain the 1-hour ozone standard. Since the air quality benefits from those measures will allow both 8-hour ozone nonattainment areas to achieve the 8-hour ozone standard, it is reasonable to expect that the 1-hour ozone standard can be maintained, as the 8-hour ozone standard is the more stringent standard.

12.0 CONSIDERATION OF A NEW 8-HOUR OZONE HEALTH STANDARD

The Clean Air Act (42 U.S.C. §7409(b)(1)) requires the United States Environmental Protection Agency (USEPA) to set primary National Ambient Air Quality Standards (NAAQS) "…based on such criteria and allowing an adequate margin of safety, are requisite to protect the public health." 42 U.S.C. §7409(d)1 further requires the USEPA to review and, if appropriate, revise the NAAQS for each criteria air pollutant every five years.

On January 31, 2007, the USEPA staff completed its review[1] of the NAAQS for ground-level ozone. The USEPA agreed to propose action to revise or retain the current ozone standards by June 20, 2007 and take final action by March 12, 2008. The USEPA staff recommended a revision to the 8-hour ozone primary standard level to a level in the range of 0.060 ppm to 0.080 ppm.

42 U.S.C. §7408(d)(2)(A) of the Clean Air Act further requires that decisions related to the NAAQS be reviewed by the Clean Air Scientific Advisory Committee (CASAC). The CASAC peer reviewed the USEPA staff recommendations and unanimously recommended that the current primary ozone NAAQS be revised to a level from 0.060 to 0.070 ppm. Both the USEPA staff recommendations for the 8-hour ozone primary and secondary standards, and CASAC recommendations after reviewing the USEPA's supporting documentation, are outlined in Table 12.1.

[1] USEPA. Review of the National Ambient Air Quality Standards for Ozone: Policy Assessment of Scientific and Technical Information - OAQPS Staff Paper. United States Environmental Protection Agency, Office of Air Quality Planning and Standards, January 2007.

Table 12.1: Proposed Changes to the 8-Hour Ozone Standard

Recommendation	USEPA	CASAC
Primary Standard		
Current primary ozone standard should be lowered from 0.08 ppm to no greater than 0.070 ppm.	X	X
The NAAQS should be specified to the third decimal place of the ppm scale to avoid any rounding issues.	X	X
It is not appropriate to consider retaining the current NAAQS.		X
Retain 8-hour averaging time and give consideration to retaining the form of the current standard.	X	
Margin of safety discussion should be added to the Final Ozone Staff Paper and taken into consideration in setting the primary ozone standard.		X
Secondary Standard		
Protection of managed agricultural crops and natural terrestrial ecosystems requires a secondary Ozone NAAQS that is substantially different from the primary ozone standard in averaging time, level and form.	X	X
Eliminate the daily maximum 8-hour average form for the secondary standard.	X	
Consider a form of the standard known as W126. This is a cumulative, weighted total of 12-hour (8 am – 8 pm) exposures over a 3-month period giving greater weight to exposures at higher levels of ozone.	X	X
Consider a range of levels from 21 down to 7 ppm-hrs (parts per million –hours) for W126.	X	
The lowest bound of the range within which a seasonal W126 welfare-based (secondary) ozone standard should be considered is 7.5 ppm-hrs; the upper bound of the range should not be as high as 21 ppm-hours.		X
The upper bound of the range considered should be no higher than 15 ppm-hour, which is estimated to be approximately equivalent to a seasonal 12-hour SUM06 level of 20 ppm-hours.		X
If multi-year averaging is employed to increase the stability of the secondary standard, the level of the standard should be revised downward to assure that the desired threshold is not exceeded in individual years.		X

Although the USEPA has not yet proposed its revisions to the 8-hour ozone primary and secondary standards, the health scientists indicate the revised standard must be lowered to adequately protect public health. Significant additional improvements, beyond those included in this SIP proposal, will be needed to bring the current ambient air quality levels through the New Jersey associated nonattainment areas (see Chapter 3) within the range recommended by CASAC and the USEPA staff.

As control measures and strategies are evaluated, consideration of longer-term strategies is critical to achieve further improvement in ozone air quality. These measures provide the regulated community certainty and time to identify the necessary funding to install control equipment, modify their products or usage patterns, and/or take other actions to implement pollution prevention strategies. As discussed in Section 5.4.6, an analysis of the 2012 modeling results (adjusted for transport, as discussed in Section 5.3.2) shows that with the implementation of additional measures beyond the 2010 attainment date the air quality in New Jersey and its associated nonattainment areas is expected to be equal to or better than 0.080 ppm (the upper range recommended by the USEPA staff), but not better than 0.070 ppm (the upper range recommended by the CASAC). The 2012 design values adjusted for transport are represented in Table 12.2. New Jersey is committed to propose the implementation of longer-term measures with implementation dates beyond the 2010 attainment date. These measures, along with reductions in the emissions from upwind sources will enable healthier air as soon as practical.

Table 12.2: 2012 Adjusted Probable Modeling Results

Site Name - County, State	Site Number	Air Monitoring Data	Modeling Results Adjusted for Transport			
		2002 Modeling Baseline DV_B (ppb)	2012 DV_{AT} RRF Adjusted (ppb)	Upper and Lower Bound of 2012 DV_{AT} (ppb)		
NNJ/NY/CT Nonattainment Area						
Teaneck - BERGEN CO, NJ	340030005	91	75	78	-	72
Bayonne - HUDSON, NJ	340170006	84	70	73	-	67
Flemington - HUNTERDON, NJ	340190001	95	69	72	-	66
Rutgers Univ. - MIDDLESEX CO, NJ	340230011	96	70	73	-	67
Monmouth Univ. - MONMOUTH CO, NJ	340250005	95	72	75	-	69
Chester - MORRIS CO, NJ	340273001	95	70	73	-	67
Ramapo - PASSAIC CO, NJ	340315001	86	66	69	-	63
Botanical Garden - BRONX CO, NY	360050083	83	70	73	-	67
Queens College - QUEENS CO, NY	360810124	83	65	68	-	61
Susan Wagner - RICHMOND CO, NY	360850067	93	73	76	-	70
Babylon - SUFFOLK CO, NY	361030002	93	76	79	-	73
Holtsville - SUFFOLK CO, NY	361030009	97	80	83	-	77
Riverhead - SUFFOLK CO, NY	361030004	83	63	66	-	60
White Plains - WESTCHESTER CO, NY	361192004	91	77	80	-	74
Danbury - FAIRFIELD CO, CT	90011123	95	73	76	-	70
Greenwich - FAIRFIELD CO, CT	90010017	95	76	79	-	73
Stratford - FAIRFIELD CO, CT	90013007	98	79	82	-	76
Westport - FAIRFIELD CO, CT	90019003	94	74	77	-	71
Middletown - MIDDLESEX CO, CT	90070007	95	72	75	-	69
Hamden - NEW HAVEN CO, CT	90099005	93	74	77	-	71
Madison - NEW HAVEN CO, CT	90093002	98	75	78	-	72
SNJ/Phila. Nonattainment Area						
Fairhill - CECIL CO, MD	240150003	97	63	66	-	60
Brandywine Creek - NEW CASTLE CO, DE	100031010	92	67	70	-	64
Bellefonte - NEW CASTLE CO, DE	100031013	90	65	68	-	62
Killens Pond - KENT CO, DE	100010002	88	66	69	-	63
Lewes - SUSSEX CO, DE	100051003	87	67	70	-	64
Lums Pond - NEW CASTLE CO, DE	100031007	94	63	66	-	60
Seaford - SUSSEX CO, DE	100051002	90	60	63	-	56
Bristol - BUCKS CO, PA	420170012	99	76	79	-	73
West Chester - CHESTER CO, PA	420290050	95	68	71	-	64
New Garden - CHESTER CO, PA	420290100	94	62	65	-	59
Chester - DELAWARE CO, PA	420450002	91	69	72	-	66
Norristown - MONTGOMERY CO, PA	420910013	92	69	72	-	66
Elmwood - PHILADELPHIA CO, PA	421010136	83	65	68	-	61
Lab - PHILADELPHIA CO, PA	421010004	71	55	58	-	52
Roxborough - PHILADELPHIA CO, PA	421010014	90	71	74	-	68
Northeast Airport - PHILADELPHIA CO, PA	421010024	96	74	77	-	71
Colliers Mills - OCEAN CO, NJ	340290006	106	76	79	-	72
Rider - MERCER CO, NJ	340210005	97	73	76	-	69
Ancora State Hospital - CAMDEN CO, NJ	340071001	100	72	75	-	69
Camden - CAMDEN CO, NJ	340070003	98	75	78	-	72
Clarksboro - GLOUCESTER CO, NJ	340155001	98	75	78	-	72
Millville - CUMBERLAND CO, NJ	340110007	95	64	67	-	61
Nacote Creek - ATLANTIC CO, NJ	340010005	89	65	68	-	61

NOTE: Highlighted sites are the controlling monitors in each nonattainment area

13.0 COMMITMENTS AND REQUESTS FOR FUTURE ACTION

As discussed in Chapter 5, the two multi-state 8-hour ozone nonattainment areas associated with New Jersey will reach attainment of the National Ambient Air Quality Standard (NAAQS) by June 15, 2010. This demonstration is contingent upon the continued implementation and enforcement of existing control measures, as well as the implementation of a number of new State and Federal control measures. New Jersey's Reasonable Further Progress (RFP) demonstration in Chapter 6 relies upon these same measures. The control measures are outlined in Chapter 4 and are organized by adoption and promulgation as well as when benefits will be achieved, i.e. either as control measures that are on the books or on the way (OTB/OTW), or measures that are beyond on the way (BOTW).

Although not outlined specifically in Chapter 4, other state and federal measures were implemented, and achieved benefits, prior to the 2002 base year. These pre-2002 benefits were achieved by control measures such as the pre-on-board diagnostics (OBD) enhanced Inspection and Maintenance (I/M) program, the federal Reformulated Gasoline (RFG) program and all New Jersey's existing Reasonably Available Control Technology (RACT) measures, and are incorporated into the 2002 inventory, from which all the future inventories are projected.

Section 5.3.5 discusses additional measures that both New Jersey and the United States Environmental Protection Agency (USEPA) are implementing that are expected to provide benefits by 2009. However, these measures were not relied upon for either the attainment demonstration modeling or the RFP demonstration. These measures provide additional assurance to address uncertainty associated with New Jersey's plausible demonstration of attainment. In addition, a portion of these measures is relied upon as a contingency, in the event that New Jersey's nonattainment areas do not meet their attainment goals.

The remainder of this chapter summarizes New Jersey's control measures and other commitments, as well as New Jersey's requests of the USEPA with respect to ozone implementation.

13.1 Control Measure Commitments

The State of New Jersey commits to propose the measures in Table 13.1 by no later than November 2007, and adopt by May 2008, in accordance with the New Jersey Administrative Procedures Act (APA) (N.J.S.A. 52:14B-1 et. seq.) and the Air Pollution Control Act (APCA) (N.J.S.A. 26:2C-1 et. seq.). For a detailed explanation of each of these control measures, see Chapter 4.

Table 13.1: State Control Measure Commitments

OTB/OTW Measures
• All measures implemented; no further commitment is necessary
BOTW Measures
• Consumer Products 2009 Amendments
• Portable Fuel Container 2009 Amendments
• Adhesives and Sealants
• Asphalt Paving
• Certain Categories of ICI Boilers
Additional measures to reduce the uncertainty of plausible attainment, and/or provide contingency for attainment*
• Refinery Rules
• New USEPA Control Technique Guidelines (CTGs)
• Case by case VOC and NO_x Emission Limit Determinations
• High Electric Demand Day Program
• Petroleum Storage Tank Rule
• Diesel Idling Rule
• Diesel Inspection and Maintenance Program
• Municipal Waste Combustors Rule
• New Source Review

*** These measures were not included in the regional modeling for 2009.**

The USEPA has committed to implement additional emission control measures. Specifically, the USEPA recently proposed new non-road engine standards and expects to propose a new national aerosol coatings rule in the near future.[1] Both of these efforts should provide additional emission reductions for 2009 and beyond. While New Jersey's attainment demonstration does not rely on further emission reductions from these measures, the implementation of these measures will help reduce the uncertainty of New Jersey's demonstration of attainment and will benefit air quality. New Jersey expects the USEPA to promulgate these measures in a timely fashion so that emission reductions can be achieved by the 2009 ozone season. Finally, New Jersey commits, as part of this proposed State Implementation Plan (SIP) Revision, to implement a number of future control measures that will result in emission reductions post-2010. These longer-term measures will provide:

- the regulated community with certainty and time to identify the necessary funding to install control equipment, modify their products or usage patterns, and/or take other actions to implement pollution prevention strategies; and,

[1] Both measures are discussed in Chapter 4.

- additional reductions, which would be relied upon should the state not attain by 2010.
- Additional public health protection, especially in view of health scientist and USEPA scientists' recommendation for a more protective ozone NAAQS.

13.2 Other Commitments

13.2.1 Transport

On December 22, 2005, the New Jersey Department of Environmental Protection (NJDEP) submitted to the USEPA its plan for addressing its transport obligations under 42 U.S.C. § 7410(a)(2)(D)(i) (CAA 110(a)(2)(D)(i)). Specifically, the plan outlines how New Jersey expects to meet its transport obligation to mitigate the transport of ozone and its precursors into and out of New Jersey. To that end, New Jersey committed as part of that plan, and recommits as part of this proposed SIP revision, to taking the following actions proposed by no later than November 2007, and adopted by May 2008, in accordance with the New Jersey APA and the APCA in an effort to address its contribution to downwind transport:

- Continue to meet its obligations under the NO_x SIP Call, while working to implement an allocation mechanism that encourage energy efficiency for New Jersey sources in the federal Clean Air Interstate Rule (CAIR) program;
- Develop multi-pollutant (oxides of nitrogen (NO_x), sulfur dioxide (SO_2) and particulate matter (PM)) performance standards providing additional emission reductions for Electric Generating Units;
- Update its RACT rules to address both 8-hour ozone and fine particulate matter ($PM_{2.5}$) precursors;
- Review the USEPA's revised and new CTGs, as they are released, and update State rules where New Jersey has affected sources;
- Continue to implement the Low Emission Vehicle (LEV) program;
- Develop rules and/or other measures to address emissions on High Electrical Demand Days (HEDD); and,
- Propose additional requirements for consumer product formulations and portable fuel containers

Addressing transported emissions, both to and from the State, is critical for New Jersey's multi-state nonattainment areas to attain and maintain the health-based ambient air quality standards. Even though many of New Jersey's existing requirements are already more stringent than the existing pollution control requirements in neighboring upwind states, New Jersey further commits to consider any additional measures, beyond those already in place or under development, implemented by our neighboring states as long as those measures are more stringent than our current actions. New Jersey also encourages the USEPA to take action where states are preempted from action. New Jersey is encouraged by the USEPA's recent proposal of a new nonroad engine rule, and expects that the USEPA will take similar actions with respect to onroad mobile sources, ships, and locomotives in time to help address the 8-hour ozone standard attainment deadlines.

13.2.2 Prevention of Significant Deterioration/Nonattainment New Source Review (PSD/NNSR)

Since the entire State of New Jersey was designated as nonattainment for the 1-hour ozone NAAQS, New Jersey already has a NNSR permitting program addressing the ozone precursors (volatile organic compound ((VOC) and NO_x). On December 29, 2005, the NJDEP submitted an equivalency determination to the USEPA documenting that the current New Jersey NNSR program is at least as stringent than the Federal program, including lower applicability levels and higher offset rates than the federal rules. Therefore, no changes to New Jersey's NNSR rules are necessary for compliance with the 8-hour ozone NAAQS. New Jersey commits to continue to implement its ozone NNSR program and have it apply to the 8-hour ozone NAAQS for major stationary sources.

New Jersey will make revisions to its NNSR program to address $PM_{2.5}$ nonattainment and expects to also clarify, simplify, and make more protective other aspects of this program. These improvements are likely to result in additional ozone benefits, but New Jersey in not relying on these benefits in this proposed ozone SIP Revision.

13.2.3 Visibility

The ozone precursors, particularly NO_x, also contribute to the formation of fine particulate matter, the main component of regional haze. New Jersey, in the context of setting the 2018 Reasonable Progress goal through a consultative process, will assess whether there is any interference by impacting states with measures in the implementation plan to prevent significant deterioration of air quality or to protect visibility at the Brigantine Wilderness Area in the Edwin B. Forsythe National Wildlife Refuge. As with all of New Jersey's SIP proposals, a public comment period on the Regional Haze SIP will allow interested parties to provide comment on the actions presented in the proposal.

13.2.4 Monitoring Network

New Jersey has an extensive 8-hour ozone monitoring network. This network was discussed in detail in Chapter 3, where Figure 3.6 provides a map of the monitoring locations throughout the State. New Jersey commits to retaining, and continuing to operate, its ozone monitoring network, subject to a joint annual review process by both the NJDEP and USEPA.

13.3 State Requests of USEPA

13.3.1 1-Hour Ozone

As discussed in Chapter 11, New Jersey requests that the USEPA make a determination that the following 1-hour ozone nonattainment areas are meeting the 1-hour ozone standard:

- Allentown-Bethlehem-Easton Pennsylvania-New Jersey Nonattainment Area (includes Warren County)
- Atlantic City Nonattainment Area (includes Atlantic and Cape May counties)
- Philadelphia Nonattainment Area (includes Burlington, Camden, Cumberland, Gloucester, Mercer and Salem counties)

13.3.2 New Jersey's Reliance on Other State Actions for Attainment

As discussed in Chapter 5, New Jersey based its plausible demonstration of attainment for its two multi-state nonattainment areas on the 2009 BOTW modeling exercise. This modeling demonstration relies not only on New Jersey working to meet its commitments to implement certain measures by 2009, but also on its neighboring states doing the same. Additionally, the implementation of measures by states further upwind than New Jersey's immediate neighbors is relied upon to reduce the transport of ozone and its precursors into the Ozone Transport Region, including New Jersey. Additional cost effective controls on the largest upwind sources are still needed to reduce the ozone and ozone precursors being transported into the Ozone Transport Region. New Jersey requests the USEPA, in reviewing the attainment demonstrations and all other SIP revisions from other states, take into consideration the impact on New Jersey's attainment obligations, and insure that upwind states are doing all that is needed to bring New Jersey's associated multi-state nonattainment areas into attainment as soon as practicable.

14.0 CONCLUSION

As discussed in Chapter 3, air monitoring data demonstrates that New Jersey and the states that share its nonattainment areas have made significant progress in reducing ozone levels. Section 3.2.3 highlights the 8-hour ozone monitor trends for the New Jersey portions of the Northern New Jersey/New York/Connecticut nonattainment area and Southern New Jersey/Philadelphia nonattainment area. In addition to showing the successes of the existing New Jersey, regional and Federal control programs at reducing ozone precursor emissions, the trends data in Chapter 3 demonstrate that New Jersey and the region are on the right path towards cleaner air.

The data in Chapter 5 provides a plausible demonstration that the two multi-state nonattainment areas associated with New Jersey will continue on the path to attain the 8-hour ozone health standard by their mandated June 15, 2010 attainment date. At its core, New Jersey's attainment demonstration is based on photochemical air quality simulation modeling that includes the implementation of numerous additional control measures prior to the summer of 2009 (these controls are referred to as Beyond On The Way (BOTW) measures, and are discussed in detail in Chapter 4). Both the United States Environmental Protection Agency (USEPA) and the Clean Air Act Advisory Committee support the use of a multi-analysis approach for 8-hour ozone attainment demonstrations in order to consider uncertainties and biases when using atmospheric models. Therefore, in its demonstration New Jersey adjusted the 2009 modeled design values to account for the fact that the photochemical modeling system used under predicts transport and ozone changes associated with emission reductions. Accurately representing the transport of ozone and its precursors is key to projecting future design values since, as highlighted in Chapter 2 and again in Chapter 9, transport accounts for more than half of the ozone problem in the Northeastern United States. Adjusting the modeling results for transport and accounting for some uncertainty in the modeling resulted in a range of future design values that show plausible attainment of the 8-hour ozone standard. Beyond the "transport adjusted" future design values, New Jersey provides additional analytical evidence to further address uncertainty in the core modeling, and to support its claim of plausible attainment

In Chapter 6, New Jersey uses the same control measures applied in its 2009 attainment demonstration to show its ability to meet its Reasonable Further Progress (RFP) milestones. These milestones are designed to insure incremental progress towards attainment, rather than relying upon the majority of emission reductions just prior to the attainment date. As highlighted by past successes in Chapter 3, New Jersey is committed to this type of steady progress to insure that the State is doing all it can as soon as practical to protect the health and well being of its citizens. New Jersey demonstrates that it can more than meet its RFP targets with its existing and planned emission control measures.

New Jersey commits to propose, by no later than November 2007, and adopt by May 2008, in accordance with the New Jersey Administrative Procedures Act and the New Jersey Air Pollution Control Act , (N.J.S.A. 26:2C-1 et. seq.), all the BOTW measures included in the attainment photochemical modeling. In addition, New Jersey commits to propose, and adopt, pursuant to the New Jersey Administrative Procedures Act and the New Jersey Air Pollution Control Act, a number of other control measures that were not included in the 2009 BOTW modeling, but will result in emission reductions by 2009, as well as future measures that will result in emission reductions post-2010. It is important that New Jersey and its neighboring states continue to reduce emissions post-2010, as these longer-term measures provide:

- the regulated community with certainty and more time to identify the necessary funding to install control equipment, modify their products or usage patterns, and/or take other actions to implement pollution prevention strategies;
- the additional reductions, which would be relied upon should the state not attain by 2010; and
- additional public health protection, especially in view of health scientist and USEPA scientists' recommendation for a more protective ozone NAAQS.

Furthermore, these additional reductions in air pollution are prudent to provide needed air quality improvement and public health protection as soon as possible and to provide more certainty that the National Ambient Air Quality Standard (NAAQS) will be attained.

All of the control measures were identified through one or more of the state and regional efforts engineered to select viable control measures. Through New Jersey's "Reducing Air Pollution Together" workshop, six air quality workgroups were formed and collaborated over several months to develop recommendations on how to reduce air emissions from their source categories. The workshop initiative and New Jersey's participation in regional efforts are discussed in detail in Chapter 4. New Jersey hosted or participated in all of these efforts to insure it had not overlooked viable control measures. New Jersey also completed Reasonably Available Control Technology (RACT) and Reasonably Available Control Measures (RACM) analyses to insure source categories were thoroughly reviewed. The RACT analysis was proposed on February 2, 2007 and New Jersey expects to submit its final RACT SIP to USEPA in June of 2007. Chapter 7 provides New Jersey's RACM analysis, which demonstrates that there are no other reasonably available control measures that would advance the nonattainment areas' attainment date by one year, or to June 15, 2009 (which would require demonstration of attainment by the summer of 2008).

The implementation of all of these measures will serve not only to help insure that New Jersey's associated nonattainment areas meet their mandatory attainment date, but will insure that New Jersey is not negatively impacting any other area's ability to meet the NAAQS through transported emissions of ozone and its precursors (see Chapter 9). The State's attainment demonstration is not only based on New Jersey's committed actions, but on the committed actions of all the other states in the Ozone Transport Region. Should other states fail to address their contribution to the New Jersey associated multi-state nonattainment areas' air quality problems, it is unlikely that New Jersey's associated multi-state nonattainment areas will meet their attainment goal. Therefore, New Jersey requests that the USEPA keep transported emissions and impact in mind as it reviews the SIPs, particularly those from the upwind states.

Given that New Jersey's associated nonattainment areas must attain by June 15, 2010, the air quality levels from 2007 – 2009 will be used to judge success. We expect to see air quality improvement over this timeframe. This provides the USEPA with an opportunity to determine success in the "real" time as it processes the State's SIP submittal. The State has provided, in Chapter 8, contingency plans that require corrective action in the event that New Jersey misses its 2008 Reasonable Further Progress milestone or fails to attain the NAAQS by the summer of 2009.

New Jersey has included, as part of this proposed SIP Revision (see Chapter 10), proposed onroad vehicle emission budgets to insure that the plans and programs implemented by the Metropolitan Planning Organizations conform with the requirements of the SIP. Proposed general conformity emission budgets are included for McGuire Air Force Base and Lakehurst Naval Air Station to ensure that emissions from their operations also conform to the requirements of the SIP.

While it is evident that additional work is needed to meet the 8-hour ozone NAAQS, its important to note that much of the State attained the 1-hour ozone standard. New Jersey is requesting (see Chapter 11) that the USEPA make a finding that three (3) of its four (4) associated 1-hour nonattainment areas are meeting the 1-hour standard.

Taken together, this proposed SIP revision provides a comprehensive plan that:

- highlights the successes of the past and moves the State beyond the "old" 1-hour standard;
- identifies all the reasonable measures that can, and need to be, implemented in order for New Jersey, and its associated multi-state nonattainment areas, to attain the 8-hour ozone NAAQS, address transport in and out of the State and prepare for likelihood of a new more stringent NAAQS in the near future;
- proves that New Jersey can easily meet its RFP milestones of 2008 and 2009;
- provides a safety net of contingency measures in the event that the State fails to meet its RFP milestones or fails to attain the NAAQS on time; and
- sets general and transportation conformity budgets that allow for growth without negatively impacting the attaimnent of the 8-hour ozone NAAQS in the multi-state nonattainment areas;
- provides a plausible demonstration of attainment by June 15, 2010 in the two multi-state nonattainment areas associated with New Jersey.