State of New Jersey
Department of Environmental Protection

State Implementation Plan (SIP)
For Regional Haze

Proposal

September 5, 2008

Preface

Pursuant to the requirements of 42 U.S.C. § 7491 (Section 169 and 169A the Clean Air Act) and the Federal Regional Haze Rules at 40 C.F.R. § 51.308(a) and (b)()(1), New Jersey is proposing a revision to the New Jersey State Implementation Plan to address the requirements for improving visibility in the mandatory Class I Federal areas, including the Brigantine Wilderness Area of the Edwin B. Forsythe National Wildlife Refuge. Elements of this State Implementation Plan address the Federal requirements pursuant to 40 C.F.R. § 51.308(d) and the Best Available Retrofit Technology components of 40 C.F.R. 51.308(e). In addition, this State Implementation Plan addresses Regional Planning, state and Federal Land Manager coordination, and contains a commitment to provide State Implementation Plan revisions and adequacy determinations in the future as required by 40 C.F.R. § 51.308 (f) and (g) which require the State to submit periodic implementation plan upgrades and progress reports. This document outlines New Jersey's long-term plan for dealing with visibility-impairing air pollution within its borders and from out-of-state sources that transport emissions to New Jersey's Federal Clean Air Act defined Class I area.

Acknowledgments

The New Jersey Department of Environmental Protection acknowledges the efforts and assistance of the many agencies and individuals whose contributions were instrumental in the preparation of this State Implementation Plan Revision. In particular, the New Jersey Department of Environmental Protection wishes to acknowledge the many individuals within the United States Department of the Interior, Fish and Wildlife Service, in particular the staff and management of the Brigantine Wilderness Area and the Air Quality Branch; the United States Environmental Protection Agency, Region 2; the Mid-Atlantic/Northeast Visibility Union; the Northeast States for Coordinated Air Use Management; and the Mid-Atlantic Regional Air Management Association; as well as staff within the New Jersey Department of Environmental Protection for their assistance and guidance.

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Acronyms and Abbreviations

$\mu g/m^3$	Micrograms per cubic meter
AL	Alabama
APA	Administrative Procedures Act
APCA	Air Pollution Control Act
AR	Arkansas
BART	Best Available Retrofit Technology
BC	British Columbia
BOTW	Beyond on the Way
CAIR	Clean Air Interstate Rule
CARB	California Air Resources Board
CENRAP	Central Regional Air Planning Association
CERR	Consolidated Emissions Reporting Rule
C.F.R.	Code of Federal Regulations
CMAQ	Congestion Mitigation and Air Quality
CMU	Carnegie Mellon University
CO	Carbon monoxide
CT	Connecticut
DE	Delaware
DC	District of Columbia
dv	Deciview
EGU	Electric Generating Unit
FLM	Federal Land Manager
GA	Georgia
HEDD	High Electrical Demand Day
HYSPLIT	Hybrid Single-Particle Lagrangian Integrated Trajectory
ICI	Industrial/Commercial/Institutional
I/M	Inspection and Maintenance
IMPROVE	Interagency Monitoring of Protected Visual Environments
IN	Indiana
IPM	Integrated Planning Model
KY	Kentucky
LEV	Low Emission Vehicle
MA	Massachusetts
MACT	Maximum Available Control Technology
MANE-VU	Mid-Atlantic/Northeast Visibility Union
MARAMA	Mid-Atlantic Regional Air Management Association
MD	Maryland
ME	Maine
MI	Michigan
MM5	Mesoscale Meteorological Model
MN	Minnesota
MO	Missouri
MS	Mississippi
MW	Megawatt

MWRPO	Midwest Regional Planning Organization
NAAQS	National Ambient Air Quality Standards
NC	North Carolina
ND	North Dakota
NE	Nebraska
NEI	National Emissions Inventory
NESCAUM	Northeast States for Coordinated Air Use Management
NH	New Hampshire
NH_3	Ammonia
NJ	New Jersey
N.J.A.C.	New Jersey Administrative Code
NJDEP	New Jersey Department of Environmental Protection
N.J.S.A.	New Jersey Statutes Annotated
NLEV	National Low Emission Vehicle Program
NOAA	National Oceanic and Atmospheric Administration
NO_2	Nitrogen dioxide
NO_x	Oxides of Nitrogen
NO_y	Total reactive nitrogen
NSPS	New Source Performance Standard
NTE	Not-To-Exceed
NWS	National Weather Service
NY	New York
OH	Ohio
ORVR	Onboard Refueling Vapor Recovery
OTB	On the Books
OTC	Ozone Transport Commission
OTW	On the Way
PA	Pennsylvania
PM	Particulate Matter
$PM_{2.5}$	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
ppm	Parts per million
PSEG	Public Service Enterprise Group
RACT	Reasonably Available Control Technology
REMSAD	Regulatory Modeling System for Aerosols and Deposition
RI	Rhode Island
RPG	Reasonable Progress Goal
RPO	Regional Planning Organization
SC	South Carolina
SD	South Dakota
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SO_4	Sulfate
SO_x	Oxides of Sulfur

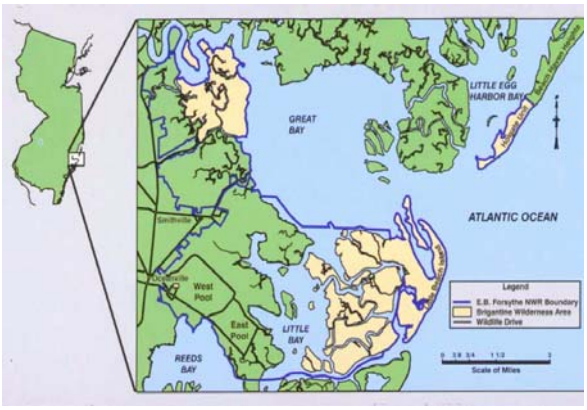
SOA	Secondary organic aerosol
TN	Tennessee
TX	Texas
USEPA	United States Environmental Protection Agency
U.S.C.	United States Code
VA	Virginia
VISTAS	Visibility Improvement State and Tribal Association of the Southeast
VOC	Volatile Organic Compound
VT	Vermont
WI	Wisconsin
WRAP	Western Regional Air Partnership
WV	West Virginia

Executive Summary

This proposed revision to the State Implementation Plan (SIP) is New Jersey's first step to address visibility impairment and meet the Federal Clean Air Act requirement to reach natural visibility conditions at the Brigantine Wilderness Area by 2064. This plan proposes to establish the baseline and natural visibility conditions, identifies the states which contribute to visibility impairment at the Brigantine Wilderness Area, and establishes the 2018 Reasonable Progress Goal. This plan also proposes to address New Jersey's contribution to visibility impairment in Acadia National Park and Moosehorn Wilderness Area in Maine, Great Gulf Wilderness Area and Presidential Range/Dry River Wilderness Area in New Hampshire, Lyebrook Wilderness Area in Vermont, and the Brigantine Wilderness Area. Facilities in New Jersey which are subject to Best Available Retrofit Technology (BART) are identified, and plans to address determinations and installation of BART are included in this plan.

Brigantine Wilderness Area

Figure ES.1: Map of Brigantine Wilderness Area



The Brigantine Wilderness Area in the Edwin B. Forsythe National Wildlife Refuge, Figure ES.1**,** is designated as a Federally protected visibility area or Class I area.

The Brigantine Wilderness Area, a unique and valuable resource, is the home and stop-over point for migratory birds and water fowl along the eastern coast of our country. Over 290 different species of birds have been observed within the wilderness area. At the peak season for bird migration in early November, concentrations of over 100,000 ducks and geese have been seen in the saltwater marshes of the refuge. The refuge itself attracts over 300,000 visitors per year who come to watch the birds or enjoy the scenic views of the Atlantic Ocean, Great Bay, Little Bay, Reeds Bay, and Little Egg Harbor area. The exceptional natural character and charm of the Brigantine Wilderness area create an oasis of beauty, Figure ES.2, within the most densely populated state in the nation.

Figure ES.2: Pictures from the Brigantine Wilderness Area

Visibility at Brigantine

Visibility monitoring at the Brigantine Wilderness Area is overseen by the United States Fish and Wildlife Service, and is part of the national Interagency Monitoring of Protected Visual Environments (IMPROVE) network. Table ES-1 presents the baseline visibility conditions, the 2018 progress benchmark, the uniform rate of progress, and the 2064 natural background goal.

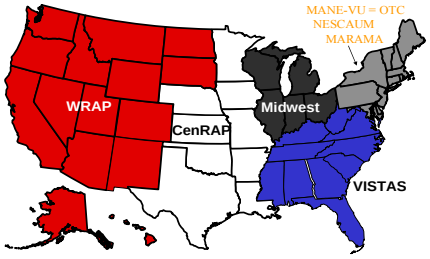
Table ES.1: Visibility Information for the Brigantine Wilderness Area

Conditions	Deciviews
Natural Background Visibility on 20% of worst visibility days (Goal in 2064)	12.2
Average Baseline Visibility on 20% of best visibility days (2000 – 2004)	14.3
Average Baseline Visibility on 20% worst visibility days (2000 – 2004)	29.0
Uniform Rate of Progress in 2018 on the 20% worst visibility days	25.1

Regional Planning Organizations

The USEPA encouraged states to form Regional Planning Organizations (RPOs) and work together to address regional haze, Figure ES.3. New Jersey joined with the mid-atlantic and northeast states to form the Mid-Atlantic – Northeast Visibility Union (MANE-VU). MANE-VU and other Regional Planning Organizations worked cooperatively to develop many of the materials utilized in this proposed SIP revision.

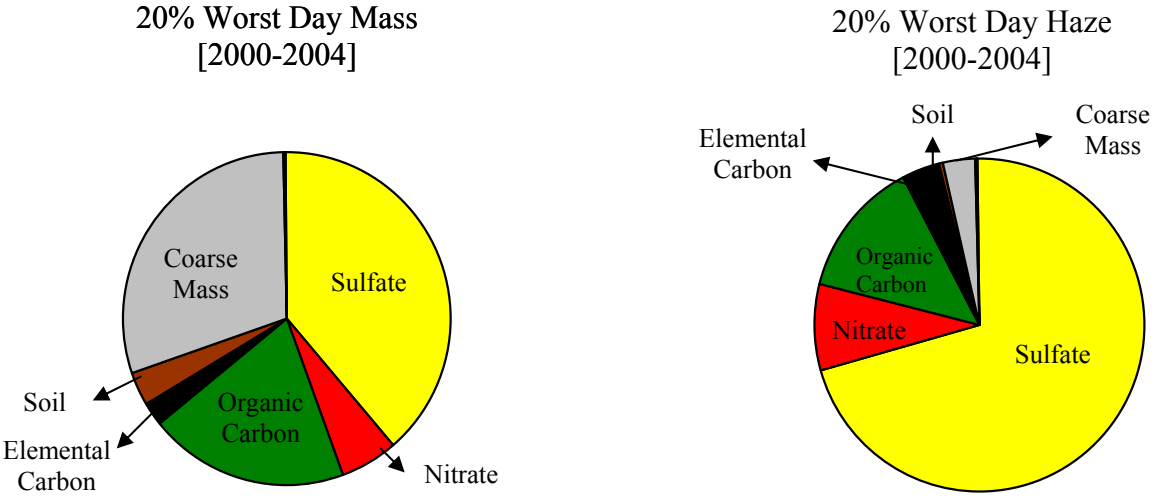
Figure ES.3: Regional Planning Organizations for Regional Haze



Causes of Visibility Impairment

Visibility impairment is caused by many different pollutants. The largest contribution is currently from sulfate, Figure ES.4. For the purposes of the 2018 reasonable progress plan, the proposed SIP focuses on identifying and implementing required measures to reduce sulfate. New Jersey is also implementing measures to reduce carbon emissions, the second largest contributor to haze.

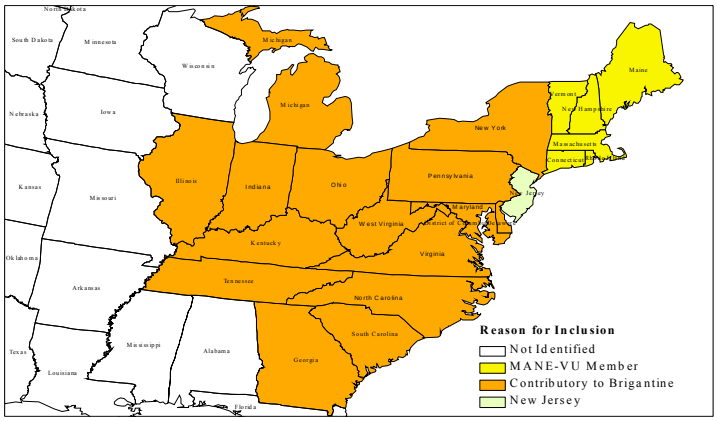
Figure ES.4: Role of Sulfate in Visibility Impairment at Brigantine Wilderness Area



States Which Contribute to Visibility Impairment

Based on a variety of technical methods, New Jersey identified 22 states which contributed to visibility impairment at the Brigantine Wilderness Area, Figure ES.5.

Figure ES.5: States Identified as Contributing to Visibility Impairment in New Jersey's Class I Area



Maine, New Hampshire and Vermont determined that New Jersey contributed to their Class I areas, Acadia National Park and Moosehorn Wilderness Area, Great Gulf Wilderness Area and Presidential Range/Dry River Wilderness Area, and Lyebrook Wilderness Area, respectively. These states determined that New Jersey contributes to them. Additionally, New Jersey contributes to visibility impairment at the Brigantine Wilderness Area.

Reasonable Measures and Reasonable Progress Goal

The USEPA regulations set the guidelines for determining the 2018 Reasonable Progress Goal (RPG). This goal is defined by establishing reasonable measures for New Jersey and the other contributing states to implement to reduce emissions. New Jersey worked with the other MANE-VU states to identify potential control measures to reduce sulfate emissions from point and area sources. The State consulted with the other Regional Planning Organizations and the contributing states within MANE-VU regarding the reasonableness of the identified measures. Using input from the consultations, the benefits from the implementation of the identified measures were modeled to project the 2018 visibility levels. These projections serve as the 2018 Reasonable Progress Goal. For the Brigantine Wilderness Area, the 2018 projection is 25.1 deciviews. This projection meets the Uniform Rate of Progress goal set by the USEPA regulations.

The reasonable measures used to set the 2018 Reasonable Progress Goal are:

- Timely implementation of the Clean Air Act requirement to install Best Available Retrofit Technology (BART) on eligible sources;
- At least 90% SO_2 emission reductions from 2002 levels at the top 100 electric generating unit (EGU) sources that impact the Brigantine Wilderness Area (for the six MANE-VU visibility protected areas, there are 167 different EGU stacks that impact one or more of these areas);

- For the MANE-VU states, reducing the level of sulfur in fuel oil.
- For the contributing states outside of MANE-VU, a 28% emission reduction from non-electric generating unit sources is sought;[1]
- Continued evaluation of other measures, including Energy Efficiency, Alternative Clean Fuels and other measures to reduce SO_2, PM and NO_x from all coal-burning facilities by 2018, and new source performance standards for wood combustion.

Other measures which were not included in the modeling to determine the 2018 reasonable progress goal are included in New Jersey's plans to further improve visibility and reduce fine particle health effects.

New Jersey Actions

- BART

New Jersey identified three (3) petroleum refineries and one (1) electric generating facility as Best Available Retrofit Technology (BART)-eligible facilities potentially subject to those requirements under the Clean Air Act. In this proposed SIP revision, New Jersey commits to propose and adopt multi-pollutant refinery rules pursuant to the New Jersey Administrative Procedures Act (APA), (N.J.S.A. 52:14B-1 et. seq.) and the New Jersey Air Pollution Control Act (APCA), (N.J.S.A.26:2C-1 et. seq.), requiring the BART-eligible petroleum refineries to perform a top-down analysis of their affected sources. Separately, New Jersey will require the electric generating unit facility to perform a top down analysis. Existing enforcement initiatives and consent decrees already require emission reduction measures which are likely to be BART for the affected sources.

- Electric Generating Units

New Jersey is home to four of the 167 EGU stacks identified in the setting of the 2018 reasonable progress goal at Brigantine or one of the five other Class I areas in MANE-VU. New Jersey has addressed emissions from these stacks through Administrative Consent Orders (ACOs) or Consent Decrees (CD) that require all four facilities to meet performance standards for SO_2, NO_x, and particulates. For the other electric generating units not specifically identified, New Jersey proposed new rules (August 4, 2008 New Jersey Register) to implement a multi-pollutant control strategy to reduce allowable NO_x, SO_2, and particulate emissions from all coal-fired boilers. Details regarding this rule proposal are available at NJDEP's website, http://www.state.nj.us/dep/aqm/index.html.

- Sulfur in Fuel Oil

New Jersey intends to propose and adopt rules pursuant to the New Jersey Administrative Procedures Act (APA), (N.J.S.A. 52:14B-1 et. seq.) and the New Jersey Air Pollution Control Act (APCA), (N.J.S.A.26:2C-1 et. seq.) to modify the sulfur in fuel limits, N.J.A.C. 7:27-9, as

[1] New Jersey and the other MANE-VU Class I states are recommending that contributing states determine the best way to achieve this level of emission reduction. The 28% represents an estimate of the benefits from the MANE-VU fuel oil strategy.

outlined in accordance with the definition of reasonable measures, for the MANE-VU strategy. Some areas in New Jersey already meet the MANE-VU limits for heavy oil.

- Energy Master Plan and Greenhouse Gas Plan

New Jersey is developing a draft Energy Master Plan[2] (EMP) to address New Jersey's electricity and heating challenges. The draft plan was released on April 17, 2008. One component of the Energy Master Plan addresses ways to increase energy efficiency in the State. New Jersey is also developing a Greenhouse Gas Reduction Plan pursuant to the Global Warming Response Act. Measures which will be implemented as a result of these plans will reduce multiple air contaminants and improve visibility.

- Smoke Management Plan and Construction Activities

Since New Jersey is home to the Federally protected visibility area, the Brigantine Wilderness Area, New Jersey is required by the USEPA rules to:

- Develop and implement a smoke management plan
- Address emissions from construction activities

To address the potential emissions from these categories of sources, New Jersey will continue to implement its Open Burning Permit Regulation, N.J.A.C. 7:27-2, and address fugitive dust emissions in a new rule to be proposed in the next few years. New Jersey is considering amendments to its Open Burning Regulation, and a new Home Wood Heating Advisory Program, to reduce emissions from wood smoke. New Jersey will mitigate construction activities on a case-by-case basis, depending on the size and nature of the construction being done and the review of the potential emissions on the property in relation to any potential off-site impacts. Existing USEPA regulations[3] and New Jersey rules[4] and standards[5] will also reduce emissions from on-road and non-road construction vehicles and equipment, as well as fugitive dust emissions.

- Wood Burning Strategies

New Jersey is considering strategies to reduce the emissions of wood smoke. Implementation of these strategies will reduce fine particle emissions and improve visibility. One strategy under consideration is a Home Wood Heating Advisory Program, similar to those in Oregon and Washington states. In general, these programs request wood burning be limited during times when unhealthy air quality is forecast or monitored. Other control measures under investigation include woodstove and fireplace change-out programs.

The NJDEP has posted on its website an informational webpage regarding techniques for

[2] www.nj.gov/emp
[3] Federal Register, Vol 69, No. 124, June 29, 2004.
[4] N.J.A.C. 7:27-32.
[5] Standards for Soil Erosion and Sediment Control in New Jersey. Promulgated by the New Jersey State and Soil Conservation Committee. Adopted July 1999.

proper wood burning, health effects of wood burning, and links to other useful web pages.[6]

- Measures to Reduce Organic Carbon Emissions

Even though the focus of the Reasonable Progress Goal is to reduce emissions of sulfur dioxide, the largest contributor to regional haze, for the 2018 reasonable progress plan, New Jersey is taking actions to reduce emissions of organic carbon, the second largest contributor to visibility impairment at Brigantine Wilderness Area. Some of New Jersey's actions to reduce emissions from organic carbon include:

- Vehicle Idling (N.J.A.C 7:27-14.3)
  - Removes or further limits the exemptions to the State's idling restrictions.
  - Removes sleeper berth exemption from vehicles effective May 1, 2010.

- Open Burning (N.J.A.C 7:27-2)
  - One of the most stringent in the nation to limit or control open burning.

- Industrial, Commercial and Institutional (ICI) Boilers (N.J.A.C. 7:27-16.8, -19.7)
  - Set performance standards for CO and VOC which ensure good combustion.
  - Annual tune up requirements which reduces NO_x emission and may also help reduce fuel consumption.

- Heavy Duty Diesel Trucks (N.J.A.C 7:27-14)
  - Proposed rule will set tighter opacity standards for the Inspection and Maintenance (I/M) program.

Consultation with the Federal Land Managers

The State of New Jersey coordinated and consulted with the Federal Land Manager for the Brigantine Wilderness Area, which is part of the United States Fish and Wildlife Service**,** during the development of this SIP, and will continue to do so for future progress reports and plan revisions. Any written comments provided will be available for review in the docket.

CAIR Vacatur

On July 11, 2008, the United States Court of Appeals for the District of Columbia Circuit vacated the federal Clean Air Interstate Rule (CAIR). This decision has significant air quality impact in the Eastern United States. To prevent back sliding of emission reductions and to meet its NOx SIP Call obligations in the absence of CAIR, New Jersey plans to reinstate the NO_x Budget Allowance Allocation rule with the expectation that the USEPA will reinstate the NOx Budget program for 2009 ozone season and beyond. New Jersey is proposing to further address the in-state emission reduction by tightening the Reasonable Available Control Technology (RACT) rules. The proposed rules were published in the New Jersey Register on August 4, 2008.[7] New Jersey is

[6] http://www.state.nj.us/dep/baqp/woodburning.html
[7] http://www.nj.gov/dep/aqm/curformp.htm

evaluating its legal options to address the potential loss in emission reductions from the upwind CAIR sources and expects the USEPA to require the emissions reductions from states whose reductions depended on CAIR.

1.0 BACKGROUND AND OVERVIEW OF THE REGIONAL HAZE REGULATIONS

1.1 Introduction

The Federal Clean Air Act[8] sets a national goal to restore visibility to its natural conditions in many of the national parks, wilderness areas and memorial parks in the United States of America. New Jersey is home to one of these areas, the Brigantine Wilderness Area in the Edwin B. Forsythe National Wildlife Refuge. Section 169A of the Clean Air Act of 1977 sets the following national visibility goal:

> *Congress hereby declares as a national goal the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I Federal areas which impairment results from man-made air pollution.*

The USEPA promulgated rules[9] outlining the requirements for States and Tribes to achieve the natural visibility goal by 2064. These rules provide the basis for defining current and future goals for both natural background and interim milestones, and a process to achieve the milestones.

New Jersey is proposing a revision to the New Jersey State Implementation Plan (SIP) to set the 2018 reasonable progress goals for Brigantine Wilderness Area, and to address New Jersey's contribution to visibility impairment in Acadia National Park and Moosehorn Wilderness Area in Maine, Great Gulf Wilderness Area and Presidential Range/Dry River Wilderness Area in New Hampshire, Lyebrook Wilderness Area in Vermont, and the Brigantine Wilderness Area. This document outlines New Jersey's long-term plan (2018) for dealing with visibility-impairing air pollution within its borders and from out-of-state sources that transport pollution to the Brigantine Wilderness Area.

Elements of this SIP address the core requirements pursuant to 40 C.F.R. 51.308(d) and the Best Available Retrofit Technology (BART) components of 40 C.F.R. 51.308(e). In addition, this SIP addresses Regional Planning, State and Federal Land Manager coordination, and contains a commitment to provide SIP revisions and the 2013 progress review as required by 40 C.F.R. § 51.308 (f) and (g) which require the State to submit periodic implementation plan upgrades and progress reports.

Regional Haze is not caused by the air pollution from any one specific source, but is caused by many air pollution sources located over a wide area. The solution to Regional Haze can only be found by looking at all emissions of visibility-impairing pollutants over a wide geographic area.

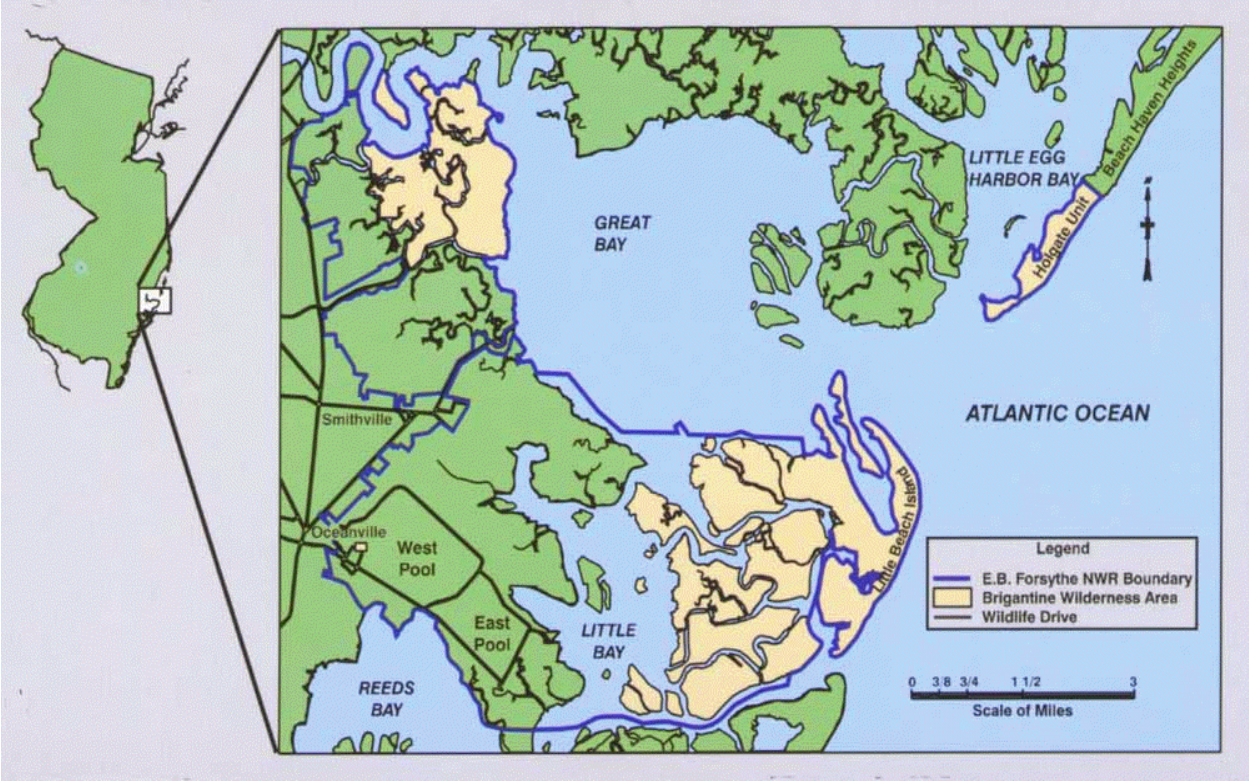
More details on the history of the Federal Regional Haze Rule and the 1990 Clean Air Amendments are included in Appendix A.

[8] 42 U.S.C. § 7491
[9] 40 C.F.R § 51.300-309

1.2 Description of the Brigantine Wilderness Area

The Brigantine Wilderness Area is part of the larger Edwin B. Forsythe National Wildlife Refuge and contains areas deserving of special attention as a designated wilderness area and so is protected from human activity and intrusion. The Brigantine Wilderness Area of the Edwin B. Forsythe National Wildlife Refuge is managed by the United States Fish and Wildlife Service of the Department of the Interior. In this document, New Jersey's Class I area will be called the Brigantine Wilderness Area to mean the smaller area, within the larger Edwin B. Forsythe National Wildlife Refuge.

Figure 1.1: Map of Brigantine Wilderness Area



This unique and valuable resource is the home and stop-over point for migratory birds and water fowl along the eastern coast of our country. Over 290 different species of birds have been observed within the wilderness area. At the peak season for bird migration in early November, concentrations of over 100,000 ducks and geese have been seen in the saltwater marshes of the refuge. The refuge itself attracts over 300,000 visitors per year who come to watch the birds or enjoy the scenic views of the Atlantic Ocean, Great Bay, Little Bay, Reeds Bay, and Little Egg Harbor area.

Figure 1.2 Pictures from Brigantine Wilderness Area

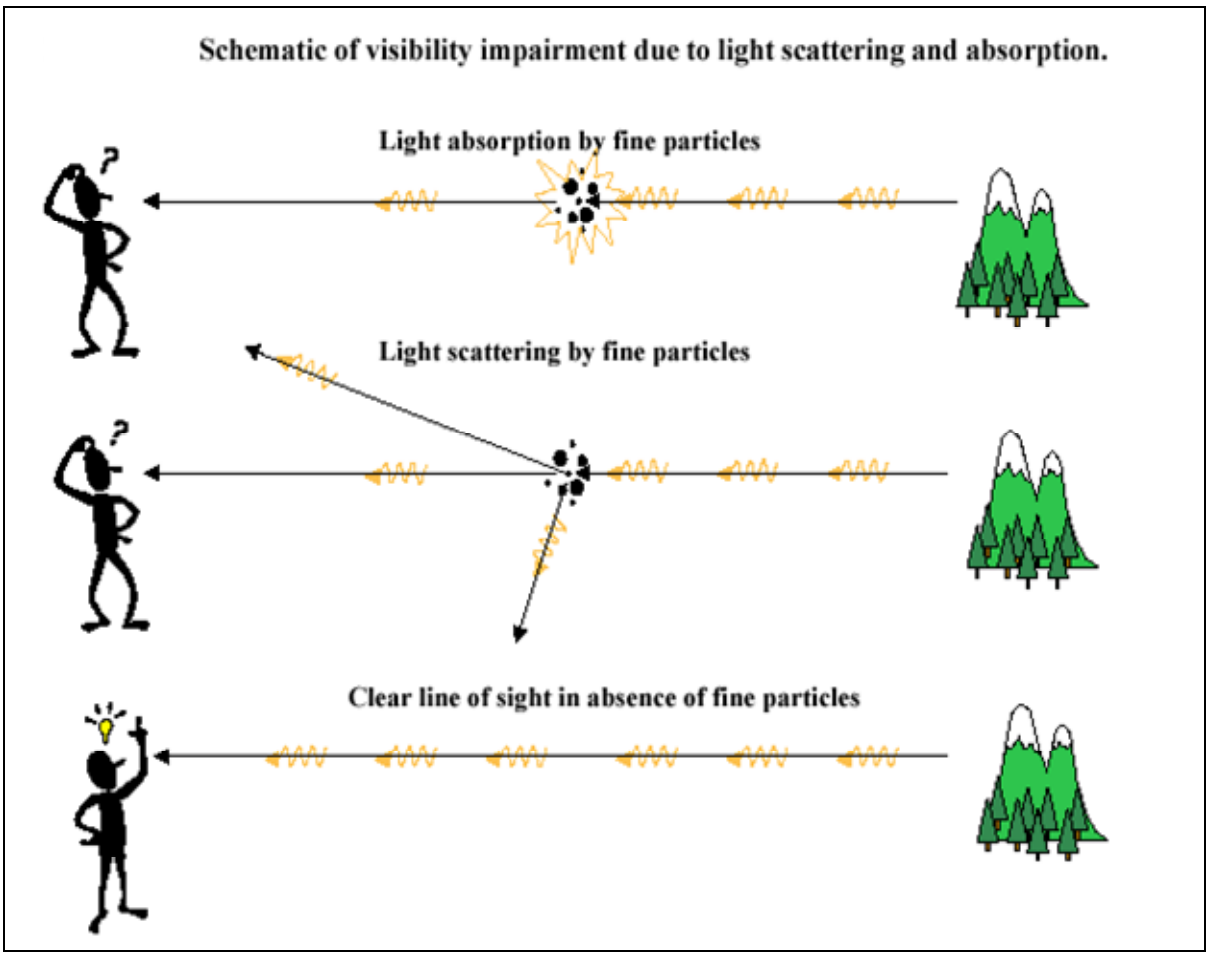
The nearby attraction of Atlantic City, New Jersey draws over 35 million visitors per year and the views of the Brigantine Wilderness Area from Atlantic City are enjoyed by all.

The exceptional natural character and charm of the Brigantine Wilderness area create an oasis of beauty within the most densely populated state in the nation.

1.3 Regional Haze in the Brigantine Wilderness Area

Regional Haze is caused by the scattering or absorption of light particles in the atmosphere from air pollution. This absorption and scattering effect of fine particles is illustrated in Figure 1.3.

Figure 1.3



This real effect on air quality is further illustrated on the next page in the pictures in Figures 1.4 and 1.5 taken at the Brigantine Wilderness Area on a clear day and on a hazy day. Note that the skyline of Atlantic City is visible on the clear day and obscured from view on the hazy day.

Figure 1.4: Brigantine Wilderness Area on a Clear Day[10]

Figure 1.5: Brigantine Wilderness Area on a Hazy Day[9]

The haziness seen in the figures represents air pollution arising from local and regional sources to obscure visual range. Different pollutants have different effects on visibility and a standardized metric (equation) to calculate visibility impairment was developed using the known concentrations of the individual pollutants or components. As will be seen in the Regional Haze Visibility Equation in the next section, many of the components contributing to visibility impairment are the same air pollutants of concern with respect to the formation of ozone and fine particulate matter, namely: sulfate, nitrate, organic mass and elemental carbon. Fine particulate matter and ozone, formed from oxides of nitrogen and volatile organic compounds, are important health concerns in New Jersey as besides contributing to regional haze and other welfare effects, they also contribute to wide-spread human health effects.[11]

[10] http://www.hazecam.net/class1/brigantine.html

[11] State Implementation Plan (SIP) Revision for the Attainment and Maintenance of the Ozone National Ambient Air Quality Standard, 8-Hour Ozone Attainment Demonstration, Final, October 29, 2007; State Implementation Plan (SIP) Revision for the Attainment and Maintenance of the Fine Particulate Matter National Ambient Air Quality

1.4 The Regional Haze Visibility Equation

The degree of visibility impairment is expressed in deciviews, a unitless value. The calculation of visibility impairment utilizes two equations, one to calculate light extinction coefficient (B_{ext}), and then its transformation into visibility impairment as expressed in deciviews (dv). The latest equation,[12] approved by the Interagency Monitoring of Protected Visual Environments (IMPROVE) Steering Committee, to calculate light extinction coefficient is:

$$B_{ext} \approx 2.2 \times f_S(RH) \times [\text{Small Sulfate}] + 4.8 \times f_L(RH) \times [\text{Large Sulfate}] + 2.4 \times f_S(RH) \times [\text{Small Nitrate}] + 5.1 \times f_L(RH) \times [\text{Large Nitrate}] + 2.8 \times [\text{Small Organic Mass}] + 6.1 \times [\text{Large Organic Mass}] + 10 \times [\text{Elemental Carbon}] + 1 \times [\text{Fine Soil Mass}] + 1.7 \times f_{SS}(RH) \times [\text{Sea Salt Mass}] + 0.6 \times [\text{Coarse Mass}] + \text{Rayleigh Scattering (Site Specific)} + 0.33 \times [NO_2\,(ppb)] \quad \text{Equation 1}$$

Where:

B_{ext} = The light extinction coefficient in inverse megameters [Mm^{-1}]

f_s (RH) and f_L (RH) = Humidity factor associated with small and large mode mass size distributions

f_{ss} (RH) = Humidity factor associated with Sea Salt

The on-site air monitoring of visibility causing pollutants by the IMPROVE monitoring network is discussed in more detail in Section 4 of this document. In Equation 1, total sulfate, nitrate and organic carbon compound concentrations are each divided into two particle size fractions, representing small and large size particle components. Site-specific Rayleigh scattering is calculated by IMPROVE for the elevation of the site as well as annual average temperature of each IMPROVE monitoring site.

Once light extinction is calculated, visibility levels (in deciviews (dv)) can be calculated. The deciview equation is as follows:

$$\text{Deciviews (dv)} = 10 \ln (b_{ext}/10) \quad \text{Equation 2}$$

where ln is the natural log function and B_{ext} is calculated using the IMPROVE equation previously described. The calculated deciviews are unitless values where the higher the value, the greater amount of visibility impairment exists.

Standard, Fine Particulate Matter Attainment Demonstration, Proposal, June 16, 2008.

[12] Review of the IMPROVE Equation for Estimating Ambient Light Extinction Coefficients - Final Report Jenny L. Hand and William C. Malm, March 2006

Equations 1 and 2 were used to calculate the baseline and projected visibility impairment in the Brigantine Wilderness Area and was used to set the progress goals as established in this document (see Section 3).

2.0 GENERAL PLANNING PROVISIONS

2.1 Regional Planning

When the Regional Haze Rule was promulgated by the USEPA, it contained a provision to encourage the formation of regional planning groups to assist the States in creating their Regional Haze State Implementation Plans (SIP). New Jersey agreed to participate in a Regional Planning Organization (RPO).

Using this early direction as a guide, the USEPA and affected states/tribes agreed to create five RPOs to facilitate interstate coordination on Regional Haze SIPs. New Jersey is a member of the Mid-Atlantic/Northeast Visibility Union (MANE-VU) RPO. Members of MANE–VU are listed in Table 2.1. New Jersey continues to work with its MANE-VU partners to jointly address regional haze issues. Additional background information on MANE-VU can be found in Appendix B.

Table 2.1: Mid-Atlantic/Northeast Visibility Union Members* (MANE-VU)

Connecticut	Pennsylvania
Delaware	Penobscot Nation
District of Columbia	Rhode Island
Maine	St. Regis Mohawk Tribe
Maryland	Vermont
Massachusetts	U.S. Environmental Protection Agency
New Hampshire	U.S. National Park Service
New Jersey	U.S. Fish and Wildlife Service
New York	U.S. Forest Service

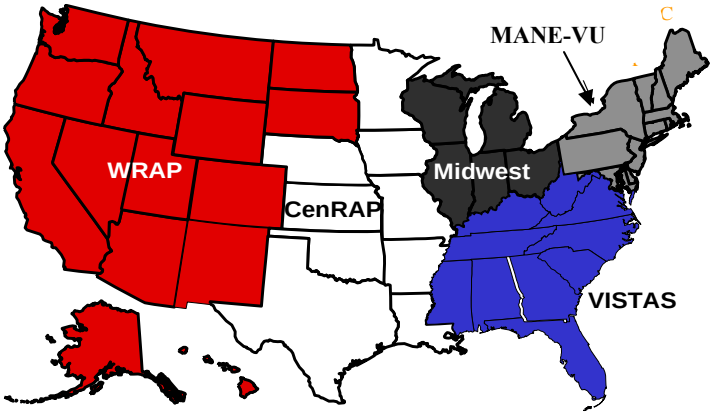
*The U.S. Environmental Protection Agency, U.S. National Park Service, U.S. Fish and Wildlife Service and U.S. Forest Service are non-voting members.

MANE-VU's managing body is a Board, composed of the Commissioners or Secretaries of the Environmental Departments and Agencies of the member states and tribes. This managing Board is responsible for the decision making of the group and sets the direction and funding priorities for the organization. MANE-VU established an active committee structure, composed of staff members from the participating states and tribes, to address both technical and non-technical issues related to regional haze.

Figure 2.1 shows the other Regional Planning Organizations (RPOs) and their member States. As discussed in Section 7, New Jersey identified the states in the midwest, i.e., states in the Midwest RPO, and southeast, i.e., states in the VISTAS RPO, as causing or contributing to visibility impairment in the Brigantine Wilderness Area. New Jersey consulted with the Midwest RPO and the VISTAS RPO in accordance with the Regional Haze Rule.[13] The details of the consultation process are described in Section 8 and in Appendix C.

[13] 40 C.F.R. § 51

Figure 2.1: Regional Planning Organizations for Regional Haze



On June 20, 2007, the Commissioners of the states with mandatory Class I Federal areas in the MANE-VU region signed a Resolution regarding principles for implementing the regional haze rule. This set of principles include: establishing the reasonable progress goals for MANE-VU Class I areas by identifying reasonable measures that can be implemented by 2018; inviting all identified contributing states to review the identified measures; and asking that the states make timely emissions reductions. The principles also call on the USEPA to implement any national or regional measures deemed reasonable through the consultation process in a timely manner, and a commitment from the states to submit the 5-year progress reports required by the regional haze rule as a revision to the states' initial SIP revision. The Class I states will rely on adequate Federal funding to comply with this Federal requirement. The signed resolution is documented in Appendix D.

This proposed SIP revision utilizes data analysis, modeling results and other technical support documents prepared for MANE-VU members to determine the states contributing to the visibility impairment at Brigantine Wilderness Area and to determine the reasonable measures to set the 2018 reasonable progress goal.

2.2 State and Federal Land Manager Coordination

40 C.F.R. § 51.308(i) requires coordination between States and the Federal Land Managers. The Federal Land Manager for the Brigantine Wilderness Area is the U.S. Fish and Wildlife Service of the U.S. Department of the Interior. As required, the State of New Jersey provided the name and title of a contact person within the NJDEP to the Federal Land Manager. In development of this proposed SIP Revision, the Federal Land Manager was consulted in accordance with the provisions of 40 C.F.R. § 51.308(i)(2). Additionally, the Department of Environmental Protection staff met with the Federal Land Manager at the Brigantine Wilderness Area, and conferred through conference calls. The State of New Jersey will continue to consult with the Federal Land Manager regarding future progress reports and plan revisions.

3.0 ASSESSMENT OF BASELINE AND NATURAL CONDITIONS WITHIN THE BRIGANTINE WILDERNESS AREA

3.1 Requirement, Data and Methods Used

Baseline conditions represent the visibility conditions which existed on the best and worst days at the time the regional haze program was established for each Class I area. The Baseline is the average visibility (in deciviews) on the 20% most impaired days, or "worst" days, and on the 20% least impaired days, or "best days," for the years 2000 through 2004.[14]

Natural background visibility conditions are the visibility conditions that would exist in absence of human-caused impairment,[15] i.e., the visibility conditions before human activities affected air quality in the area.

Each State with a Class I area must establish goals (expressed in deciviews) that provide for reasonable progress toward the goal of achieving natural visibility by 2064. The plans for achieving the reasonable progress goals must provide for an improvement in visibility on the most impaired days and ensure no degradation in visibility on the least impaired days.

The USEPA established procedures for calculating visibility levels, using available air monitoring data.[16] On-site air monitoring data at the Brigantine Wilderness Area were collected from the Interagency Monitoring of Protected Visual Environments (IMPROVE) air monitoring network and used to calculate the historic deciview levels as contained in this proposed SIP revision.[17]

The Northeast States for Coordinated Air Use Management (NESCAUM) evaluated the data from the IMPROVE monitor at the Brigantine Wilderness Area and calculated the baseline conditions using on-site data gathered within the 5-year period of 2000 to 2004.[18] This value sets the starting point to measure visibility impairment in the Brigantine Wilderness Area .

3.2 Baseline and Natural Visibility at the Brigantine Wilderness Area

Natural background conditions, the conditions that would exist in the absence of all man-made pollution, represents the visibility goal for each Class I area to achieve in 2064. Natural background concentrations of naturally occurring air contaminants were estimated, using the USEPA guidance[19] and Equations 1 and 2.[20]

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[14] USEPA. Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze. Pg. 76. EPA-454/B-07-002. April 2007

[15] NESCAUM. Baseline and Background Visibility Conditions. December, 2006

[16] 40 C.F.R. § 51.301 and 51.308(d)(4)

[17] The IMPROVE monitoring network was set-up by the USEPA and the Federal Land Managers to measure air quality in certain national parks and wilderness areas (See Section 4)

[18] Ibid

[19] USEPA. Guidance for Estimating Natural Visibility Conditions under the Regional Haze Rule, EPA-454/B-03-005, September, 2003

[20] 40 C.F.R. § 51.301

The estimated natural background visibility in the Brigantine Wilderness Area for 20% worst days is 12.2 deciviews. The calculation of this value is described in Appendix E.

The five-year average baseline visibility, using the on-site monitoring data from the years 2000 to 2004, for the Brigantine Wilderness Area is 14.3 deciviews for the 20 percent best visibility days (least impaired) and 29.0 deciviews for the 20 percent worst visibility days (most impaired). These values were calculated for both best and worst visibility in accordance with 40 C.F.R. § 51.308(d)(2).

The regulations require that the rate of improvement projected for the long range strategy be compared with the uniform rate of progress. The uniform rate of progress is calculated by dividing the level of improvement needed (current conditions – natural background goal) by the time to meet the goal, or sixty (60) years. For the 2018 reasonable progress goal, this was calculated as follows:

29.0 deciviews – 12.2 deciviews / 60 years (difference between 2004 and 2064)

= 0.28 deciviews /year x 14 years (between 2004 and 2018)

= 3.9 deciview improvement by 2018

Or as the 2018 goal:

29.0 – 3.9 = 25.1 deciview in 2018

These data are summarized in Table 3.1.

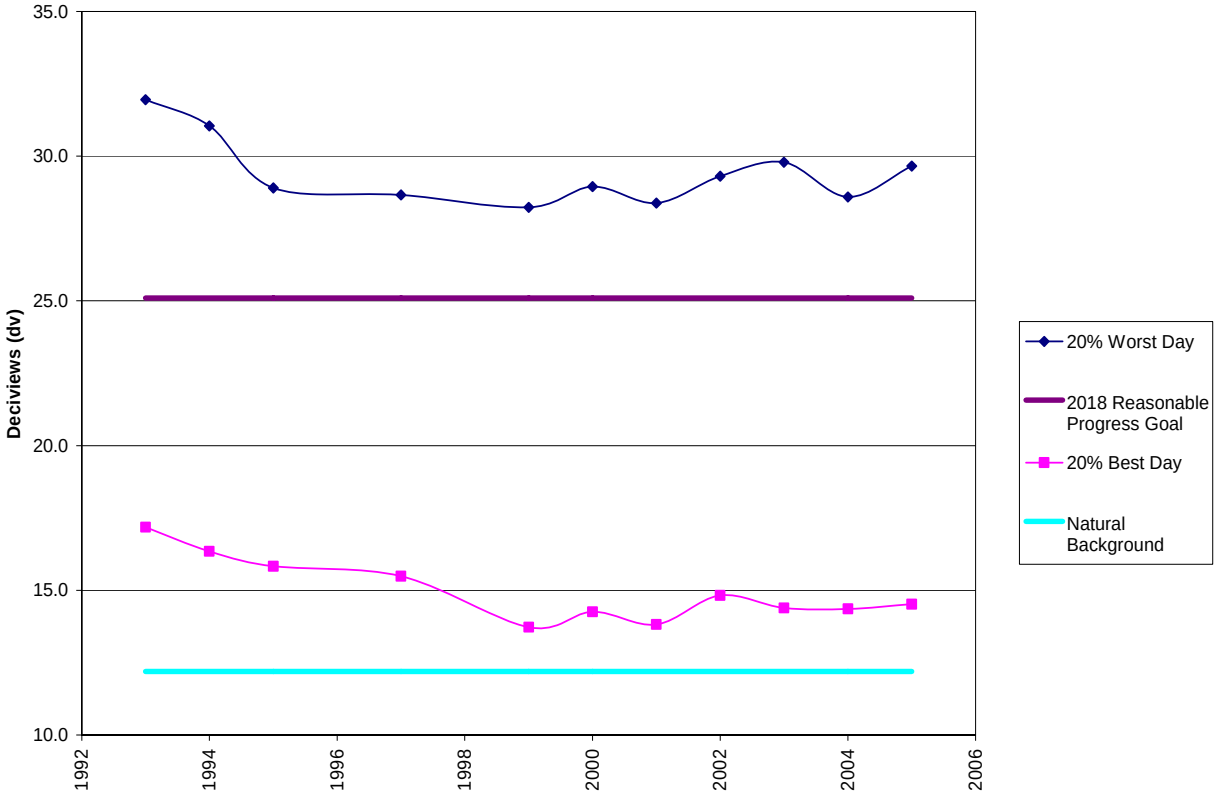
Table 3.1: Visibility Information for the Brigantine Wilderness Area

Conditions	Deciviews
Natural Background Visibility on 20% of worst visibility days (Goal in 2064)	12.2
Average Baseline Visibility on 20% of best visibility days (2000 – 2004)	14.3
Average Baseline Visibility on 20% worst visibility days (2000 – 2004)	29.0
Uniform Rate of Progress in 2018 on the 20% worst visibility days	25.1

3.3 Visibility Trends at the Brigantine Wilderness Area

Figure 3.1 presents the trends in the visibility impairment levels as recorded at the Brigantine Wilderness Area. The figure shows that visibility slightly improved at the Brigantine Wilderness Area between 1993 and 2005. The downward trend impairment in the levels is most noticeable after the implementation of the first phase of the Clean Air Act's Acid Rain Program sulfur dioxide controls in the early 1990's, but this downward trend has leveled off in recent years.

Figure 3.1: Trends in Visibility Levels at the Brigantine Wilderness Area 1993 to 2005



4.0 MONITORING STRATEGY FOR VISIBILITY IMPAIRMENT IN THE BRIGANTINE WILDERNESS AREA

4.1 Introduction

Visibility conditions representative of those within the Brigantine Wilderness Area are monitored by the Federally operated Interagency Monitoring of Protected Visual Environments program, or also known as the IMPROVE monitoring program. In 1985, the IMPROVE monitoring program was established to measure visibility impairment in mandatory Class I areas throughout the United States. This monitoring is designed to aid the creation of Federal and State implementation plans for the protection of visibility in Class I areas stipulated in the 1977 amendments to the Clean Air Act. Data from the IMPROVE monitoring program have been collected since the early 1990s at the Brigantine Wilderness Area.

The IMPROVE monitoring sites are operated and maintained through a formal cooperative relationship between the USEPA, the U.S. National Park Service, the U.S. Fish and Wildlife Service, the Bureau of Land Management, and U.S. Forest Service. In 1991, several additional organizations joined the effort. These organizations include the National Association of Clean Air Agencies (formerly State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials), Western States Air Resources Council, Mid-Atlantic Regional Air Management Association, and the Northeast States for Coordinated Air Use Management.

IMPROVE Program Objectives

Data collected at these sites are used by land managers, industry planners, scientists, public interest groups, and air quality regulators to understand and protect the visual air quality resource in Class I areas. Most importantly, the IMPROVE program scientifically documents for American citizens, the visual air quality of their wilderness areas and national parks. Program objectives include:

- Establish current visibility and aerosol conditions in mandatory Class I areas,
- Identify chemical species and emission sources responsible for existing man-made visibility impairment,
- Document long-term trends for assessing progress towards the national visibility goals,
- Provide regional haze monitoring representing all visibility-protected Federal Class I areas where practical, as required by the USEPA's Regional Haze Rule.

4.2 Monitoring Information and Strategy for the Brigantine Wilderness Class I Area

40 C.F.R. § 51.308(d)(4) requires a monitoring strategy for measuring, characterizing, and reporting regional haze visibility impairment that is representative of all mandatory Class I Areas within the State. The monitoring strategy for New Jersey relies upon the continued availability of the IMPROVE network.

The IMPROVE monitor for the Brigantine Wilderness Area (indicated as BRIG1 in the IMPROVE monitoring network database) is located outside the Edwin B. Forsythe National

Wildlife Refuge Headquarters in Oceanville, New Jersey at an elevation of 5 meters, a latitude of 39.47˚ and a longitude of -74.45˚.

Figure 4.1: The IMPROVE Monitor at the Brigantine Wilderness Area - BRIGI

Since access to or disturbance of the wilderness area is meant to be limited or non-existent in order to protect the ecological and biological resources, the monitoring station is located as close as possible to, but not within, the wilderness area. Being located as close as practicable to the wilderness area means that the air monitoring data collected is representative of the air quality within the wilderness area but does not disturb the wilderness area's ecology, or natural resources.

The haze data for Brigantine Wilderness Area are collected by an IMPROVE monitor that is operated and maintained by the U.S. Fish and Wildlife Service. In 2007, NJDEP established at the same location a monitoring station that measures trace level SO_2 and $PM_{2.5}$ using continuous and Federal reference methods for sample collection. A visibility camera was also installed in 2007. NJDEP is currently testing a real time sulfate analyzer, but it is not yet in operation. This station replaces the one previously located nearby at the Nacote Creek Research station in Galloway Township.

The NJDEP worked extensively over the past two years to consolidate and coordinate the air monitoring sites in the area. The NJDEP plans to monitor the following air contaminants at the Brigantine Wilderness Area and maintain the monitors at this location if shown to be viable, to produce scientifically valid results, and to provide information needed to ascertain attainment of any national ambient air quality standard including progress to the national visibility goals.

The planned monitoring at this site includes:

- Continuous Ozone,
- Fine Particulate - $PM_{2.5}$ (measured by the Federal Reference Method),
- Fine Particulate - $PM_{2.5}$ (measured by a continuous instrument),
- Trace Gas Analyzer for SO_2,
- Continuous Sulfate (if proven practical by NESCAUM and NJDEP),
- NO_x / NO_y[21] (anticipated to be conducted by Stockton State College in NJ),
- An On-Site Camera to observe visibility levels,[22] and a
- Nephelometer.

The NJDEP plans to operate and maintain the monitoring site at the Brigantine Wilderness Area for the foreseeable future, although this is contingent upon continued Federal and State funding. Any network changes will be subject to a joint annual review process by both the NJDEP and the USEPA.

Assuming continued availability of the IMPROVE monitoring data, New Jersey developed a monitoring strategy that is representative of the Class I area, and addresses the transport of pollutants from other areas to the Class I area. This program meets the requirements of 40 C.F.R. §51.305. The measurement of ozone and fine particulate concentrations, as well as NO_x/NO_y, SO_2 and sulfate, along with the continued collection of data by the IMPROVE program, will provide data from this location that can be used to assess transported pollutants and their sources. Information that can be directly correlated with the on-site Nephelometer / Camera will be collected and made available for analysis.

[21] NO_x is the abbreviation for oxides of nitrogen; NOy is the abbreviation for total reactive nitrogen.
[22] The camera results from Brigantine is available on a real time basis at http://www.hazecam.net/brigantine.html

5.0 EMISSION INVENTORY

5.1 Regional Emission Inventory

The USEPA approved the 2002 Emission inventory for New Jersey on July 10, 2006. New Jersey also submitted this 2002 Base Year inventory to the USEPA's National Emission Inventory (NEI)[23] database as required by the Consolidated Emission Reporting Rule (CERR). In addition, this 2002 inventory served as the baseline inventory for New Jersey's 8-Hour Ozone Attainment Demonstration State Implementation Plan (SIP), completed in October 2007, and the $PM_{2.5}$ Attainment Demonstration SIP, proposed on June 16, 2008.

40 C.F.R. § 51.308(d)(3)(iii) requires New Jersey to identify the baseline emission inventory on which emission reduction strategies to improve visibility are based. Based on USEPA guidance,[24] 2002 was identified as the baseline emission inventory year for regional haze. As such, New Jersey and the MANE-VU states used 2002 as the baseline year for their Regional Haze SIP. New Jersey worked with other MANE-VU states in contributing to the development of the regional inventory compiled by the Mid-Atlantic Regional Air Management Association (MARAMA).[25] Version 3 of the 2002 base year emission inventory was used in the regional modeling exercise. Technical support documentation for the MANE-VU 2002 base year inventory is presented in Appendix F. Emission inventory data files are available on the MARAMA website at: http://www.marama.org/visibility/EI_Projects/index.html. The 2002 emission inventories from non-MANE-VU areas within the modeling domain were obtained from other Regional Planning Organizations for their corresponding areas. The regional planning organizations and inventories included the Midwest Regional Planning Organization (MWRPO) - version K, and the VISTAS RPO - the G2 inventory.

This proposed Regional Haze SIP also includes a regional inventory for projected emissions for 2018 (i.e., the first planning period year). The MANE-VU states used the 2018 MARAMA compiled inventory, version 3, as the future year inventory to evaluate the benefits of additional control measures. The emission control scenarios used for this future year inventory include:

1. A combined on-the-books/on-the-way (OTB/OTW)[26] control strategy accounting for emission control regulations already in place as of June 15, 2005, as well as some emission control regulations expected to achieve additional emission reductions by 2009.

2. A beyond-on-the way (BOTW)[27] scenario to account for controls from potential new regulations that may be necessary to meet attainment and other regional air quality goals, mainly for ozone.

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[23] 65 Fed. Reg. 33268-80 (May 23, 2000) and http://www.epa.gov/ttn/chief/cerr/CERR_FR.pdf.

[24] 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.

[25] See http://www.marama.org/visibility

[26] State Implementation Plan (SIP) Revision for the Attainment and Maintenance of the Ozone National Ambient Air Quality Standard, 8-Hour Ozone Attainment Demonstration, Chapter 4 – Control Measures, page 4-1, Final, October 29, 2007

An updated scenario to account for additional potentially reasonable control measures. For the MANE-VU region, these include: SO_2 reductions at a set of 167 EGU stacks which were identified as contributing to visibility impairment at northeast Class I areas, implementation of a low-sulfur fuel strategy for non-EGU sources, and implementation of a Best Available Retrofit Technology (BART) strategy for BART-eligible sources not controlled under other programs. Documentation for the future year estimations of EGUs and the remaining source sectors (non-EGU sectors) is presented in Appendix F.

5.1.1 Components of the Regional Emission Inventory

40 C.F.R. § 51.308(d)(4)(v) requires a statewide emission inventory of pollutants that reasonably anticipate to cause or contribute to visibility impairment in any mandatory Class I area. As specified in the applicable USEPA guidance, the pollutants inventoried by the State of New Jersey include:

- volatile organic compounds,
- nitrogen oxides,
- fine particulate matter ($PM_{2.5}$),
- coarse particulate matter (PM_{10}),
- ammonia, and
- sulfur dioxides.

The emission inventories also include carbon monoxide (CO), but this pollutant does not contribute to regional haze.

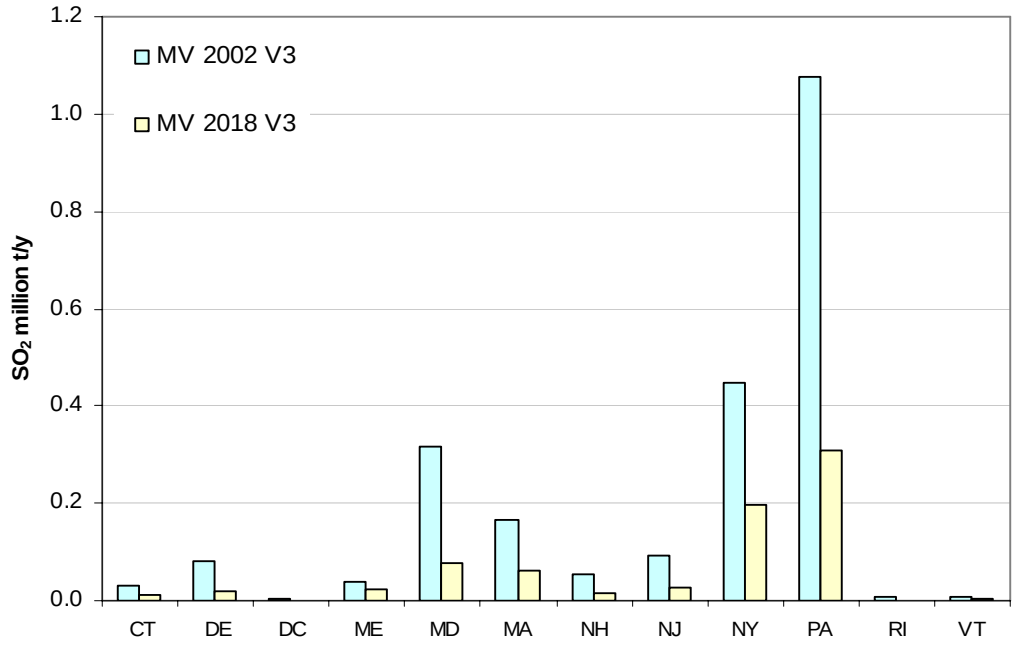
5.2 Emission Inventory Characteristics

5.2.1 Sulfur Dioxide (SO_2)

Figure 5.1 shows SO_2 emissions trends in the MANE-VU states extracted from the NEI for the 2002 MANE-VU inventory,[27,28] and the 2018 MANE-VU projections. All the states, including New Jersey, show declines in the 2018 annual SO_2 emissions as compared to the 2002 emissions.

[27] ibid.
[27] USEPA, 2005 http://www.epa.gov/ttn/chief/eiinformation.html
[28] MARAMA 2004, http://www.marama.org/visibility/2002%20NEI/index.html

Figure 5.1: MANE-VU State Level Sulfur Dioxide Emissions



Note that Figure 5.1 only shows the SO_2 emissions from the MANE-VU states. Sulfur dioxide emissions from the Midwest, VISTAS, and CENRAP states were also included in the modeling to set the progress goal for the Brigantine Wilderness Area and SO_2 emissions from EGUs and fuel burning sources in these regions were included in the regionally prepared inventories. Figure 5.2 shows the contribution from different source categories to the overall, annual 2002 SO_2 emissions in the MANE-VU states. The chart shows that point sources dominate SO_2 emissions, which primarily consist of stationary combustion sources for generating electricity, industrial energy, and heat. Smaller stationary combustion sources called "area sources" (primarily commercial and residential heating) are another important source category in the MANE-VU states. By contrast, on-road and non-road mobile sources make only a relatively small contribution to overall SO_2 emissions in the region,[29] except in New Jersey where the contributions from on-road sources are more than that from area sources.

[29] NESCAUM, "Regional Haze and Visibility in the Northeast and Mid-Atlantic States," January 2001.

Figure 5.2: 2002 Annual SO_2 Emissions
(Bar graph: Percentage fraction of four source categories,
Circle: Annual emissions amount in 10^6 tons per year)

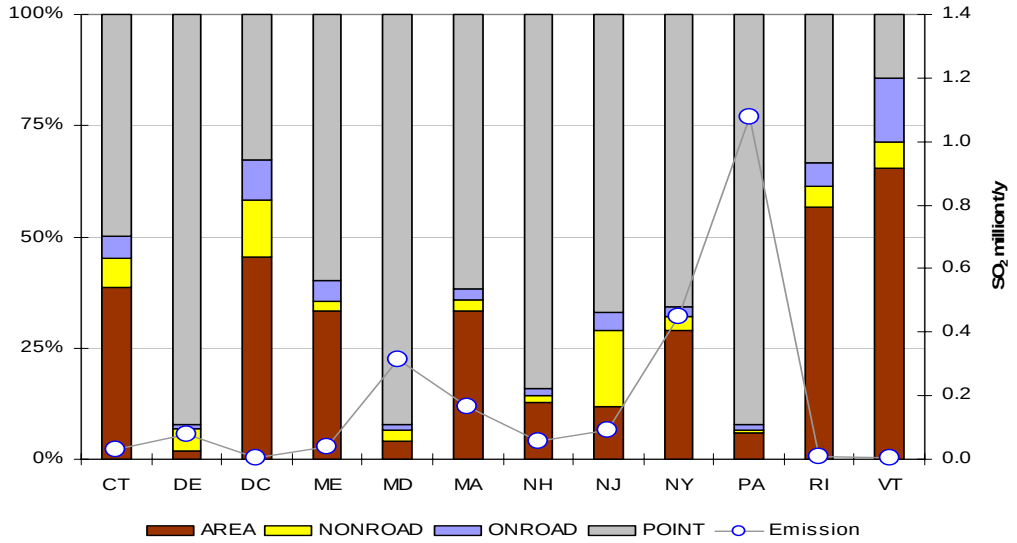


Figure 5.3: 2018 Annual SO_2 Emissions
(Bar graph: Percentage fraction of four source categories,
Circle: Annual emissions amount in 10^6 tons per year)

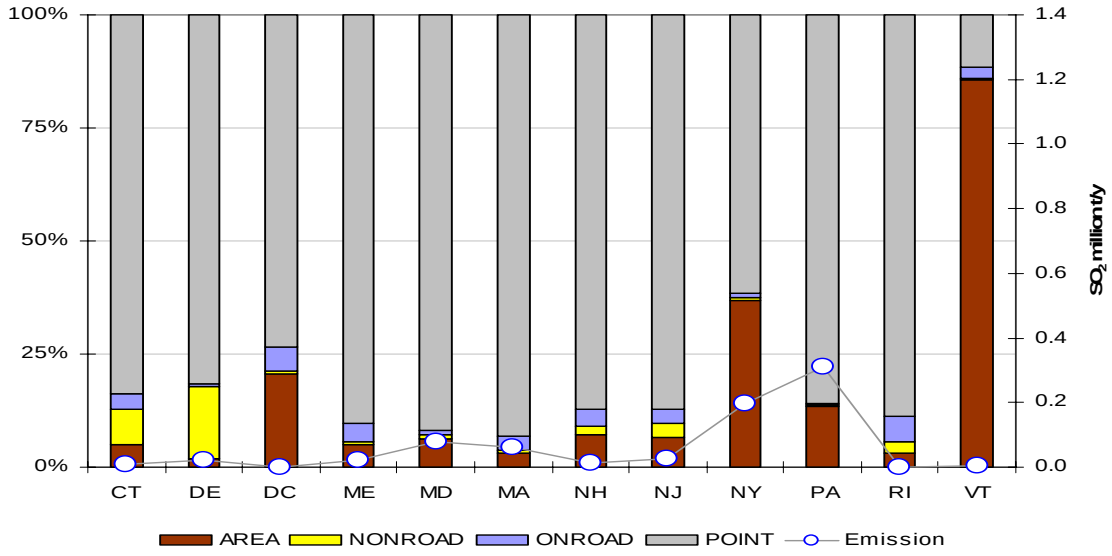


Figure 5.3 shows that point sources still dominate SO_2 emissions in New Jersey and in the other MANE-VU states.

5.2.2 Volatile Organic Compounds (VOC)

Volatile Organic Compounds (VOCs) are chemicals or mixtures of organic chemicals that evaporate easily at room temperature. The USEPA defines VOC as any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions.[30] The VOC inventory category is of interest primarily from the organic carbon perspective of $PM_{2.5}$. From a regional haze perspective, there is less concern with the volatile organic gases emitted directly to the atmosphere and more with the secondary organic aerosol (SOA) that the VOCs form after condensation and oxidation processes.

Figure 5.4: MANE-VU State Level VOC Emissions

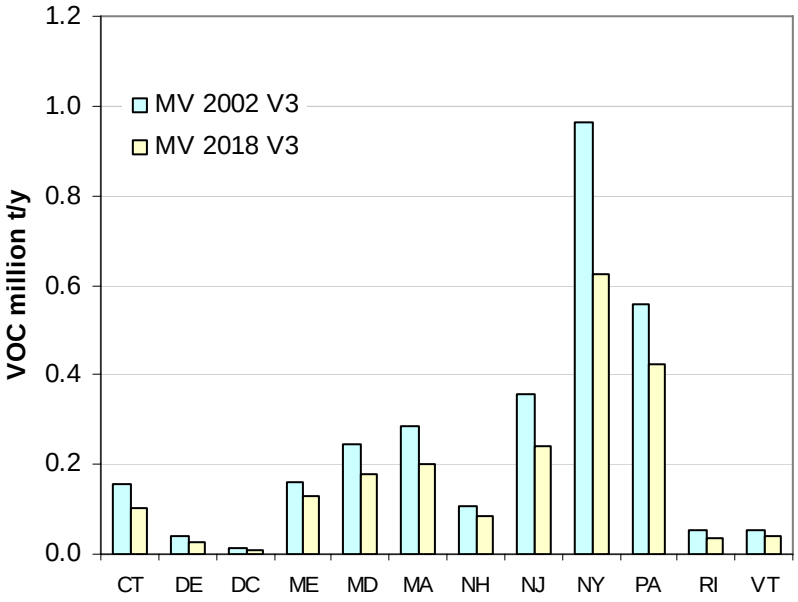


Figure 5.4 shows VOC emissions trends in the MANE-VU states extracted from the NEI for the 2002 MANE-VU inventory and the 2018 MANE-VU projections. All states show declines in 2018 annual VOC emissions as compared to 2002 emissions.

As seen in Figures 5.5 and 5.6, the VOC inventory is dominated by mobile and area sources. On-road mobile sources of VOCs include exhaust emissions from gasoline passenger vehicles and heavy duty vehicles as well as evaporative emissions from transportation fuels. VOC emissions may also originate from a variety of area sources (including solvents, architectural coatings, and dry cleaners) as well as from some point sources (e.g., industrial facilities and petroleum refineries).

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

Figure 5.5: 2002 Annual VOC Emissions
(Bar graph: Percentage fraction of four source categories,
Circle: Annual emissions amount in 10^6 tons per year)

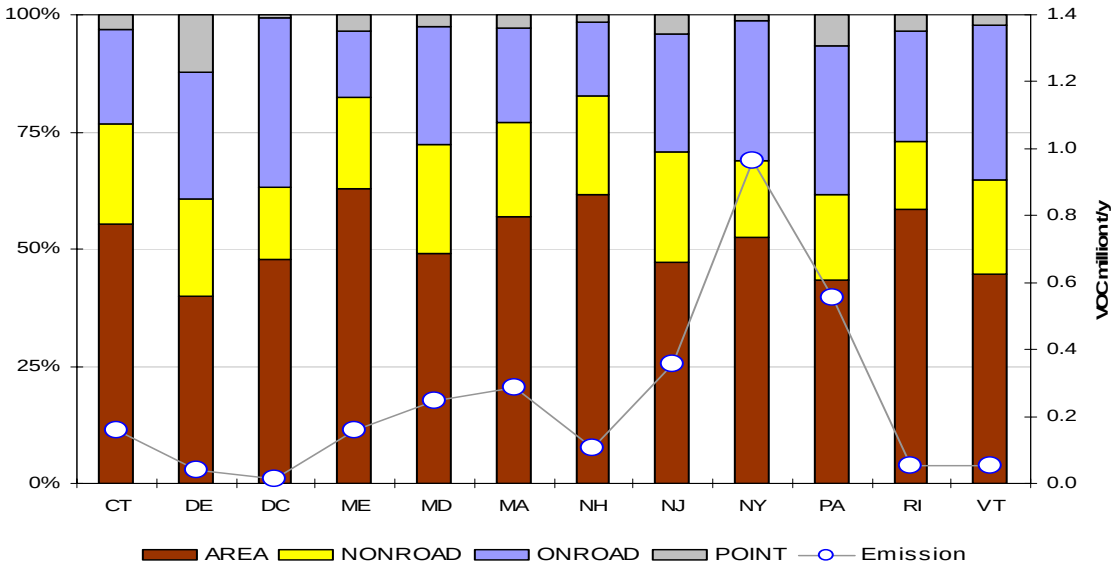
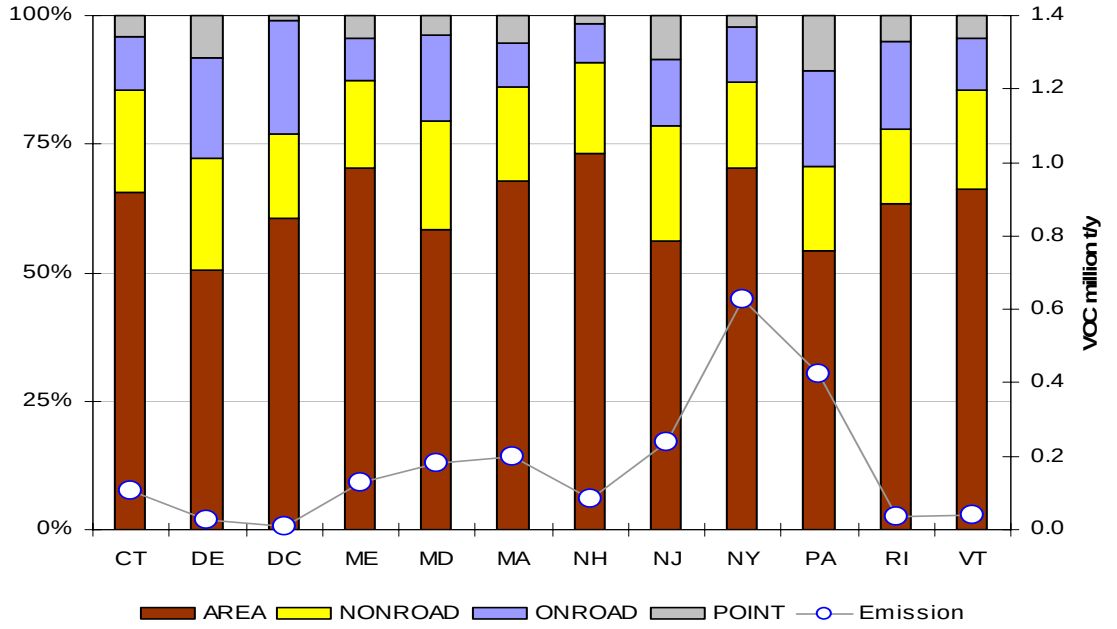


Figure 5.6: 2018 Annual VOC Emissions
(Bar graph: Percentage fraction of four source categories,
Circle: Annual emissions amount in 10^6 tons per year)



The Brigantine Wilderness Area is surrounded on three sides by the coniferous forests in the Pinelands National Reserve, an internationally important ecological region of 1.1 million acres in size and occupying 22 percent (%) of New Jersey's land area. It is the largest body of open space on the Mid-Atlantic seaboard between Richmond, Virginia and Boston, Massachusetts. While the biogenic emissions from the coniferous trees of the Pinelands area are thought to adversely

affect visibility, New Jersey does not need to address them in this SIP for a variety of reasons. The first is that the Congressional goal for visibility requires only the absence of all man-made pollution by the year 2064 and not the reduction or absence of all biogenic emissions. Thus the emissions from biogenic sources are accounted for in setting the natural background target goal to be reached in 2064. Natural background levels assume that a certain degree of visibility impairment is due to biogenic and other natural sources.

5.2.3 Oxides of Nitrogen

Oxides of Nitrogen (NO_X) emissions contribute directly to visibility impairment in the eastern United States by forming light-scattering nitrate particles. Nitrate generally accounts for a substantially smaller fraction of fine particle mass and related light extinction than sulfate and organic carbon at northeastern Class I sites. Notably, nitrate may play a more important role at urban sites and in the wintertime. In addition, NO_X may have an indirect effect on summertime visibility by virtue of its role in the formation of ozone, which in turn promotes the formation of secondary organic aerosols.[31]

Figure 5.7 shows NO_X emissions at the state level in the MANE-VU region. This increase is most likely due to industrial sources and the transportation sector, as power plant combustion sources have implemented modest emissions reductions during the same time period and better inventory methods. NO_x emissions from all states are projected to decline from 2002 to 2018.

Figure 5.7: MANE-VU State Level Nitrogen Oxide Emissions

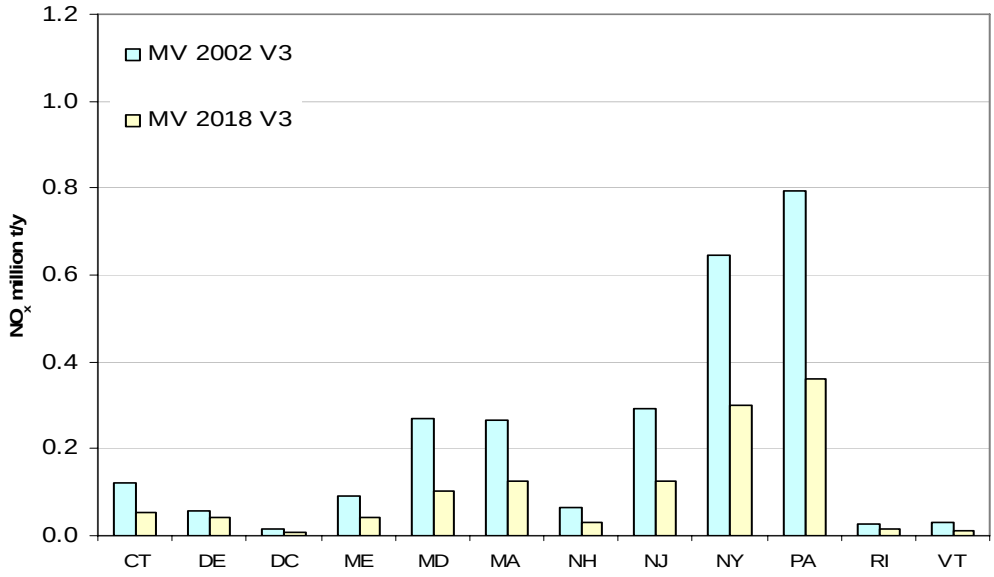


Figure 5.8 shows that mobile sources dominated the NO_x emissions inventories for the states in 2002. Figure 5.9 shows that in 2018, the emissions are almost evenly distributed among all the sectors.

[31] NESCAUM, "Regional Haze and Visibility in the Northeast and Mid-Atlantic States," January 2001

Figure 5.8: 2002 Annual NO_X Emissions
(Bar graph: Percentage fraction of four source categories,
Circle: Annual emissions amount in 10^6 tons per year)

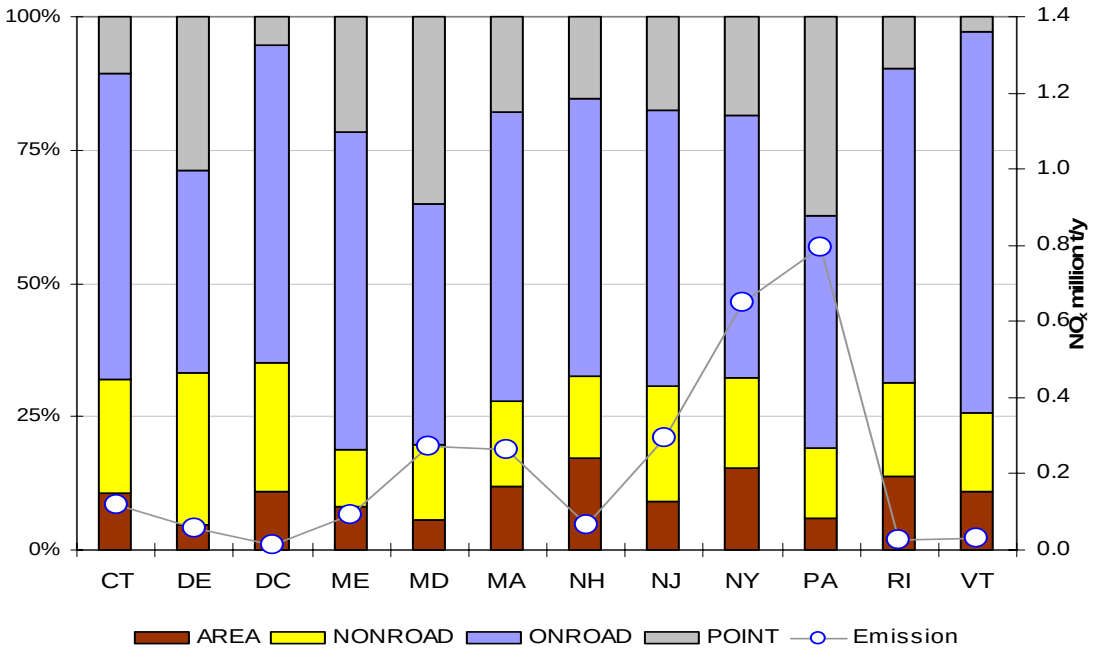
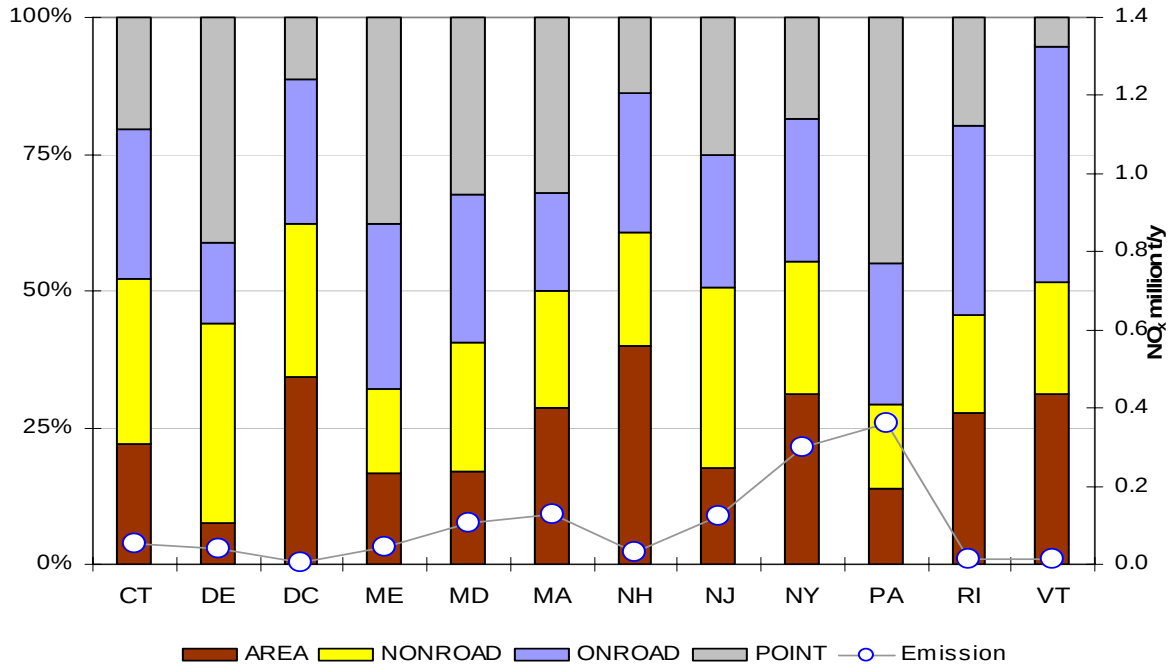


Figure 5.9: 2018 Annual NO_X Emissions
(Bar graph: Percentage fraction of four source categories,
Circle: Annual emissions amount in 10^6 tons per year)



5.2.4 Primary Particulate Matter (PM_{10} and $PM_{2.5}$)

Directly-emitted or "primary" particles (as distinct from secondary particles that form in the atmosphere through chemical reactions involving precursor pollutants like SO_2 and NO_X) can also contribute to regional haze. For regulatory purposes, a distinction is made between particles with an aerodynamic diameter less than or equal to 10 micrometers and smaller particles with an aerodynamic diameter less than or equal to 2.5 micrometers (i.e., primary PM_{10} and $PM_{2.5}$, respectively). Figure 5.10 and Figure 5.11 show PM_{10} and $PM_{2.5}$ emissions for the MANE-VU states for the years 2002 and 2018. PM_{10} and $PM_{2.5}$ emissions from all states are projected to decline from 2002 to 2018

Figure 5.10: MANE-VU State Level Primary PM_{10} Emissions

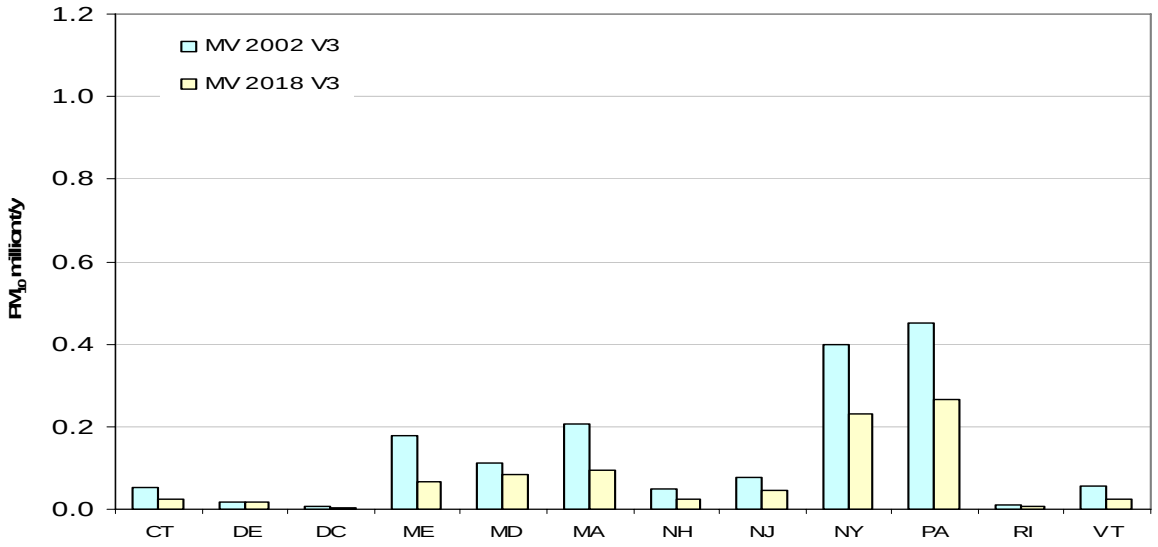
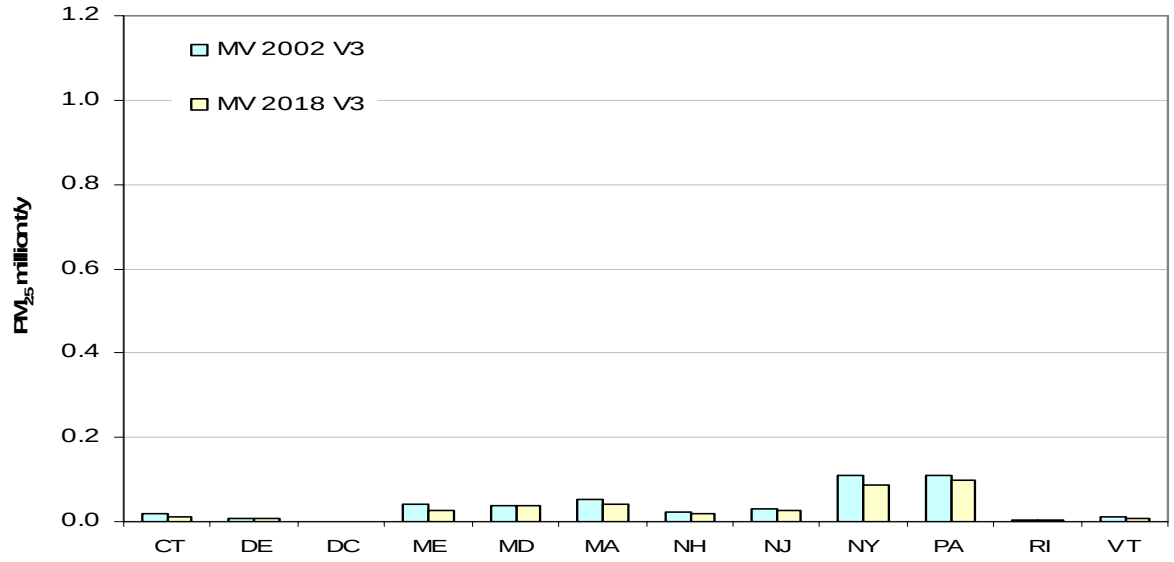


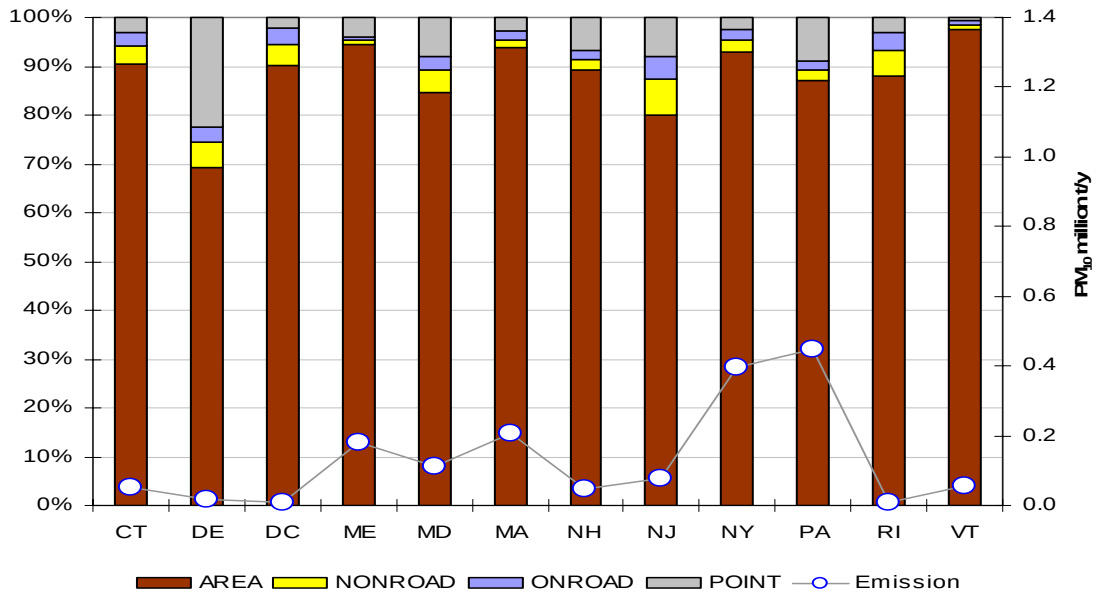
Figure 5.11: MANE-VU State Level Primary $PM_{2.5}$ Emissions



Source attribution studies show that wood burning emissions may be a larger component of the total PM mass in rural areas, like the Brigantine Wilderness Area, than in urban areas. In rural areas, wood burning emissions may contribute five to ten percent of the total PM mass measured at the monitoring site. Another important consideration in this regard is that residential wood combustion occurs primarily in the winter months, while managed or prescribed burning activities occur largely in other seasons. The latter category includes agricultural field-burning activities, prescribed burning of forested areas and other burning activities.

Figures 5.12, 5.13, 5.14 and 5.15 show that area sources, small point sources located over a wide area, dominate the primary PM emissions.[32] The relative contribution of larger point sources is larger in the primary $PM_{2.5}$ inventory than in the primary PM_{10} inventory since the crustal component (which consists mainly of larger or "coarse-mode" particles) contributes mostly to overall PM_{10} levels and not to primary $PM_{2.5}$ levels. At the same time, pollution control equipment commonly installed at large point sources is usually more efficient at capturing coarse-mode particles.

Figure 5.12: 2002 Annual Primary PM_{10} Emissions
(Bar graph: Percentage fraction of four source categories,
Circle: Annual emissions amount in 10^6 tons per year)



[32] The NEI inventory categorizes residential wood combustion and some other combustion sources as area sources.

Figure 5.13: 2002 Annual Primary $PM_{2.5}$ Emissions
(Bar graph: Percentage fraction of four source categories,
Circle: Annual emissions amount in 10^6 tons per year)

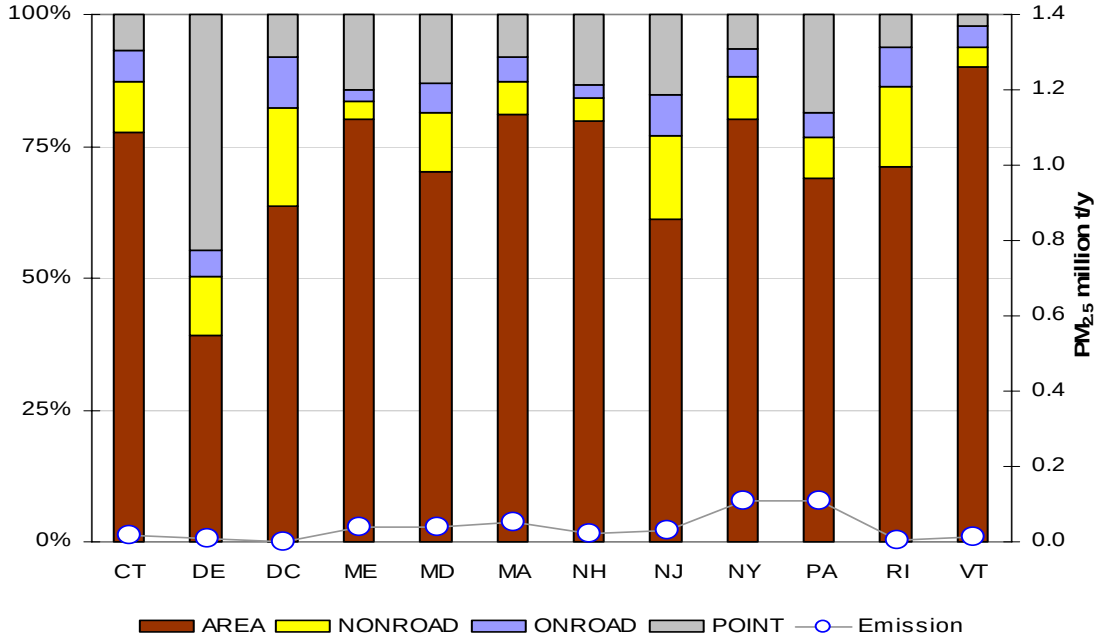


Figure 5.14: 2018 Annual Primary PM_{10} Emissions

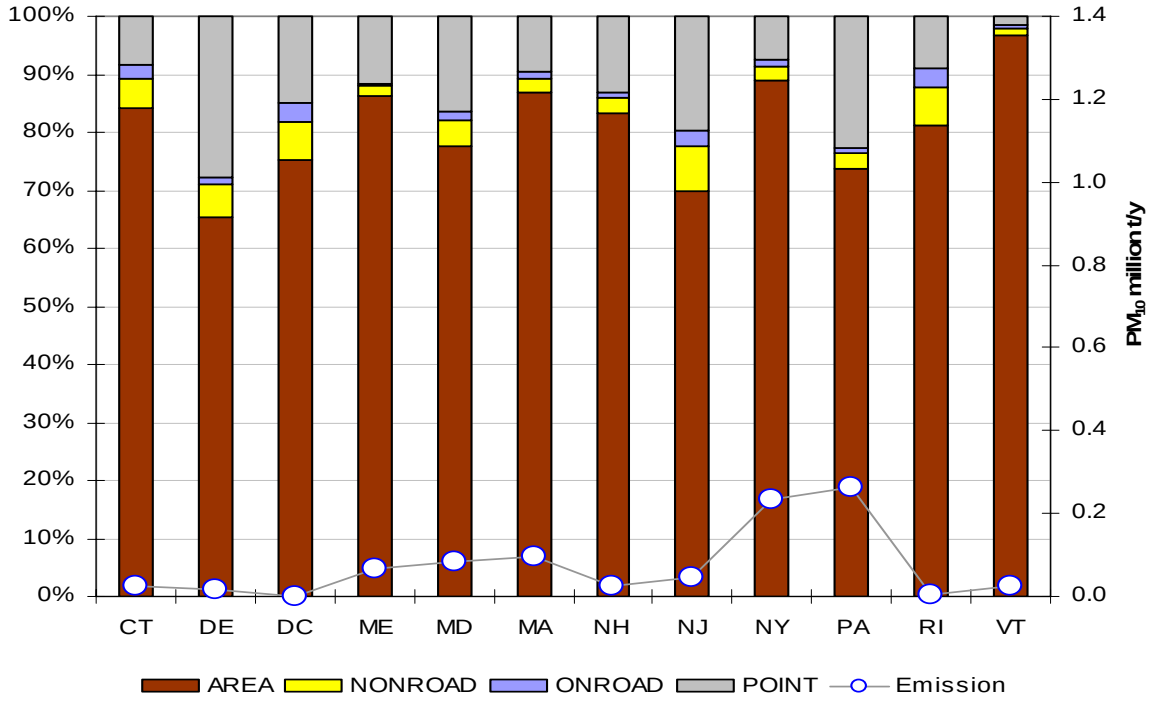
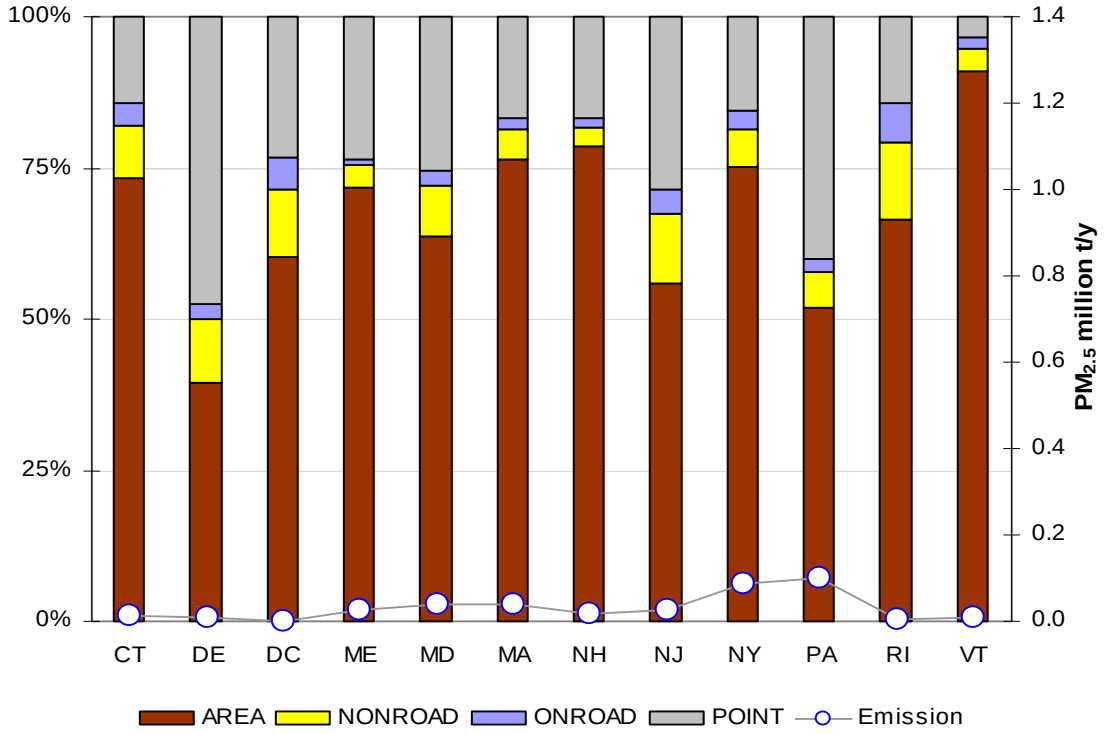


Figure 5.15: 2018 Annual Primary $PM_{2.5}$ Emissions



5.2.5 Ammonia Emissions (NH_3)

Ammonium ion (formed from ammonia emissions to the atmosphere) is an important constituent of airborne particulate matter, typically accounting for ten to twenty percent of total fine particle mass. According to 1998 estimates, livestock, agriculture and fertilizer use accounted for approximately 86 percent of all ammonia emissions to the atmosphere.[33] However, better ammonia inventory data for the photochemical models is needed to simulate fine particle formation and transport in the eastern United States. Because the USEPA does not regulate ammonia as a criteria pollutant or as a criteria pollutant precursor, these data do not presently exist at the same level of detail or certainty as for NO_X and SO_2.

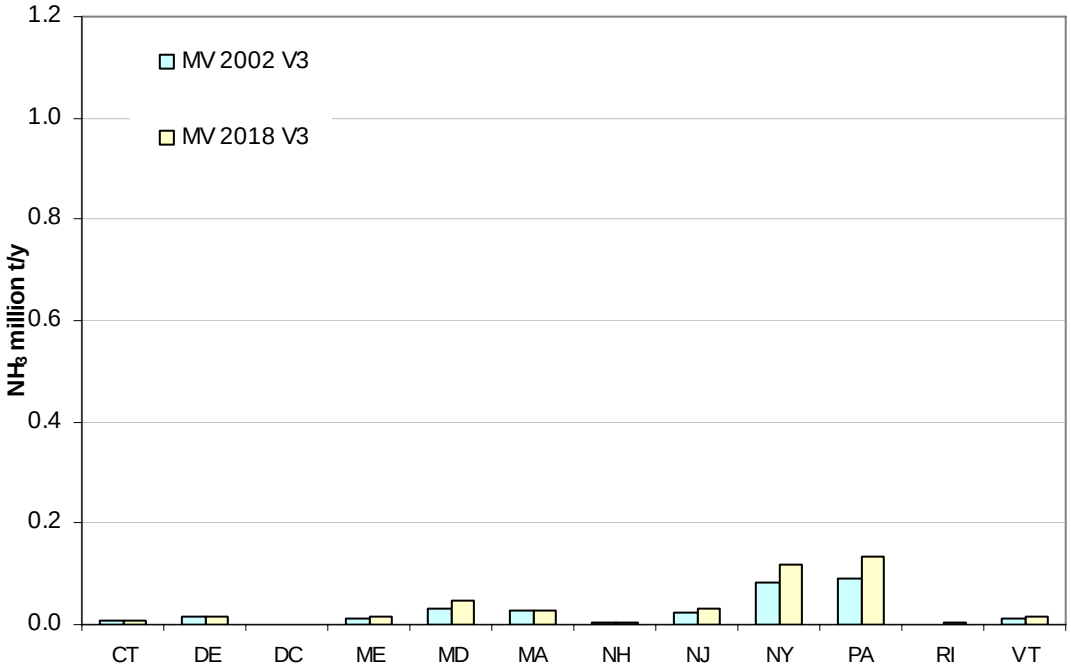
To address the need for improved ammonia inventories, MARAMA, NESCAUM and USEPA funded research at Carnegie Mellon University (CMU) in Pittsburgh to develop a regional ammonia inventory.[34] This study focused on three issues with respect to current emissions estimates: (1) a wide range of ammonia emission factor values, (2) inadequate temporal and spatial resolution of ammonia emissions estimates, and (3) a lack of standardized ammonia source categories.
The CMU project established an inventory framework with source categories, emissions factors, and activity data that are readily accessible to the user. With this framework, users can obtain

[33] USEPA, *National Air Pollutant Trends, 1900 – 1998*, EPA 454/R-00-002, available online: http://www.epa.gov/ttn/chief/trends/trends98/trends98.pdf, 2000b.
[34] Davidson, C., Strader, R., Pandis, S., and Robinson, A., Preliminary *Proposal to MARAMA and NESCAUM: Development of an Ammonia Emissions Inventory for the Mid-Atlantic States and New England*. Carnegie Mellon University, Pittsburgh, PA. 7-Jan. 1999.

data in a variety of formats[35] and can make updates easily, allowing additional ammonia sources to be added or emissions factors to be replaced as better information becomes available.[36, 37]

Figure 5.16 shows that estimated ammonia emissions were fairly stable in 2002 and 2018 for MANE-VU states. Area and on-road mobile sources dominate the ammonia inventory as shown in Figures 5.17 and 5.18. Specifically, emissions from agricultural sources and livestock production account for the largest share of estimated ammonia emissions in the MANE-VU region, except in the District of Columbia. The two remaining sources with significant emissions contribution are wastewater treatment systems and gasoline exhaust from highway vehicles.

Figure 5.16: MANE-VU State Level Ammonia Emissions



[35] For example, the user will have the flexibility to choose the temporal resolution of the output emissions data or to spatially attribute emissions based on land-use data.

[36] Strader, R., Anderson, N., and Davidson, C., *Development of an Ammonia Inventory for the Mid-Atlantic States and New England, Progress Report, October 18, 2000*, available online: http://marama.org/rt_center/MARAMAprogress10-18-00.pdf, 2000.

[37] NESCAUM, "Development of an Improved Ammonia Emissions Inventory for the United States," December 2001.

Figure 5.17
2002 Annual NH_3 Emissions
(Bar graph: Percentage fraction of four source categories,
Circle: Annual emissions amount in 106 tons per year)

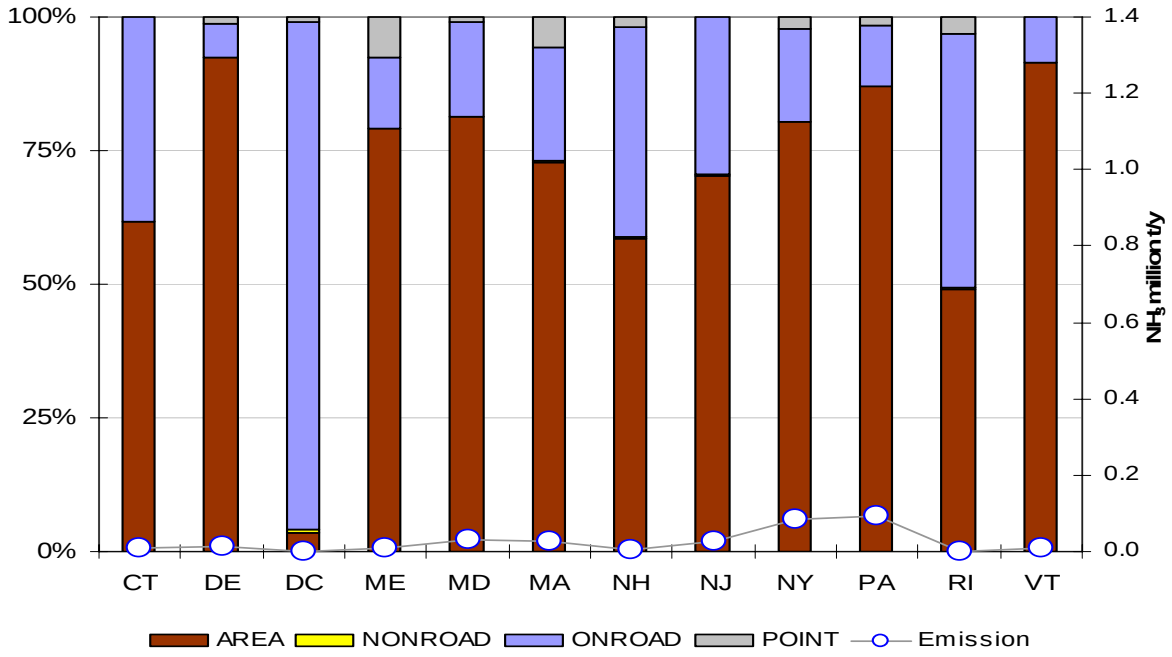
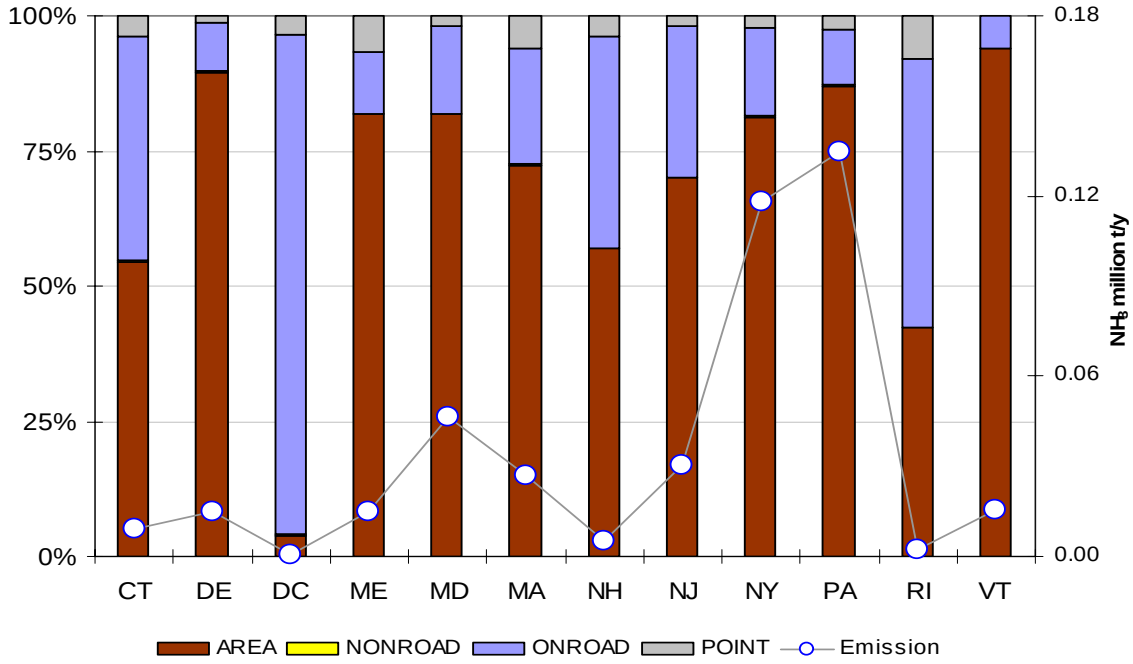


Figure 5.18
2018 Annual NH_3 Emissions



5.3 Source Retirement and Replacement Schedules

40 C.F.R. § 51.308(d)(3)(v)(D) requires New Jersey to consider source retirement and replacement schedules. A full listing of the assumptions for equipment replacement in each State can be found in the documentation for development of the 2018 MANE-VU inventory.[38] In developing the long-term strategy, source retirement and replacement schedules were considered in the following areas when the 2018 inventory was developed:

Mobile Sources: The USEPA's MOBILE6 model considers that a certain number of the vehicle fleet in each State will be replaced every year by newer, less polluting vehicles. This "fleet turn-over" to less polluting vehicles that meet the USEPA Tier II motor vehicle standards was a component of the MOBILE6 modeling. These lower emissions have been built into the 2018 inventory as well as the benefits received from lower sulfur gasoline in on-road diesel and gasoline vehicles and the 2007 heavy-duty diesel standards. The reasons for including the benefits from lower sulfur gasoline in on-road diesel and gasoline vehicles and the 2007 heavy-duty diesel standards in the emission projections for 2018 are discussed in Section 8. All new mobile source measures and standards, as well as any benefits from implementation of individual State Inspection and Maintenance programs and implementation of statewide Low Emissions Vehicle (LEV) standards in applicable states, including New Jersey, were used in developing the 2018 inventory.

Electric Generating Units (EGUs): The MANE-VU 2018 inventory was developed using the Integrated Planning Model (IPM) to forecast growth in electric demand and replacement of older, less efficient and more polluting power plants with newer, more efficient and cleaner units. While the output of the IPM model predicts that a certain number of older plants will be replaced by newer units to meet future electric growth and state-by-state NO_x and SO_2 caps, New Jersey did not directly rely upon the closure of any particular plant in establishing the 2018 inventory upon which the reasonable progress goals were set. The IPM model results are not the basis upon which to reliably predict plant closures and the issues of specific plant closures in New Jersey are addressed in the "Reasonable Measures" Section of this document (see Section 8 of this document).

Non-Road Sources: The USEPA's Non-Road model considers that a certain number of non-road sources will be replaced every year by newer, less polluting vehicles and equipment that meet the new USEPA emission standards for non-road sources. These lower emissions were included in the 2018 inventory as well as the benefits received from lower sulfur gasoline and diesel in off-road vehicles. Any new or proposed Federal standards for marine or other engine types or fuel standards to lower the sulfur content used in these engines were not assumed in creating the 2018 progress goal. The cutoff point for nonroad sulfur content and fuel standards is 2004.[39]

[38] Development of the Emission Projections for the 2009, 2012, and 2018 for the NonEGU Point, Area, and Nonroad Sources in the MANE-VU Region, Draft Technical Support Document, Prepared for the Mid-Atlantic Regional Air Management Association (MARAMA), Prepared by MACTEC Federal Programs, Inc., December 7, 2006. http://www.marama.org/visibility/Inventory%20Summary/MANEVU_Emission_Projections_TSD_022807.pdf

[39] http://www.epa.gov/otaq/models/nonrdmdl/nonrdmdl2004/sulfur.txt

Volatile Organic Compound (VOC) Sources: The 2018 MANE-VU **i**nventory was prepared with a certain replacement schedule for better controlled VOC sources which lead to lower emissions in 2018 due to these controls. Examples of new air pollution controls whose effectiveness is dependent upon replacement of the unit include portable fuel containers and consumer products.

Wood-Burning Equipment: The 2018 MANE-VU inventory was prepared with a certain replacement schedule for better controlled wood burning sources which lead to lower emissions in 2018 due to the gradual implementation of these controls. A small fraction of wood burning fireplaces and wood stoves are changed out each year in every state and the incremental benefits of this change-out were assumed to accrue to 2018 and beyond.

6.0 BEST AVAILABLE RETROFIT TECHNOLOGY (BART)

6.1 Introduction

The Best Available Retrofit Technology (BART) requirement of Section 169A of the Clean Air Act (42 U.S.C.§7491(b)(2)(A)) and implementing rules (40 C.F.R. Part 51, Appendix Y) are intended to reduce visibility impairing pollutants emitted from existing stationary sources which were grandfathered from the New Source Review (NSR) requirements of the Clean Air Act. The visibility impairing pollutants are defined by the USEPA as sulfur dioxide (SO_2), oxides of nitrogen (NO_x) and particles with an aerodynamic diameter less than or equal to 10 and 2.5 µm (i.e., PM_{10} and $PM_{2.5,}$ respectively).[40] The BART requirements apply to existing facilities having any of 26 types of stationary sources which began operation between August 7, 1962 and August 7, 1977, with a cumulative potential to emit 250 tons per year or more of any single visibility impairing pollutant and may reasonably be anticipated to cause or contribute to any visibility impairment in a Class I area. Once the SIP is approved by the USEPA, the BART facility has up to five years to install the appropriate controls and comply with the established emission standards.[41] New Jersey plans to set a compliance date by rule, or a case-by-case SIP revision, within the five year timeframe after USEPA approval of its Regional Haze SIP.

The 26 source categories under the Federal Clean Air Act that are subject to the BART requirement for regional haze include the following types of stationary sources.

1) Acid Plants
2) Petroleum Refineries
3) Lime Plants
4) Phosphate Rock Production
5) Coke Oven Batteries
6) Sulfur Recovery Plants
7) Carbon Black Plants
8) Lead Smelters
9) Fuel Conversion Facilities
10) Power Plants
11) Coal Cleaning
12) Kraft Pulp Mills
13) Portland Cement Plants
14) Zinc Smelters
15) Iron and Steel Mills
16) Aluminum Ore Production
17) Copper Smelters
18) Municipal Incinerators
19) Sintering Plants
20) Secondary Metal Production
21) Chemical Plants
22) Boilers
23) Petroleum Storage Facilities
24) Taconite Ore Production
25) Glass Fiber Facilities
26) Charcoal Production

6.2 Description of BART-Eligible Sources in the State of New Jersey

The BART-eligible facilities in New Jersey are listed in Table 6.1. These facilities were identified in an analysis conducted by the Northeast States for Coordinated Air Use Management (NESCAUM) for New Jersey and other MANE-VU members using the methodology in the guidelines in the BART Rule.[42] A detailed description of each BART-eligible facility and the

[40] 70 Fed. Reg. 39160 (July 6, 2005)
[41] 70 Fed. Reg. 39158 (July 6, 2005)
[42] 40 C.F.R. pt. 51, Appendix Y

identification process is included in the MANE-VU Five-Factor Analysis of BART-eligible Sources[43], and is included in Appendix G.

The NJDEP requested by letter from Director O'Sullivan, dated November 1, 2006, (See Appendix G) that each of these facilities review and confirm their applicable emissions units, and informed the facilities of New Jersey's intention to propose rule changes requiring a top-down evaluation of available control options for each affected emission unit to address BART requirements.

Table 6.1: BART-Eligible Facilities in the State of New Jersey

Source	Pollutants	Location (County)	Facility I.D
PSEG – Hudson	NO_x, SO_2, PM	Hudson	12202
Amerada Hess	NO_x, SO_2	Middlesex	17996
ConocoPhillips	NO_x, PM, SO_2	Union	41805
Sunoco Eagle Point	NO_x, PM, SO_2	Gloucester	55781

The BART-eligible facilities in New Jersey fall into two of the 26 targeted categories, petroleum refineries and power plants. The State has also identified petroleum refineries and electrical generating units for further multi-pollutant air pollution control as part of New Jersey's revisions to its State Implementation Plans to attain the 8-hour ozone and $PM_{2.5}$ standards.

6.3 Determination of BART Requirements for Identified BART-Eligible Sources and Analysis of the Best System of Control for Each Source through Proposed Regulation

New Jersey commits to establish rules, or operating permit requirements, in accordance with the New Jersey Administrative Procedures Act (APA), (N.J.S.A. 52:14B-1 et. seq.) and the New Jersey Air Pollution Control Act (APCA), (N.J.S.A.26:2C-1 et. seq.), requiring each BART-eligible facility to perform a top-down analysis to determine the Best Available Retrofit Technology for its BART-affected emission units. BART-affected emission units are those with start-up dates between August 7, 1962 and August 7, 1977, and having cumulative potential emissions for SO_2 or for NO_x greater than 40 tons per year for such pollutant(s), or for PM_{10} greater than 15 tons per year of such pollutant. A case-by-case BART analysis is required to address air pollution control measures for each pollutant that exceeds the plant-wide thresholds.[44] As a result of its final 8-Hour Ozone SIP and proposed $PM_{2.5}$ commitments, New Jersey will also propose multi-pollutant rules regulating many of the affected emission units located at the BART-eligible facilities and similar facilities. These rules will include boilers that serve electric generating units (EGUs), and certain refinery operations such as fluid catalytic cracking units (FCCUs), flares and process heaters. See Table 6.2.

[43] Mid-Atlantic/Northeast Visibility Union Regional Planning Organization. "Draft Five-Factor Analysis of BART-Eligible Sources." February 7, 2007

[44] 70 Fed. Reg. 39117 (July 6, 2005)

Table 6.2: Control Measure Commitments by the State of New Jersey

Rule Category	Rule Summary	Compliance Date
Coal-fired boilers* serving EGUs	PM, 0.0300 lb/MMBtu (existing control) 0.0150 lb/MMBtu (new, modified, or reconstructed particulate control) SO_2, 0.150 lb/MMBtu on 30-day rolling avg and 0.250 lb/MMBtu on 24-hour daily basis NO_x, 1.50 lb/MWh	December 15, 2012 (unless subject to consent decree)
Petroleum Refineries**		
FCCUs	To be proposed	To be determined during rulemaking (unless subject to consent decree)
Flares	To be proposed	
Heaters and boilers	To be proposed	
BART	Case-by-case determination	

Notes: *rule proposed on August 4, 2008 in NJR
**rule commitment from New Jersey's final 8-hr Ozone SIP and the proposed $PM_{2.5}$ SIP

The multi-pollutant refinery rule will include provisions that establish procedures to perform the top-down BART analysis to determine BART for each BART-affected emission unit located at identified refineries, and set a schedule for installation of BART.

In regard to BART-affected emission units at PSEG – Hudson Generating Station, New Jersey will require PSEG to perform the required top-down analysis as a condition of its Title V Operating Permit. NJDEP will submit to the USEPA a single source revision to the State Implementation Plan addressing control of BART units at this facility. Unit 2, the only coal-fired boiler at PSEG – Hudson Generating Station, is subject to a consent decree requiring additional controls in 2010.

Beginning in 2000, the USEPA and NJDEP have entered into, or continue to negotiate, consent decrees (CDs) addressing air contaminant emissions from the petroleum refineries in New Jersey. These consent decrees require implementation of control technologies, performance standards, emissions caps, and optimization plans to achieve significant reductions of SO_2, NO_x and PM, as well as additional reductions of benzene and VOCs. The focus of the consent decrees include fluidized catalytic cracking units (FCCUs), heaters and boilers (and fuel gas combustion devices), flares, and sulfur recovery units. See Appendix G for the applicable consent decrees. Many of the units covered by the consent decrees have also been identified as affected units at BART-facilities. All BART-affected units, including those covered by the consent decrees, will be required to perform a top-down BART analysis, which may result in additional air pollution control being required.

Given the State's commitment to establish rules as part of the 8-hour ozone and $PM_{2.5}$ SIPs, and the consent agreements and enforcement initiatives which apply to the BART-eligible facilities, the State does not expect that the BART analyses will identify significant additional emission reductions. For example, the PM, NO_x and SO_2 air pollution controls being installed on the Unit

2 coal-fired boiler at PSEG – Hudson Generating Station, pursuant to a consent decree (CD), will satisfy BART requirements. The emission limits for this coal-fired boiler are consistent with the USEPA's presumptive BART limits for SO_2,[45] and more stringent than those established for NO_x.[46] Other operations at this facility, such as the coal handling systems, are not subject to the presumptive norms, and will need a case-by-case evaluation and may need to reduce emissions to comply with BART.

6.4 Analysis of Visibility Improvement Achievable from all BART Sources in the Region

One of the factors which can be considered in the BART analysis is a determination of whether the emissions from the unit reasonably cause or contribute to visibility impairment in any Class I area. In June 2004, the MANE-VU Board made a decision[47] that if a source is eligible for BART, it is subject to BART regardless of its modeled visibility impairment from the specific unit. To examine the visibility impacts from the BART-eligible facilities, MANE-VU chose to use the cumulative assessment of contribution option[48] to analyze the contribution to visibility impairment of all BART-eligible facilities within the region. As a result of NESCAUM's cumulative assessment (NESCAUM, 2006b) of the sources in MANE-VU, it was determined every BART-eligible facility contributes to visibility impairment to some degree.[49] New Jersey agrees with the use of a cumulative assessment and will not include source specific visibility assessment as an exemption criterion in its BART rules.

[45] 70 Fed. Reg. 39132 (July 6, 2005)
[46] 70 Fed. Reg. 39135 (July 6, 2005)
[47] Mid-Atlantic/Northeast Visibility Union Regional Planning Organization. "Draft Five-Factor Analysis of BART-Eligible Sources." February 7, 2007
[48] 70 Fed. Reg. 39163 (July 6, 2005)
[49] Mid-Atlantic/Northeast Visibility Union Regional Planning Organization. "Draft Five-Factor Analysis of BART-Eligible Sources." February 7, 2007

7.0 CONTRIBUTION ASSESSMENT OF STATES CAUSING OR CONTRIBUTING TO VISIBILITY IMPAIRMENT IN THE BRIGANTINE WILDERNESS AREA

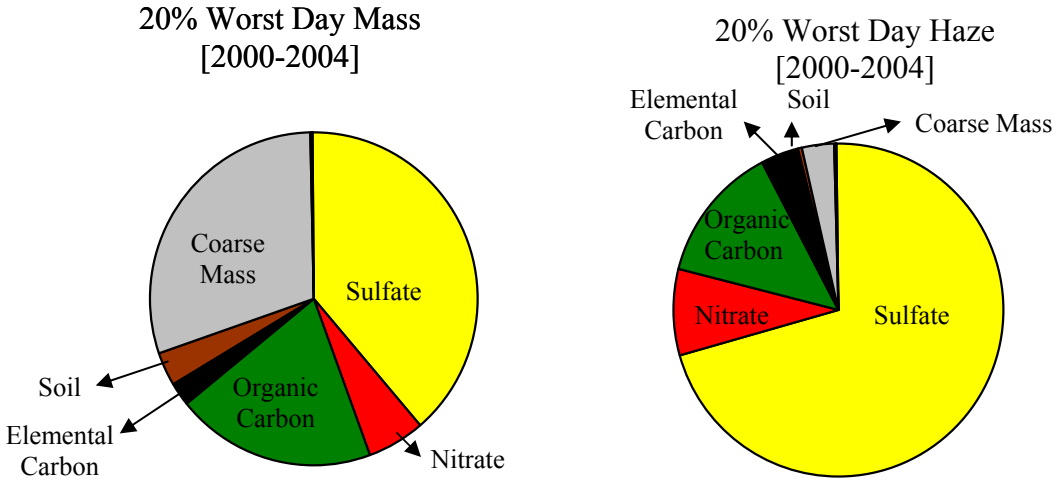
7.1 Introduction

The Regional Haze Rule (40 C.F.R. § 51.308 (d)(1)(B)(iv)) requires that New Jersey consult with those states which may reasonably be anticipated to cause or contribute to visibility impairment in the Brigantine Wilderness Area when establishing the progress goal for the area. The identified states are then required to demonstrate that they have included in their implementation plan all measures necessary to obtain their share of emission reductions needed to meet the progress goal for the area (40 C.F.R. § 51.308(d)(3)(ii)). New Jersey relied upon the contribution assessment work performed for the Mid-Atlantic / Northeast-Visibility Union (MANE-VU) by the Northeast States for Coordinated Air Use Management (NESCAUM) to determine which states contribute to visibility impairment at the Brigantine Wilderness area. The contributory assessment is included as Appendix H of this document. MANE-VU used several techniques, rather than rely upon one single method, to assess which states contribute to visibility impairment in MANE-VU Class I areas. A summary of those techniques is discussed in this section.

7.2 Contribution Assessment

MANE-VU's assessment, as well as those of the VISTAS and Midwest RPO as evidenced in Appendix H of this document, concluded that sulfates were the predominant pollutant responsible for causing visibility impairment in the northeastern United States in the period, 2000 - 2004. See Figure 7.1 for Brigantine. This is due to the hydroscopic and optical properties of the sulfate particles. As a result, sulfates were the focus of the efforts to identify reasonable measures to set the 2018 reasonable progress goal. New Jersey is also implementing measures to reduce carbon emissions, the second largest contributor to haze. See Section 9.7.

Figure 7.1: Role of Sulfate in Visibility Impairment at Brigantine Wilderness Area



The techniques used in MANE-VU's contribution assessment are discussed in the next subsections. These methods are based on emission inventory and meteorological data analysis as well as three dimensional models which considered emissions, meteorology and the atmospheric process.

7.3 Contribution Assessments Based on Emissions Inventories

Two data analysis methods were developed that directly combine emission inventory data with meteorological data in order to provide first-order contributions to observed sulfate from individual states. The first approach, known as "Q/d," evaluates the state contribution as a ratio of the total SO_2 emissions from that state and the distance from the state to the receptor. States and sources were assigned wind sectors to account for prevailing wind patterns in establishing contributions. The second approach, known as "Emissions times Upwind Probability," evaluates each state's contribution by considering wind patterns. This approach determines the residence times at particular location for the air parcels using back trajectories. See Appendix A of the MANE-VU Contribution Assessment for a more detailed description of trajectory methods. The back trajectory-derived residence times for the air parcels were mapped onto a grid to create a "residence time probability field," which was then multiplied by an SO_2 emissions field to obtain estimated source contributions. The results of these two approaches are computed for Class I areas in and around the MANE-VU region.

7.3.1 Sulfur Dioxide Emissions Divided by Distance

For specific receptor locations, like a Class I visibility area, relative impacts from an upwind source decrease with increasing distance from the source as pollutants are dispersed in the atmosphere and removed through deposition. For a non-reactive primary pollutant, the relationship between down wind concentrations at a receptor and emissions from a source can be approximated as a function of $1/d^2$, where d represents the distance between the source and the receptor. For secondary pollutants like sulfate, where reductions in ambient concentrations occur as a result of atmospheric processes other than dispersion, including deposition of sulfate on surfaces, the relationship between down wind concentrations at a receptor and emissions from a source is better characterized by the function $1/d$.[50] During regional sulfate episodes when sulfur conversion rates are enhanced by the presence of gas and aqueous-phase oxidants, pollutant concentrations decline even less rapidly with distance as accelerated aerosol formation rates work to both generate more sulfate and reduce the remaining sulfur available for deposition (deposition rates are roughly an order of magnitude slower for sulfate than for SO_2).

Table 7.1 shows the relative contribution of states and Canadian provinces on Brigantine Wilderness area. The principal contributors of sulfate to the Brigantine Wilderness Area, according to the Q/d method, include the mid-western states of Indiana and Ohio, as well as Pennsylvania and New York.

[50] MANE-VU Contribution Assessment. August 2006

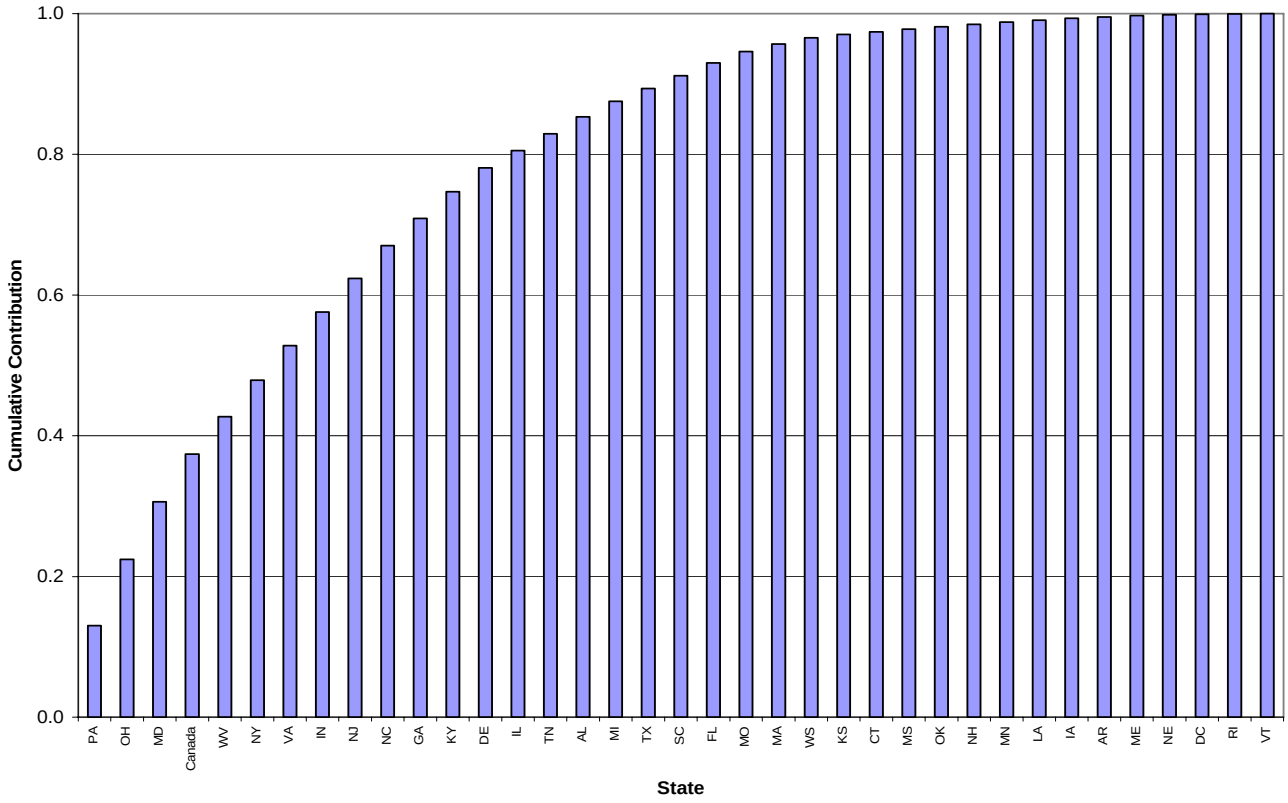
Table 7.1: 2002 SO_2 Emissions over Distance Impact ($\mu g/m^3$)[51]

STATE	BRIGANTINE	EMISSIONS
Pennsylvania	0.38	1,090,562
Ohio	0.27	1,273,755
Maryland	0.24	292,970
West Virginia	0.16	573,136
New York	0.15	341,493
Indiana	0.14	914,039
North Carolina	0.14	510,452
Virginia	0.14	309,709
New Jersey	0.14	64,437
Georgia	0.11	605,040
Kentucky	0.11	521,583
Delaware	0.10	83,549
Illinois	0.07	642,264
Tennessee	0.07	423,705
Alabama	0.07	548,054
Michigan	0.06	432,166
Florida	0.06	537,327
Texas	0.05	849,831
South Carolina	0.05	262,867
Missouri	0.05	361,911
Massachusetts	0.03	123,754
Wisconsin	0.03	263,040
Kansas	0.01	136,104
New Hampshire	0.01	53,772
Minnesota	0.01	124,151
Mississippi	0.01	126,456
Iowa	0.01	230,676
Connecticut	0.01	41,093
Oklahoma	0.01	139,327
Louisiana	0.01	346,170
Arkansas	0.01	140,096
Maine	<0.01	39,423
Nebraska	<0.01	46,074
Rhode Island	<0.01	2,531
Vermont	<0.01	1,575
Dist. of Columbia	<0.01	1,715
PROVINCE		
Ontario	0.12	5,010
Quebec	0.03	6,567
New Brunswick	0.02	1,261
Nova Scotia	0.02	7,566
Newfoundland	<0.01	15,287
Prince Edward Is.	<0.01	10,157

[51] Emissions were scaled using the CALPUFF model which is a Lagrangian puff model, available from the USEPA, used to calculate ambient air concentrations under given emission scenarios and conditions. See Attachment C-1 to this document for more details on the Scaling method used.

Figure 7.2 shows the cumulative fraction of the states and provinces at Brigantine Wilderness Area

Figure 7.2: Cumulative Sulfate Contributions to the Brigantine Wilderness Area based on Emissions divided by Distance (Q/d) Results



The top 14 states from Figure 7.1 contribute about 80 percent of the total sulfate contribution in the Brigantine Wilderness Area.

7.3.2 Emissions times Upwind Probability

The Emissions times Upwind Probability method for assessing contribution to pollution involves multiplying the back-trajectory calculated residence time probability for a grid cell with the total emissions from that grid cell and associated with a political jurisdiction such as a state.

The back trajectories[52] used in this study were calculated by the HYSPLIT system.[53,54] For this analysis, five years of 72-hour back trajectories were calculated eight times per day, 14,600 back trajectories in total. The resulting matrix of emissions and air parcel residence times contain the

[52] A back trajectory is the path that a parcel of air is calculated to have taken prior to its arrival at a given receptor (see Chapter 5 of the MANE-VU Contribution Assessment in Appendix H of this document).
[53]Draxler, R.D. and Hess, G.D., "Description of the HYSPLIT-4 Modeling System," *NOAA Technical Memorandum ERL, ARL-224*, Air Resources Laboratory, Silver Springs, Maryland, 24 pgs., 1997.
[54]Draxler, R.D. and Hess, G.D., "An Overview of the HYSPLIT-4 Modeling System for Trajectories, Dispersion, and Deposition," *Australian Meteorological Magazine*, 1998, 47, 295-308.

SO_2-weighted residence times that are then numerically integrated within the boundaries of each state to define a "contribution" for each state. This provides a relative ranking of contribution by state that can be used to compare with other methods of attribution.[55]

The area of analysis included states from Maine to Mississippi. Several states lie on the periphery of the available SO_2 emissions field and were used in the study despite an incomplete inventory of SO_2 emissions for the far edges of each state; these included Missouri, Arkansas, Mississippi, Alabama, and Georgia.[56] Canada has significant SO_2 emissions in the domain of the SO_2 grid, hence contributions have been calculated for portions of Ontario, Quebec and New Brunswick that were within the SO_2 emission grid. Table 7.2 provides a ranking of state contributions.

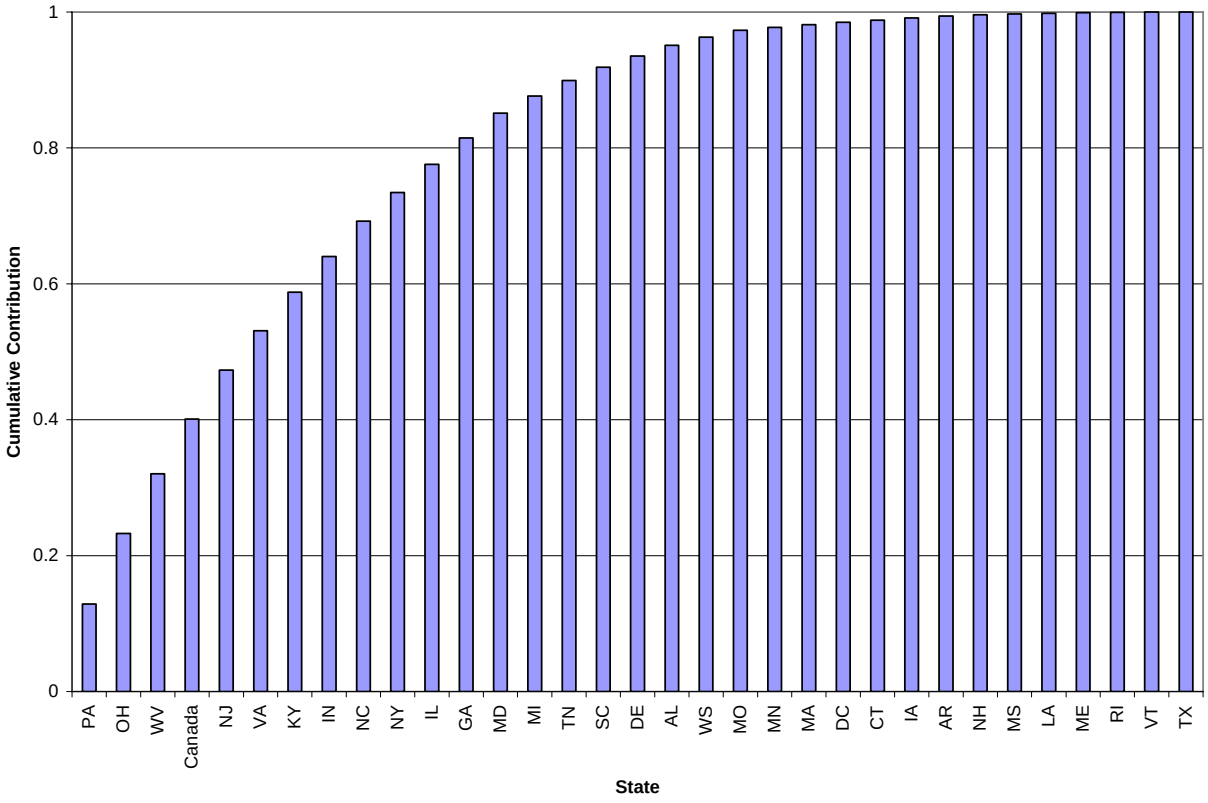
Table 7.2: 2002 SO_2 Upwind Probability

STATE	BRIGANTINE
Pennsylvania	13%
Ohio	10%
West Virginia	9%
New Jersey	7%
Kentucky	6%
Virginia	6%
Indiana	5%
North Carolina	5%
New York	4%
Illinois	4%
Georgia	4%
Maryland	4%
Michigan	2%
Tennessee	2%
Alabama	2%
South Carolina	2%
Delaware	2%
Wisconsin	1%
Missouri	1%
Massachusetts	<1%
New Hampshire	<1%
Minnesota	<1%
Connecticut	<1%
Maine	<1%
Iowa	<1%
Dist. Of Columbia	<1%
Arkansas	<1%
Mississippi	<1%
Vermont	<1%
Louisiana	<1%
Rhode Island	<1%
Texas	<1%
Canada	8%

[55] Note that the absolute units are expressed as nmole/hr, which represent a fractional contribution of a grid cell's emission rate that is likely to influence a downwind receptor. The physical meaning of this contribution is not clear, so this has been used in a relative sense only.

[56] These states still had significant areas that were not covered by the SO_2 grid. Thus only a fraction of these states' emissions were included in the total state contribution. The following are estimates of the area *not* covered by the SO_2 grid: MO-20%, AR-10%, MS-25%, AL-20%, GA-5%.

Figure 7.3: Cumulative Sulfate Contributions to the Brigantine Wilderness Area based on Emission times Upwind Probability (E x UP) Results



The top 12 states from Figure 7.3 contribute about 80 percent of the total sulfate contribution in the Brigantine Wilderness Area.

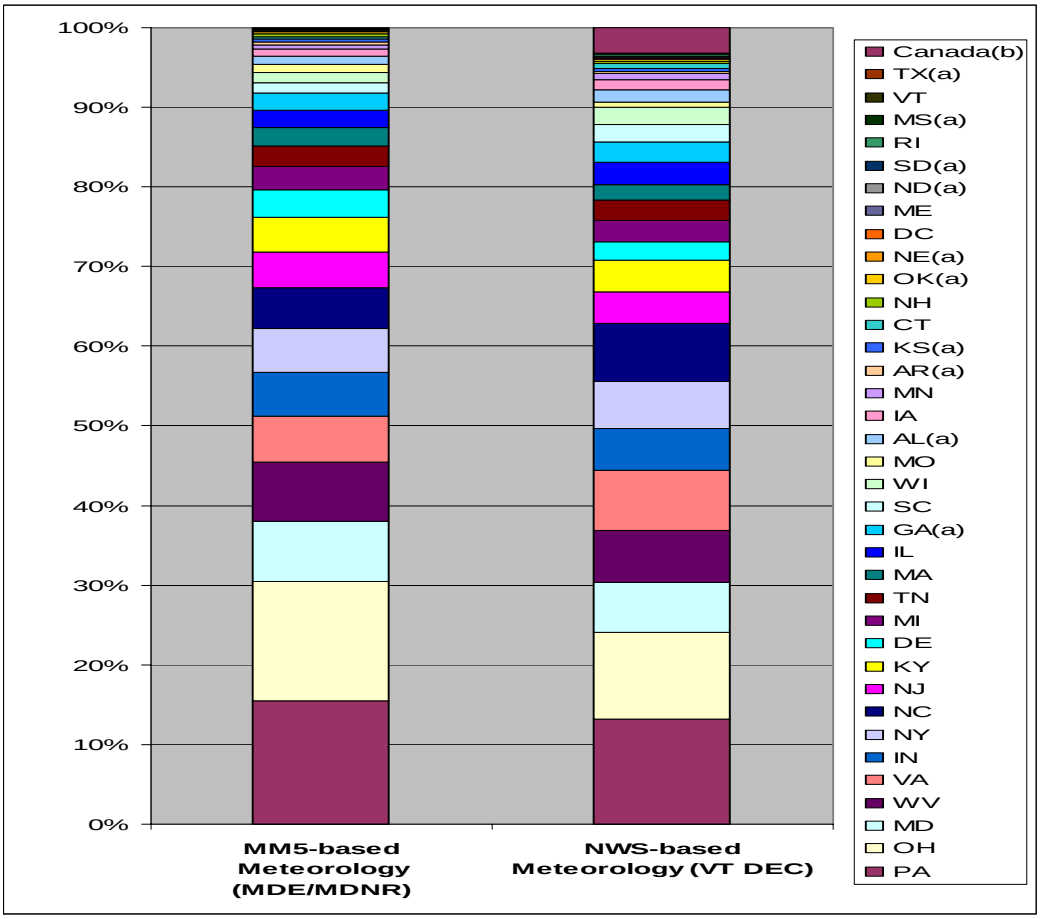
7.4 Contribution Assessments Based on Dispersion Models

The MANE-VU Contribution Assessment also explored the use of lagrangian puff dispersion models such as CALPUFF for estimating source contributions and compares two related but distinct versions of the CALPUFF modeling system that demonstrate the sensitivity of this tool to emissions and meteorology inputs. Dispersion models are commonly used to study the impacts of pollutant plumes or specific point source emissions on surrounding areas. The scale of these models has traditionally been limited to a few hundred kilometers because of a perceived lack of ability to accurately reproduce horizontal dispersion beyond these distances. Recent advances in the CALPUFF system including enhancements to its horizontal diffusion and dispersion algorithms as well as the addition of chemical transformation parameterizations have resulted in improved performance over much greater distances.

The CALPUFF modeling domain was designed to be consistent with the other modeling systems (e.g., REMSAD, CMAQ) described in Section 7.5 and the MANE-VU Contribution Assessment report (Appendix H), enabling the comparison of the impacts from sources of sulfate-related visibility impacts in the MANE-VU region. Two different meteorological fields were considered

as part of the analysis, one based on the MM5 model[57] and one based on the National Weather Service (NWS) data.

Figure 7.4: Modeled 2002 Contributions to Sulfate by State at Brigantine



Depending upon the meteorological fields, 12 – 14 states contribute 80 percent (%) of the sulfate mass at the Brigantine Wilderness Area.

7.5 Contribution Assessments Based on Grid Models

The MANE-VU Contribution Assessment also used the Eulerian grid model, Regulatory Modeling System for Aerosols and Deposition (REMSAD), in the analysis. This type of model is likely to yield a more definitive assessment of contribution from different sources. Eulerian or "grid" models strive to provide a comprehensive accounting of the impacts from the emissions by considering the meteorological dynamics, chemical production, transformation, and destruction as well as wet and dry deposition and microphysical processes. With this degree of sophistication also comes attendant uncertainty, thus the consideration of more than one analysis system.

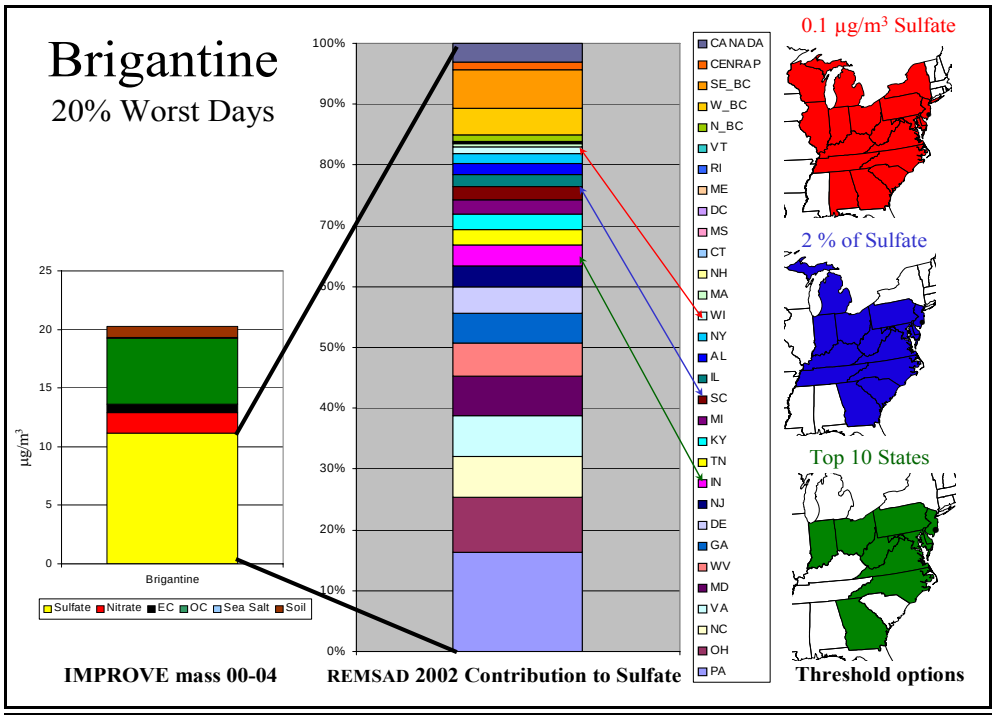
[57] http://www.mmm.ucar.edu/mm5/

REMSAD was used with a 12 km grid in the eastern United States domain. The air quality was modeled using 22 vertical layers with hourly temporal resolution for the entire calendar year 2002. REMSAD has simplified chemistry but allows for emissions tracking of sulfate, nitrate, and mercury through a tagging feature that calculates the contribution of specific sources to ambient concentrations, visibility impacts, and wet or dry deposition. REMSAD model was used primarily for attribution of sulfate species in the eastern United States via the species-tagging scheme included in Version 7.10 and newer versions of the model. Sulfate is the focus of the regional haze plan for the first milestone period year (2018) in the MANE-VU Class I states.

The left side of Figure 7.5 presents the IMPROVE monitored data by species for 2000-2004 (the baseline years), the center provides the REMSAD modeling results for 2002 indicating the contributions of the measured sulfate concentrations by states and regions, and, on the right, three maps indicating meeting the following criteria:

1. States/regions that contributed 0.1 $\mu g/m_3$ sulfate or greater on the 20% worst visibility days in the base year (2002)
2. States/regions that contributed at least 2% of total sulfate observed on 20% worst visibility days in 2002
3. The top ten contributing states on the 20% worst visibility days in 2002.

Figure 7.5: Modeled 2002 Contributions to Sulfate by State at Brigantine



7.5.1 Model Performance Evaluation

The first step in the modeling process is to verify the model's performance in terms of its ability to predict fine particles and other airborne pollutant 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 fine particles and other airborne pollutants 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 regional haze.

The Regional Modeling System for Aerosols and Deposition (REMSAD) is a three-dimensional Eulerian model designed to support a better understanding of the distributions, sources, and removal processes relevant to fine particles and other airborne pollutants. It calculates the concentrations of both inert and chemically reactive pollutants by simulating the physical and chemical processes in the atmosphere that affect pollutant concentrations.

The results of a model performance were examined prior to using REMSAD's results to support MANE-VU's contribution assessment. The performance of REMSAD was evaluated and found to meet the performance criteria set in USEPA guidance.[58] Modeling results were compared with IMPROVE measurement, and showed that REMSAD's simulation field is well-matched with measurement data.

7.6 Identification of States that Contribute to Visibility Impairment at the Brigantine Wilderness Area

The different methods employed in the Contribution analysis yield similar results. The same states appear as the greatest contributors to sulfate levels in the Brigantine Wilderness Area.

For the purposes of the first progress goal (2018) for the Brigantine Wilderness Area, New Jersey identified the states causing or contributing to visibility impairment at the Brigantine Wilderness Area using the techniques listed in Table 7.3.

[58] 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

Figure 7.6: States Identified as Contributing to Visibility Impairment in New Jersey's Class I Area

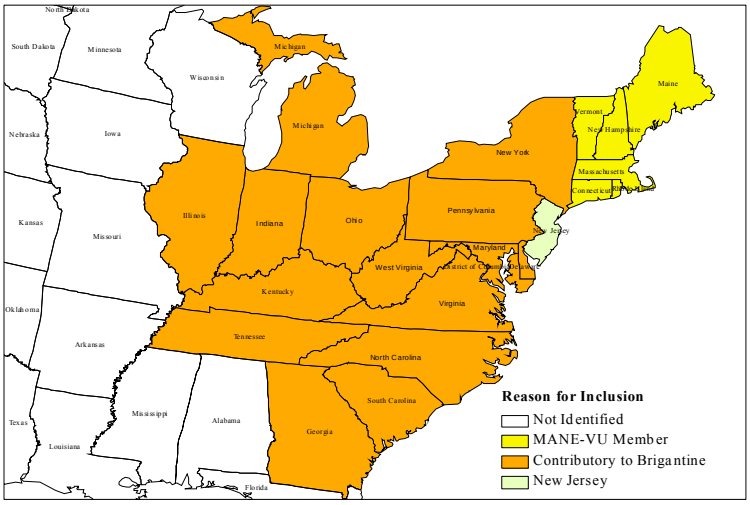


Figure 7.6 shows the states identified as contributing to visibility impairment in the Brigantine Wilderness Area for this first round of Regional Haze SIP planning or that were identified by New Jersey because of their involvement in the MANE-VU Planning Organization.

New Jersey believes that many sources in more states will eventually need to address the transport of their emissions to the Brigantine Wilderness Area to help achieve the natural visibility goal.

7.7 Notification

On January 18, 2007, the NJDEP Commissioner Lisa Jackson sent a letter to 22 states identified as causing or contributing to regional haze in the Brigantine Wilderness Area or that are members of the MANE-VU regional planning organization. These states are listed in Table 7.3 and the copies of the letters can be found in Appendix I. New Jersey does not expect that states that were identified because they were MANE-VU members, and did not meet the criteria for contribution of a greater than 0.1 ug/m^3 or greater than two percent sulfate contribution to the Brigantine Wilderness Area, will need to document in their Regional Haze Plan that they have obtained their share of emission reductions necessary to reach the first progress goal for the Brigantine Wilderness Area, unless any of the top 167 EGU stacks is located in the states. Rather, New Jersey would like to see these MANE-VU members, not identified as contributing to meet the 2018 reasonable progress goal, propose and adopt through their administrative processes the agreed upon Reasonable Measures. See Section 8.4.1 for more specifics.

Table 7.3: States invited to consult on establishing New Jersey's Class I Area 2018 Reasonable Progress Goals

State Name (alphabetical order)	Technique / Reason for Inclusion
Connecticut	MANE-VU member
Delaware	> 0.1 ug/m^3 or > 2% Sulfate Contribution, MANE-VU member
District of Columbia	> 0.1 ug/m^3 or > 2% Sulfate Contribution, MANE-VU member
Georgia	> 0.1 ug/m^3 or > 2% Sulfate Contribution
Illinois	> 0.1 ug/m^3 or > 2% Sulfate Contribution
Indiana	3 of 5 techniques (Q/D, CALPUFF 1 & 2)
Kentucky	> 0.1 ug/m^3 or > 2% Sulfate Contribution
Maine	MANE-VU member
Maryland	4 of 5 techniques (Q/D, REMSAD, CALPUFF1 &2)
Massachusetts	MANE-VU member
Michigan	> 0.1 ug/m^3 or > 2% Sulfate Contribution
New Hampshire	MANE-VU member
New York	4 of 5 techniques (Q/D, REMSAD, CALPUFF 1 &2)
North Carolina	4 of 5 techniques (Q/D, REMSAD, CALPUFF1 &2)
Ohio	All techniques
Pennsylvania	All techniques
Rhode Island	MANE-VU member
South Carolina	> 0.1 ug/m^3 or > 2% Sulfate Contribution
Tennessee	> 0.1 ug/m^3 or > 2% Sulfate Contribution
Vermont	MANE-VU member
Virginia	4 of 5 techniques (Q/D, REMSAD, Calpuff 1 &2)
West Virginia	All techniques

7.8 New Jersey's Contribution to Other Class I areas

New Jersey was identified as a MANE-VU member contributing to visibility impairment in Maine, New Hampshire, and Vermont Class I areas.

8.0 REASONABLE PROGRESS GOALS AND LONG TERM STRATEGY

8.1 Introduction

New Jersey is required to establish the natural visibility conditions and reasonable progress goals to provide for progress towards achieving natural visibility in 2064, for Brigantine Wilderness Area.[59] The goals must be set in such a way to provide improvement in visibility on the most impaired days and ensure no degradation in visibility on the least impaired days.

In defining the reasonable progress goals, New Jersey determined reasonable measures, considering the cost of compliance, the time necessary for compliance, the energy and non-air quality environmental impacts, and the remaining useful life of the existing sources subject to such requirements.[60] In developing the 2018 reasonable progress goal, New Jersey relied upon information and analyses developed by MANE-VU to meet the requirements.

New Jersey consulted with states identified as contributing to the Brigantine Wilderness Area (see Section 7) through a process involving the states and the Federal Land Managers to set the natural background conditions and the 2018 progress goal.

This Section presents the goals and describes the process used by New Jersey to set them.

8.2 Brigantine Wilderness Area Visibility Goal

Table 8.1 summarizes the existing visibility conditions and the goals as described in Section 3.

The uniform rate of improvement needed to achieve the reasonable progress goal on 20% of worst visibility days by 2018 is 3.9 deciviews, or an average baseline visibility of 25.1 deciviews on 20% of worst visibility days.

Table 8.1: Visibility Goals for the Brigantine Wilderness Area

Conditions	Deciviews
Natural Background Visibility on 20% of worst visibility days (Goal in 2064)	12.2
Average Baseline Visibility on 20% of best visibility days (2000 – 2004)	14.3
Average Baseline Visibility on 20% of worst visibility days (2000 – 2004)	29.0
Uniform Rate of Progress in 2018 on the 20% worst visibility days	25.1

8.3 The Process

This subsection discusses the process that New Jersey and the other Class I states in MANE-VU used to develop the reasonable progress goals in MANE-VU Class I areas, which include the

[59] 40 C. F. R. § 51.308 (d)(1)
[60] 40 C. F. R. § 51.308 (d)(1)(i)

Brigantine Wilderness area. New Jersey utilized USEPA guidance[61] in setting the reasonable progress goal for Brigantine.

8.3.1 Identifying Reasonable Controls and the Four Factor Analysis

40 C.F.R. § 51.308 (d)(1)(i)(A) requires that in establishing reasonable progress goals for each Class I area, the state must consider the costs of compliance, the time necessary for compliance, the energy and non-air quality environmental impacts of compliance, and the remaining useful life of any potentially affected sources, and the SIP must include a demonstration showing how these factors were taken into consideration in setting the goal. These factors are sometimes termed the "four statutory factors," since their consideration is required by the Clean Air Act.[62]

As discussed in Section 7, sulfate currently causes the most visibility impairment at the Brigantine Wilderness Area. New Jersey considers it reasonable to focus on SO_2 emissions reduction measures in setting the 2018 reasonable progress goal. Based on information from the contribution assessment and additional emission inventory analyses, MANE-VU identified the following source categories for further examination as reasonable measures:

- Coal and oil-fired Electric Generating Units (EGUs)
- Point and area source industrial, commercial and institutional boilers
- Cement and Lime Kilns
- Heating oil, and
- Residential wood combustion

MANE-VU analyzed these potential source categories based on the "four statutory factors" according to 40 C.F.R. § 51.308(d)(3)(v). Detailed information on control technologies assessed is presented in the MANE-VU Reasonable Progress Report,[63] Appendix N.

MANE-VU determined that due to the complexities of the individual units and the lack of specific data, a generalized determination of emission reductions from the cement and lime kiln category was not reasonable at this time. However, specific controls at individual cement plants or lime kilns may be reasonable under source specific control programs (i.e., BART). Additionally, MANE-VU determined for similar reasons that it was not reasonable at this time to develop a regional residential wood combustion program. New Jersey agrees with these determinations as they apply to the region. New Jersey has no cement and lime kilns. New Jersey will consider state specific wood burning provisions as described in section 9.6.

After identifying potential control measures and performing the four factor analysis, MANE-VU performed initial modeling which showed the visibility impacts from the implementation of the measures. The initial modeling results showed that the projected 2018 visibility on the 20% worst days at the Brigantine Wilderness area was better than the uniform rate of progress. Details of MANE-VU's initial modeling were later documented in the MANE-VU Modeling for

[61] USEPA, Office of Air Quality Planning and Standards. Guidance for Setting Reasonable Progress Goals Under the Regional Haze Program. June 1, 2007.
[62] Section 169A (g)(1) [42. U.S.C. 7491]
[63] "Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas" (MACTEC, July 9, 2007)

Reasonable Progress Goals report.[64] Based on the modeling results and other analysis performed by MANE-VU, the MANE-VU states developed "Asks", which are "emission management" strategies. These strategies served as the basis for the consultation with the other states.

8.3.2 Consultation

The regulations at 40 C.F.R. 51.308 (d)(1)(iv) requires states with Class I areas to develop reasonable progress goals in consultation with any state that may reasonably cause or contribute to visibility impairment in the Class I area. The rule states:

> *In developing each reasonable progress goal, the State must consult with those States which may reasonably be anticipated to cause or contribute to visibility impairment in the mandatory Class I Federal area. In any situation in which the State cannot agree with another such State or group of States that a goal provides for reasonable progress, the State must describe in its submittal the actions taken to resolve the disagreement. In reviewing the State's implementation plan submittal, the Administrator will take this information into account in determining whether the State's goal for visibility improvement provides for reasonable progress towards natural visibility conditions.*

As stated in Section 7, as part of this consultation process, NJDEP Commissioner Lisa Jackson sent a letter to the 22 eastern states identified as contributing to regional haze in the Brigantine Wilderness Area. Copies of the letters sent by NJDEP to other states and responses from some states are provided in Appendix I.

New Jersey consulted with contributing states in the MANE-VU, MWRPO and VISTAS regions through conference calls and in-person meetings in 2007, to compare technical work and findings, discuss any adjustments that might be appropriate, and develop mutually beneficial solutions. During consultation, the MANE-VU Class I states established a resolution setting out the principles by which the regional haze rule will be implemented. The MANE-VU states also agreed through formal statements to pursue the adoption and implementation of the reasonable measures discussed in Section 8.4. These consultations are documented in more detail in Appendix C.

Some of the key discussions of these consultations include discussions of emission inventory issues and modeling assumptions, and a review and identification of controls at the EGUs (actual vs. IPM estimated). There was no specific guidance by the other RPOs regarding any expected reductions from non-EGUs sources, and there was conceptual agreement to explore the development of an agreement to seek additional national control programs. Based on the consultations, changes were made to the definition of reasonable measures for inclusion in the final modeling, including changes to the definition of controls on the 167 stacks. The modified emission control strategies used to define reasonable measures and the 2018 reasonable progress goal are discussed in the Section 8.4.

[64] MANE-VU Modeling for Reasonable Progress Goals. February 7, 2008

Additionally, MANE-VU conducted several public meetings with stakeholders as part of the consultation effort to discuss the progress and results of the collaborative regional efforts. These meetings are described in Appendix C.

8.3.3 "Asks"

After reviewing the four factor analysis, MANE-VU determined its reasonable measures to begin consultation with the other states. These were labeled as the "asks." These "asks" were documented in two separate statements that were agreed to as a regional strategy at the June 20, 2007 MANE-VU Board meeting. They apply to the states within and outside MANE-VU who were identified as contributing to visibility impairment in any of the MANE-VU Class I areas, including the Brigantine Wilderness Area. The statements are presented in Appendix D and are summarized below.

- "Asks" within MANE-VU
    - Timely implementation of BART requirements
    - 90 percent (%) or greater SO_2 emission reductions from each of the 167 electric generating unit (EGUs) stacks identified by MANE-VU
    - Low sulfur fuel oil strategy
    - Continued evaluation of other measures, including measures to reduce SO_2 and NO_x emissions from all coal-burning facilities and promulgation of new source performance standards for wood combustion

- "Asks" outside MANE-VU
    - Timely implementation of BART requirements
    - 90 percent (%) or greater SO_2 emission reductions from each of the 167 electric generating units (EGUs) identified by MANE-VU
    - 28 percent (%) reduction[65] from non-EGU sources
    - Continued evaluation of other measures, including measures to reduce SO_2 and NOx emissions from all coal-burning facilities and promulgation of new source performance standards for wood combustion

The majority of the sulfate responsible for visibility impairment in MANE-VU Class I areas is from electric generating sources. MANE-VU, through modeling,[66] identified the 167 separate EGU stacks that significantly impact at least one MANE-VU Class I area. MANE-VU states determined that it was reasonable to seek at least a 90 percent reduction[67] in SO_2 emissions

[65] Based on MANE-VU's initial analysis of available projection inventories for 2018, these targets were estimated as 151,000 and 308,000 tons per year reduction in non-EGU SO2 emissions from the Midwest RPO and VISTAS RPO respectively. MANE-VU reached a consensus with the Midwest RPO during the consultation process that 131,6000 tons per year was a more accurate estimate of the magnitude of a 28 percent reduction relative to their projected 2018 non-EGU SO2 emissions of 470,000 tons per year.

[66] See Appendix D of the MANE-VU Contribution Assessment which describes two CALPUFF platforms that were used to model 2002 CEM emissions for approximately 800 eastern U.S. EGUs.

[67] In practice, installation of stack control devices such as SO_2 Scrubbers can achieve as high as 98 percent SO_2 reduction, thus the 90 percent SO_2 reduction from the 167 EGU stacks was determined to be reasonable.

relative to their 2002 CEMS-reported emission levels from each of these 167 EGU stacks. The MANE-VU "ask" recognized that it may not be feasible to achieve the emission reductions requested at every stack. Thus, the MANE-VU "ask" includes a provision allowing the contributing state to pursue alternative measures to achieve the same level of emission reduction elsewhere if controls at a specific stack were found not to be feasible.

The 28 percent (%) emission reduction from non-EGU sources is intended to represent a similar emission reduction as the MANE-VU Low Sulfur Fuel Oil strategy in the areas inside of MANE-VU. This strategy intentionally does not define a specific control measure. It was the intention of the MANE-VU states to enable the contributing states to define how they would achieve this additional reduction in a way that is most reasonable for the sources in their state.

The next step was for MANE-VU to finalize the definition of the reasonable measures and to perform modeling to establish the 2018 reasonable progress goal. The details on the MANE-VU modeling and the 2018 reasonable progress goal are discussed in Section 8.5.

8.4 Reasonable Measures for Brigantine – Regional Measures

This section presents the reasonable measures determined by New Jersey after consultation with contributing states and used to establish the 2018 reasonable progress goal for the Brigantine Wilderness area. This long-term strategy to reduce and prevent regional haze will allow each state time to pursue adoption and implementation of these reasonable and cost-effective SO_2 measures in a reasonable timeframe. It is expected that the measures will be in place as expeditiously as practicable, but no later than December 31, 2017, to ensure the visibility benefits will be seen in the 2018 milestone year.

8.4.1 MANE-VU States

The reasonable emission control strategies to be implemented in the MANE-VU states to achieve the reasonable progress goal at Brigantine Wilderness Area by 2018 are listed in Table 8.2. During consultation, the MANE-VU states agreed through a statement (See Appendix D) to pursue the adoption and implementation of the reasonable measures in Table 8.3. New Jersey requests that MANE-VU members expeditiously propose and adopt, through their administrative processes, the agreed upon Reasonable Measures. New Jersey expects any state that is home to any of the 167 EGU stacks, identified by MANE-VU as contributing to haze in Class I areas, to address the emissions from the stack in their haze SIP. New Jersey recognizes that a 90 percent (%) reduction may not be feasible for every stack identified. If a state finds that such a reduction is not feasible, then New Jersey expects the state to identify the alternative measures the state will pursue to provide for equivalent emission reductions and document those measures in their SIP.

Table 8.2: Reasonable Measures for MANE-VU States

BART	Timely implementation of BART requirements		
EGU	A 90% or greater reduction in sulfur dioxide (SO_2) emissions* from each of the 167 stacks identified by MANE-VU		
Low Sulfur Fuel Oil	**Strategy**	**S-1**	**S-2**
Low Sulfur Oil - inner Zone (NJ, NY, PA)	Distillate	500 ppm	15 ppm
	#4	0.25% sulfur	0.25% sulfur
	#6	0.3-0.5 % sulfur	0.3-0.5 %
	Required no later	2012	2016
Low Sulfur Oil - outer zone (rest of MANE-VU)	Distillate	500 ppm	15 ppm
	#4		0.25% sulfur
	#6		0.3-0.5 %
	Required no later	2014	2018
Additional Controls	Continued evaluation of other measures, including Energy Efficiency, Alternative Clean Fuels and other measures to reduce SO_2 and NO_x from all coal-burning facilities by 2018, and new source performance standards for wood combustion		

* If it is infeasible for a state to achieve this level of reduction from a unit, alternative measures will be obtained.

After consideration of the costs of compliance, the time necessary for compliance, the energy and non-air quality environmental impacts of compliance, and the useful life of existing sources that contribute to visibility impairment, New Jersey and the MANE-VU states believe that the reduction measures in Table 8.3 constitute reasonable progress and are necessary to achieve the Reasonable Progress Goal.

Section 9 discusses the actions New Jersey will be taking to implement these reasonable measures.

8.4.2 Areas outside MANE-VU

The states found to contribute to haze at the Brigantine Wilderness Area for the 2018 milestone year are Georgia, Illinois, Indiana, Kentucky, Michigan, North Carolina, Ohio, South Carolina, Tennessee, Virginia, and West Virginia.[68] The reasonable measures are listed in Table 8.3.

Table 8.3: Reasonable Measures for non-MANE-VU states

BART	Timely implementation of BART requirements
EGU	A 90% or greater reduction in sulfur dioxide (SO_2) emissions* from each of the 167 stacks identified by MANE-VU
Non-EGU	- 28 percent non-EGU SO_2 reduction by 2018 for each contributing State
Additional Controls	Continued evaluation of other measures, including measures to reduce SO_2 and NO_x from all coal-burning facilities by 2018, and promulgation of new source performance standards for wood combustion

* If it is infeasible for a state to achieve this level of reduction from a unit, the state must identify alternative measures for equivalent emission reductions.

New Jersey and the MANE-VU states considered the costs of compliance, the time necessary for compliance, the energy and non-air quality environmental impacts of compliance, and the useful life of existing sources that contribute to visibility impairment, and determined that the measures listed in Table 8.4 constitute reasonable progress and are necessary to achieve the Reasonable Progress Goal.

During consultation, an issue was raised regarding whether it would be acceptable for Midwest RPO states to substitute reductions from the EGU sector for reductions that may not be obtainable in the non-EGU sector. MANE-VU states indicated that this would be acceptable, depending on the location and type of the EGU source.

West Virginia expressed concern that MANE-VU included a 28 percent (%) reduction from the non-EGU sector, indicating that they did not have any measures to meet this additional reduction burden. West Virginia also indicated that the additional emission reductions from the EGUs not captured in the MANE-VU modeling could cover the non-EGU sector reduction modeled. To the extent that the additional emission reductions are achieved from the EGUs and the reductions are not offset by increases by another EGU under the CAIR cap and trade program,[69] New Jersey

[68] In addition, the State of Vermont identified at least one source in the State of Wisconsin as a significant contributor to visibility impairment at the Lye Brook Wilderness Class I Area.

[69] The CAIR cap and trade program was vacated on July 11, 2008, by the United States Court of Appeal for the District of Columbia. New Jersey is currently evaluating its legal options to address the loss in emission reductions from the upwind sources. New Jersey will address this issue during its 2013 evaluation required by the visibility rule.

would accept these reductions to meet the non-EGU emission reduction measure included in the definition of reasonable measures for the Brigantine Wilderness Area.

8.5 Reasonable Progress Goal for Brigantine Wilderness Area

To determine the reasonable progress goal (RPG) in deciviews, MANE-VU conducted an updated model simulation with refined representations of the reasonable control measures as determined through the consultation process. See Section 8.4.

The final modeling included the non-EGU measure emission reductions, which were not reflected in the initial modeling, as well as updated information for the 167 EGU stacks. The EGU emission projections with the 90% control at the 167 stacks were less than the Federal Clean Air Interstate Rule (CAIR) cap. Emissions were added back into the modeling emission inventory to maintain the CAIR cap. New Jersey and other MANE-VU states consider additional EGU controls beyond CAIR as reasonable and necessary. A description of how the emissions controls were modeled to determine the visibility impact of the MANE-VU reasonable measures are documented in the MANE-VU 2018 Visibility Projections Report,[70] and the Alpine Geophysics Report,[71] included in Appendix J. Section 8.7 discusses the performance of the modeling system used to set the 2018 reasonable progress goal.

The reasonable measures included in the final modeling would result in a 3.9 deciview improvement on the 20 percent worst days and 2.1 deciview improvement on the 20 percent best days, Table 8.4. The results indicate that the uniform rate of progress will be achieved.

Table 8.4: Reasonable Progress Goals for the Brigantine Wilderness Area (all values expressed as deciviews)

	Baseline Visibility (2000-2004)	Natural Background Conditions in 2064	Reasonable Progress Goal for 2018	2018 CMAQ Projections
20% Worst Days	29.0	12.2	25.1	25.1
20% Best Days	14.3	5.5	12.2	12.2

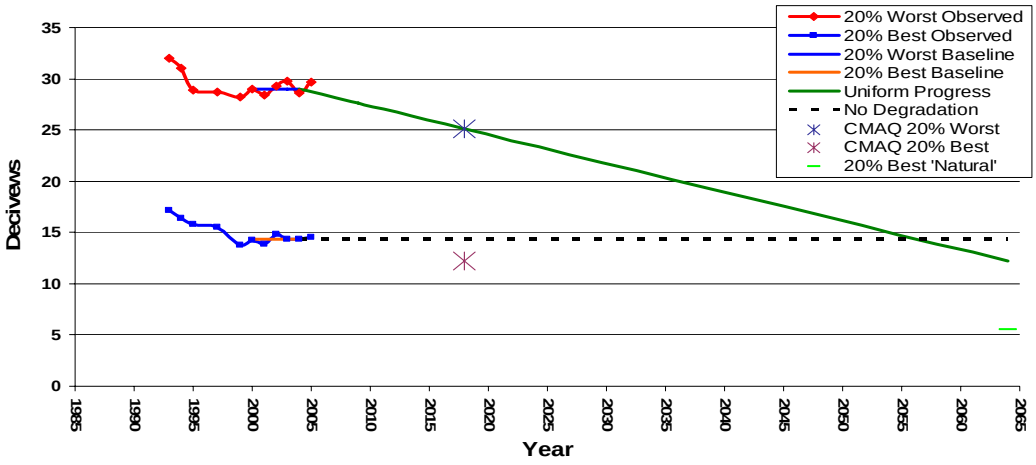
The MANE-VU final modeling results were developed using the CMAQ modeling platform described in the *MANE-VU Modeling for Reasonable Progress Report*, Appendix N.

Figure 8.1 illustrates the predicted visibility improvement by 2018, resulting from the implementation of the reasonable measures.

[70] Mid-Atlantic/Northeast Visibility Union Regional Planning Organization. "Draft 2018 Visibility Projections Report." March 31, 2008

[71] Alpine Geophysics "Documentation of 2018 Emissions from Electric Generating Units in the Eastern U.S. for MANE-VU's Regional Haze Modeling" April 2008

<u>Figure 8.1</u>: Projected Visibility Improvement at Brigantine Wilderness Area Based on Best and Final Modeling



In establishing the reasonable progress goal for 2018, New Jersey recognizes that contributing states have the flexibility to submit SIP revisions between now and 2018, as they adopt reasonable control measures as expeditiously as practicable to achieve the 2018 reasonable progress goal at Brigantine Wilderness Area. It is expected that the measures will be in place no later than December 31, 2017, to ensure the visibility benefits will be seen in the 2018 milestone year.

MANE-VU received comments from West Virginia, Reliant Energy, VISTAS, and the Utility Air Regulatory Group (UARG) on the final modeling. West Virginia, Reliant Energy and VISTAS objected to MANE-VU not using the same modeling emission inventory as VISTAS, specifically for the EGUs. The UARG comments focused on the fact that the MANE-VU 2018 visibility modeling report included control measures and emission reductions that went beyond currently existing regulations. They claimed that since the CAIR program and other "on the books" or "on the way" measures are projected to achieve uniform rates of progress as previously modeled, additional reductions to both EGU and non-EGU sectors were unnecessary. The comments regarding the MANE-VU final modeling are documented in Appendix K.

The USEPA rules require states to identify all reasonable measures, including potential point, area and mobile source controls to set the 2018 reasonable progress goal. New Jersey and MANE-VU's analysis indicate that identified measures are reasonable and thus were appropriately used to set the 2018 progress goal, even if better than uniform rate of progress is achieved. The final modeling for the Brigantine Wilderness Area indicates that even with the additional reasonable measures, the uniform rate of progress benchmark will just be achieved in the Brigantine Wilderness Area.

MANE-VU did not use the VISTA RPO emission inventory because the CAIR program is a cap and trade program. During the consultation, there was no enforceable mechanism to require that states stay within their budget. Thus MANE-VU chose to add back emissions to reflect the CAIR cap. This assumption provides a conservative projection of less visibility improvement.

New Jersey supports enforceable measures in state haze SIPs to require at least 90% SO_2 reduction at all 167 EGUs without offsetting emission increases elsewhere. The vacatur of CAIR is added reason to implement such requirement.

8.6 CAIR Vacatur

On July 11, 2008, the United States Court of Appeals for the District of Columbia Circuit vacated the federal Clean Air Interstate Rule (CAIR). This decision has significant air quality impact in the eastern United States.

At this time, New Jersey is evaluating its legal options to address the loss in emission reductions from the upwind CAIR sources. It is expected that the potential loss in emission reductions will be addressed prior to the 2018 visibility goal by CAIR states. New Jersey commits to address this issue during its 2013 evaluation.

On August 4, 2008, New Jersey proposed NOx and SO2 performance standards for electric generating units (EGUs). The performance standards are more stringent than the emission rates used in the CAIR calculation of the Emission Budgets.

New Jersey supports a more stringent cap and trade CAIR program, as well as baseline performance standards for all EGUs. We expect that the USEPA will adopt a more effective national program to address interstate transport well before 2018.

8.7 Baseline Inventory and Projections

40 C.F.R. § 51.308(d)(3)(iii) requires New Jersey to identify the baseline inventory on which the long-term strategy is based. For the MANE-VU region, New Jersey used the 2002 MANE-VU inventory Version 3.0 as its baseline inventory. The inventory is documented in Section 5 of this SIP. For other regions, MANE-VU used inventories developed by the RPOs for those regions, including VISTAS Base G2, MWRPO's Base K, and CENRAP's emissions inventory as obtained. (Specific files are identified in the MANE-VU report, "Modeling for Reasonable Progress Goals" on page 1-18).

For EGUs, VISTAS modeling projected total SO_2 emissions for the MWRPO, MANE-VU and VISTAS to be below the CAIR cap. New Jersey supports VISTAS EGU emission inventory approach, but as previously stated, does not find a regulatory mechanism to reduce the CAIR cap, thus the rationale to the add back emissions. If the additional reductions are realized, then the interim reasonable progress goal may be achieved sooner and more progress made to reduce haze.

The 167 EGU stacks and their baseline emissions are listed in Appendix L. The baseline emission inventory for the non-EGU sector is also presented in Appendix F.

8.8 Model Performance Evaluation

To set the 2018 reasonable progress goal, the CMAQ modeling system was utilized. One of the steps in the modeling process is to assess the modeling system's ability to predict pollutant concentration fields in the correct locations and at the right levels and time. To do this, model predictions for the base year simulation are compared to the actual ambient data observed. This assessment involves the evaluation of statistical and graphical information. If the model appears to be predicting pollutant concentration fields appropriately, then the model can be used as a predictive tool to evaluate various control strategies and their effects on visibility.

The results of a model performance evaluation were examined in accordance with the USEPA Modeling Guidance[72] prior to using CMAQ's results to support achieving the 2018 reasonable progress goal. NESCAUM conducted a performance evaluation of the 2002 base case CMAQ simulation for the pollution of interest on behalf of the MANE-VU member states. MANE-VU's performance evaluation found the modeling tools to meet the performance criteria set in the USEPA modeling guidance. Predicted $PM_{2.5}$ sulfate and measured sulfate are in 1:1 linear relationship between the model and observations. Appendix H provides comprehensive evaluation of the results.

The CMAQ air quality simulations were performed cooperatively among five modeling centers: New York State Department of Environmental Conservation (NYSDEC), the New Jersey Department of Environmental Protection (NJDEP) in association with Rutgers University, the Virginia Department of Environmental Quality (VADEQ), University of Maryland (UMD), and NESCAUM. The modeling was conducted on the 12-km resolution domain for the years of 2002, 2009 and 2018. The model performance for visibility was examined based on the 2002 annual CMAQ run. Measurements from IMPROVE and STN networks were used for the evaluation.

Regional haze modeling also requires a CMAQ performance evaluation for aerosol extinction coefficient (B_{ext}) and the haze index. CMAQ prediction of the aerosol extinction coefficient at all Class I sites in the eastern United States agrees well with IMPROVE observation because CMAQ performs well on sulfate, which dominates aerosol extinction.

Overall, MANE-VU CMAQ modeling for 2002 accurately portrays sulfate, $PM_{2.5}$, aerosol extinction coefficient, and the Haze Index. For more details on CMAQ performance evaluation, see Appendix C of the MANE-VU Contribution Assessment report, presented in Appendix H of this report.

[72] USEPA. Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$, 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

9.0 NEW JERSEY ACTIONS

Maine, New Hampshire and Vermont determined that New Jersey contributed to their Class I areas, Acadia National Park and Moosehorn Wilderness Area, Great Gulf Wilderness Area and Presidential Range/Dry River Wilderness Area, and Lyebrook Wilderness Area, respectively. New Jersey is also home to four (4) of the 167 EGU stacks identified for reasonable controls. Additionally, New Jersey sources contribute to visibility impairment at the Brigantine Wilderness Area. To address the contributions, New Jersey is committed to take action to reduce the impact of these and other sources in New Jersey. New Jersey is basing its actions in part on the measures in the MANE-VU final modeling[73].

40 C.F.R. § 51.308(d)(3) requires New Jersey to submit a long-term strategy that addresses regional haze visibility impairment for each mandatory Class I Federal area within and outside the State which may be affected by emissions from within the State. The long-term strategy must include enforceable emissions limitations, compliance schedules and other measures necessary to achieve the reasonable progress goals established by states where the Class I areas are located. This section describes how New Jersey meets the long-term strategy requirements.

9.1 BART

The Best Available Retrofit Technology analysis and any subsequent requirement for the installation of control technology are required by the Clean Air Act and the USEPA regulations.[74] New Jersey's planned BART actions are described in Section 6.

The four identified BART-eligible facilities in New Jersey are PSEG – Hudson, Amerada Hess, ConocoPhillips, and Sunoco Eagle Point. All these facilities are (or will be) subject of NSR enforcement actions and/or agreements that will significantly reduce NO_x, SO_2, PM and VOC emission. Also, New Jersey will be using a facility-specific approach to confirm that measures being implemented are BART and if necessary, control the haze pollutants from these facilities. New Jersey commits to propose and adopt rules to require the top-down BART analysis and implementation of any identified BART control measures for the three refineries as part of New Jersey's refinery rules (N.J.A.C 7-27-33.7). BART for the PSEG – Hudson facility will be addressed separately in a single source SIP revision.

9.2 EGU Strategy

- **167 EGU Stacks** – Four of the 167 EGU stacks identified by MANE-VU as contributing to visibility impairment are located in New Jersey. They are located in the following facilities: BL England, PSEG - Hudson, and PSEG – Mercer. These facilities all have coal-fired EGU boilers. The BL England facility is under an Administrative Consent Order (ACO)[75] to meet performance standards for SO_2, NO_x, and PM. The Hudson and Mercer facilities are under a

[73] On a recent MANE-VU call (date) of the State Air Director Representative, the MANE-VU Class I states indicated that they were all defining their 2018 Reasonable Progress Goal based on the final MANE-VU modeling.
[74] 40 C.F.R. pt. 51
[75] New Jersey Department of Environmental Protection Administrative Consent Order (ACO) NEA 040002-73001. Effective January 24, 2006

Consent Decree[76] to also meet performance standards for SO_2, NO_x and PM.[77] These orders/decrees will require more than a 90 percent (%) SO_2 emission reduction by 12/15/2012, in addition to about 90% reduction of NO_x and PM.. New Jersey has also adopted a mercury rule[78] that sets performance standards for coal-fired boilers, for companies which choose the multi-pollutant strategy in that rule. All four of the167 EGU stacks located in New Jersey are committed to multi-pollutant controls, as part of their mercury rule compliance plan.

- **Electric Generating Units (EGU) Boilers –** In addition to the mercury rule multi-pollutant control incentive, New Jersey has proposed[79] to implement mandatory multi-pollutant performance standard to reduce allowable NO_x, SO_2 and particulate emissions from all ten coal-fired boilers in New Jersey. Lowering the maximum allowable emission rates of particles, NO_x and SO_2 from these coal-fired boilers will help reduce regional haze. The NJDEP is proposing a December 15, 2012 compliance date to coincide with New Jersey's mercury rule. Most units will comply sooner pursuant to enforcement agreements or the existing multi-pollutant provisions of the mercury rule for coal-fired boilers at N.J.A.C. 7:27-27.7(d). New Jersey has also proposed more stringent NO_x emission standards for gas and oil-fired boilers serving EGUs. New Jersey intends to establish these rules, in accordance with the New Jersey Administrative Procedures Act (APA), (N.J.S.A. 52:14B-1 et. seq.) and the New Jersey Air Pollution Control Act (APCA), (N.J.S.A.26:2C-1 et. seq.).

9.3 Low-Sulfur Fuel Oil Strategy

New Jersey intends to propose and adopt rules 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.) to modify the sulfur in fuel limits in accordance with the definition of reasonable measures, outlined in Subsection 8.4.1, for the MANE-VU strategy. N.J.A.C. 7:27 – 9 already meets the #6 fuel oil sulfur levels in parts of the state.

9.4 Energy Efficiency

New Jersey issued a draft Energy Master Plan[80] (EMP) to address New Jersey's electricity and heating challenges. Components of the Energy Master Plan address ways to increase energy efficiency in the State.

On July 6, 2007, Governor Corzine signed the Global Warming Response Act. The Act requires New Jersey to reduce greenhouse gas emissions by 20 percent (percent) by 2020 and by 80 percent (percent) by 2050. Measures to meet these requirements will also help reduce SO_2, PM, and NO_x emissions and improve visibility. A Greenhouse Gas Reduction Plan will be proposed in the Fall of 2008.

[76] http://www.epa.gov/compliance/resources/decrees/amended/psegfossil-amended-cd.pdf
[77] The Hudson and Mercer facilities will meet 90 percent SO_2 reduction by 2010
[78] N.J.A.C 7:27-27.7
[79] http://www.nj.gov/dep/aqm/curformp.htm
[80] www.nj.gov/emp

9.5 Additional Class I State Required Measures

The Clean Air Act and the USEPA Rule require states with Class I areas to address emissions from construction activities and implement smoke management plans. This subsection describes New Jersey's action for these categories.

9.5.1 Measures to Mitigate the Impacts from Construction Activities

40 C.F.R. § 51.308(d)(3)(v)(B) requires New Jersey to consider measures to mitigate the impacts of construction activities.

Construction activities are sources of crustal (or inorganic) forms of directly emitted particulate matter (PM) and emissions from the construction equipment that are blown by the winds. While much of the wind blown emissions are coarse PM, smaller particles are also present. During high wind events, fine crustal PM has been shown to be transported over very long distances, and contribute to regional haze.

New Jersey has standards[81] that reduce fugitive dust emissions from construction. These Standards were adopted by the New Jersey Department of Transportation and New Jersey Department of Agricultures under the "Soil Erosion and Sediment Control Standards: Standards for Dust control." The Standard covers the control of dust on construction sites and roads, the control of flowing sediment from accessing construction sites, and the control of on-site construction traffic to minimize land disturbance.

New Jersey plans to evaluate additional control measures to minimize the impact on air quality from the equipment used in construction projects. The USEPA regulations will limit the sulfur content of diesel fuel for on-road and non-road vehicles and equipment to 15 ppm before 2018. Additionally, the USEPA recently promulgated rules to require lower emissions from new non-road diesel engines.[82] New Jersey has existing rules to limit the idling of vehicles and equipment. New Jersey has also proposed a rule to further reduce allowable smoke from on-road diesel engines.[83] These measures will help reduce haze emissions and regional haze.

Additionally, New Jersey will consider additional mitigating measures for construction activities on a case-by-case basis depending on the size and nature of the construction being done and the review of the potential emissions on the property in relation to any potential off-site impacts. To implement these requirements, the NJDEP can use existing authority under the Waterfront Development Rules, as well as Environmental Impact Statements required pursuant to the National Environmental Policy Act and/or Executive Order. In addition, any unreasonable off-site air quality impacts during construction can be addressed by New Jersey's general prohibition of air pollution at N.J.A.C. 7:27-5 et seq. Mitigation measures would be required if construction activities unreasonably interfere with the enjoyment of life or property.

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[81] Standards for Soil Erosion and Sediment Control in New Jersey. Promulgated by the New Jersey State Soil Conservation Committee. Adopted July 1999.
[82] Federal Register, Vol. 69, No. 124, June 29, 2004.
[83] http://www.nj.gov/dep/aqm/CPR-041708.pdf

As an example, mitigation of construction emissions in New Jersey was included as a permit condition for a large commercial development in the northern part of the State. The project included the construction of office buildings, an amusement park, a shopping mall and an indoor ski slope. One of the prime contractors was required to reduce particulate matter (PM) emissions from their construction equipment and their subcontractors' construction equipment by 35 percent. A variety of retrofit devices and fuels were used to achieve this reduction: diesel particulate filters, diesel oxidation catalysts, closed crankcase filtration systems, and the use of ultra low (15ppm sulfur content) and low sulfur diesel (500ppm sulfur content).

The Clean Air Act[84] requires that Federal actions conform to a state's State Implementation Plan (SIP). Specifically the Clean Air Act requires that the action/activity will not:

- Cause or contribute to any new violation of any National Ambient Air Quality Standard (NAAQS) in any area;
- Increase the frequency or severity of any existing violation of any NAAQS in any area; or,
- Delay timely attainment of any NAAQS or any required interim emission reductions or any other milestones in any area.

Federal actions taken in New Jersey must comply with the Federal General Conformity Rules[85] for $PM_{2.5}$ in the 13 counties in nonattainment of the $PM_{2.5}$ standard and in the entire State for 8-hour ozone. The General Conformity Rule requires that VOC, NO_x, and $PM_{2.5}$ direct and indirect emissions from a project that exceed *de minimis* levels be mitigated, unless the activities are exempt. Emission reductions obtained through the implementation of measures required by the Federal conformity regulation will also reduce emissions from projects and help reduce regional haze.

9.5.2 Fugitive Dust

New Jersey intends to further address fugitive dust[86] emissions in a new rule. The rule as currently envisioned will establish provisions requiring a dust management plan for certain source categories and any facility with a history of dust emissions. Requiring dust management plans for these facilities will help control dust emissions to eliminate nuisance dust, improve visibility, and improve the health of the citizens of New Jersey. As with any rule, the New Jersey Air Pollution Control and Administrative Procedures Act requirements will be followed.

9.5.3 Agricultural and Forestry Smoke Management

40 C.F.R. § 51.308(d)(3)(v)(E) requires New Jersey to consider smoke management techniques for the purposes of agricultural and forestry management in developing reasonable progress goals.

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[84] 42 U.S.C. 7506

[85] 40 C.F.R 93.150

[86] Fugitive dust is made up of suspended particles caused by human activities and wind. Typical sources of fugitive dust include wind erosion, construction, roads, and agriculture. Industrial activities such as quarries and mineral processing can also emit fugitive dust.

New Jersey addresses smoke management through its Open Burning rules.[87]

9.5.3.1 Open Burning

New Jersey has one of the most stringent open burning rules in the nation. The existing New Jersey rules limit all types of open burning within the State, N.J.A.C. 7:27-2 et seq. These rules have been in effect since 1956, with subsequent revisions further restricting open burning. The rules prohibit most open burning, limit other types of open burning, and have been successful in minimizing burning throughout the State. The instances where open burning is allowed, after a person obtains an air pollution control and Forest Fire Service permit, include:

- Infested plant life,
- Prescribed burning,
- Emergencies
- Dangerous material,
- Herbaceous plant life and hedgerows,
- Orchard prunings and cullings
- Land clearing for farming

New Jersey plans to propose amendments to the current rules to require that any permit issued for open burning in the State would prohibit open burning on days forecasted as unhealthy for air quality. This condition is currently envisioned to apply in all but emergency situations.

New Jersey commits to coordinate with Forest Fire Service to consider the effects on Brigantine when reviewing open burning permit applications for certain areas near Brigantine, especially for prescribed burning.

New Jersey's area source emissions inventory currently tracks estimated emissions from burning by county using data obtained from several sources, including the New Jersey Division of Fire Safety and the NJDEP Bureau of Forest Fire Management, Divisions A, B, and C. Open burning is estimated to be a minor contributor to organic carbon emissions in New Jersey based on MANE-VU's contribution assessment.

9.5.3.2 Prescribed Burning

Prescribed burning is one of the few categories where open burning is allowed by permit under specific conditions for public safety reasons. Prescribed burning is supervised by the Bureau of Forest Fire Management, to ensure public safety. Prescribed burning, when properly conducted, could be beneficial as it minimizes the potential future threat of large and serious uncontrolled wildfires which could seriously jeopardize human life and property. In addition, it reduces the number of wildfires and the visibility impairment associated with uncontrolled wildfire.

[87] N.J.A.C. 7:27-2

9.5.3.3 Agricultural Management

A few other categories where open burning is currently allowed with a permit in New Jersey, but limited in its scope, are conducted on agricultural lands. These categories include infested plant life, herbaceous plant life and hedgerows, orchard prunings and cullings and land clearing for agricultural purposes. NJDEP issues open burning permits to agricultural operations and establishments and ensures through these permits that only certain materials are burned.

9.6 Wood Burning Strategies

Wood burning is one of the largest sources of direct fine particulate matter, $PM_{2.5}$, emissions in New Jersey. With the high price of conventional heating fuels, the onset of cold weather brings a dramatic increase in the use of fireplaces and woodstoves. This results in large quantities of particulate matter being released into the local air shed. Wood smoke contains over 200 chemicals and compound groups, many considered as air toxics.

New Jersey is considering strategies to reduce the emissions of wood smoke. Implementation of these strategies would reduce fine particle emissions and improve visibility. One strategy under consideration is a Home Wood Heating Advisory Program, similar to those in Oregon and Washington states. In general, these programs require the limitation of burning during times when unhealthy air quality is forecast or monitored. Other control measures under investigation include woodstove and fireplace change-out programs. Financial incentives might be provided to help home owners to replace their older, more polluting fire box or stove with a newer, less polluting one.

The NJDEP has posted on its website an informational webpage regarding techniques for proper wood burning, health effects of wood burning, and links to other useful web pages.[88]

9.7 Measures to Reduce Organic Carbon Emissions

Organic carbon is the second largest contributor to visibility impairment. New Jersey is taking actions to reduce emissions from these products of incomplete combustion:

1. Boilers (N.J.A.C 7:27-16.8)

   Volatile Organic Compounds (VOCs) form secondary organic aerosol (SOA) after condensation and oxidation processes in the atmosphere, thereby contributing to the organic fraction of visibility impairment. The existing rule sets VOC and Carbon Monoxide (CO) limits for indirect heat exchanges (boilers and furnaces). Lower levels for VOC and CO are being considered by NJDEP for Industrial, Commercial and Institutional (ICI) boilers as Maximum Achievable Control Technology (MACT).
2. Industrial/Commercial/Institutional Boilers and Other Indirect Heat Exchangers (N.J.A.C 7:27-19.7)

[88] http://www.state.nj.us/dep/baqp/woodburning.html

The existing rule, N.J.A.C. 7:27-19.7 (g), requires annual tune-ups for any industrial/commercial/institutional boiler or other indirect heat exchanger with a maximum gross heat input rate of at least 10 million BTU per hour and greater, beginning in 2008, and expands to any unit of at least 5 million BTU per hour and greater, beginning in 2010. This rule will reduce organic carbon emissions.

3. Diesel Idling Rule (N.J.A.C. 7:27-14.3)

The existing rule removes exemptions in the previous rule and eliminates the sleeper berth exemption in 2010.

4. Diesel Retrofit Program (N.J.A.C 7:27-32)

The existing rule requires mandatory retrofit of particulate control for school buses, garbage trucks, commercial buses and publicly owned fleets. The retrofits are scheduled to occur between 2008 and 2015. These rules will reduce the emissions of fine particles. An estimated 11,500 public vehicles will be affected by the mandatory retrofit program.

5. Control and Prohibition of Open Burning (N.J.A.C 7:27-2)

See Section 9.5.3.1 of this plan.

6. Heavy Duty Trucks (N.J.A.C. 7:27-14)

On June 16, 2008, the NJDEP proposed tighter opacity limits to be used in the Inspection and Maintenance (I/M) program. This rule proposal will reduce emissions of organic carbon.

10.0 COMMITMENTS

Attaining the 2018 Reasonable Progress Goal is contingent upon the continued implementation and enforcement of existing control measures, the implementation of a number of new State and Federal control measures, as well as the implementation of the "ask" reasonable measures by the contributing states and tribes. The remainder of this section summarizes New Jersey's commitments, as well as New Jersey's requests of the USEPA with respect to regional haze improvement, to reduce SO_2, PM and NO_x emissions.

10.1 Control Measure Commitments

Table 10.1 provides a status on control measures committed to in New Jersey's final 8-hour Ozone SIP[89] and proposed $PM_{2.5}$ SIP[90] that will also provide the emission reductions needed to achieve the Reasonable Progress Goal for visibility improvement in the Class I Areas. New Jersey commits to propose and adopt the measures in Table 10.1 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.). New Jersey expects that the control measure commitments in Table 10.1 will be in effect prior to the 2018 regional haze reasonable progress milestone. For a detailed explanation of each of these control measures, see Appendix M.

Table 10.1: State Control Measure Commitments

Control Measures	Status/Commitment
NOx RACT Rule 2006 (includes distributed generation and certain boilers)	Rule adopted September 8, 2005
Diesel Idling Rule Changes	Rule adopted May 25, 2007
Diesel Smoke Rule Changes	Rule proposed June 16, 2008
Asphalt Production Plants	Rule proposed August 4, 2008
ICI Boilers – Area Sources	Rule proposed August 4, 2008
ICI Boilers – Non-EGU Point Sources	Rule proposed August 4, 2008
Coal-fired Boilers Serving EGUs	Rule proposed August 4, 2008
High Electrical Demand Day units	Rule proposed August 4, 2008
Glass Furnaces	Rule proposed August 4, 2008
Facility Specific Emission Limits and Alternative Emission Limits	Rule proposed August 4, 2008
Municipal Waste Combustors	Rule proposed August 4, 2008
Low Sulfur Fuel Oil Strategy	Rule Proposal being Drafted
Refinery Rules Including BART	Rule Proposal being Drafted
Onroad Motor Vehicle Control Programs (Fleet turnover 2010)	New standards (both Federal and State) are already adopted to provide for these benefits
Nonroad Motor Vehicle Control Programs (Fleet turnover 2010)	New standards (both Federal and State) are already adopted to provide for these benefits
#6 Fuel Oil-Fired Boilers	$PM_{2.5}$ SIP Commitment
Stationary Diesel Engines	$PM_{2.5}$ SIP Commitment
Fugitive Dust Emission Regulation	Analysis Underway
Open Burning Permit Regulation Revisions	Analysis Underway
Home Wood Heating Advisory Program	Analysis Underway

[89] http://www.state.nj.us/dep/baqp/8hrsip/8hrsip.html#final
[90] http://www.state.nj.us/dep/baqp/pm25sip/pm25sip.html

10.2 Other Commitments

10.2.1 Visibility

New Jersey commits to continue carrying out the required review of proposed sources impact on visibility under 40 C.F.R. § 52.26 and 52.28, by implementing the Prevention of Significant Deterioration (PSD) permit requirements for new or modified major sources of air pollutants located within 100 kilometers of the Class I area, or within a larger radius on a case-by-case basis, in accordance with all applicable Federal rules for review of the impacts on Class I areas.

New Jersey's PSD program prevents new and modified sources from significantly impacting visibility. In addition, older sources are expected to shut down with time, and new source emissions are minimized, thereby improving air quality and enhancing visibility at Brigantine.

10.2.2 Consultation with Federal Land Managers

New Jersey commits to coordinate on-going consultation with the appropriate Federal Land Manager and the USEPA regarding future progress reports and State plan revisions.

10.2.3 Monitoring

The NJDEP commits to operate and maintain the monitoring site at the Brigantine Wilderness Area for the foreseeable future, although this is contingent upon continued Federal and State funding. Any network changes will be subject to a joint annual review process by both the NJDEP and the USEPA.

10.2.4 Emission Inventory

New Jersey commits to update the emission inventory periodically in accordance with the requirements of Section 51.308(d)(4)(v).

10.2.5 Comprehensive Periodic Implementation Plan Revisions

New Jersey commits to revise and submit a regional haze implementation plan by July 31, 2018, and every ten years thereafter, in accordance with the requirements listed in Section 51.308(f) of the Federal rule for regional haze, contingent on the availability of Federal funds to support the Regional Planning Organizations and MANE-VU. Section 51.308(f) requires that each state identified in Section 51.300(b) (3) revise and submit its regional haze implementation plan revision to the USEPA by July 31, 2018, and every ten years thereafter. Section 51.308(f) also states what the states are required to include in the SIP revisions. To meet this commitment, New Jersey expects to rely on the collaborative Regional Planning Organization efforts which require continued Federal funding. See section 10.2.6.3.

10.2.6 State Requests of USEPA

10.2.6.1 IMPROVE Network

As discussed in Section 4.1, the monitoring strategy for the State of New Jersey, as required by 40 C.F.R. § 51.308(d)(4), relies upon the continued availability of the IMPROVE network. New Jersey requests that the USEPA continue to provide support to the upkeep and maintenance of the IMPROVE network for the Brigantine Wilderness Area.

10.2.6.2 New Jersey's Reliance on Other State Actions for Reaching Reasonable Progress Goal

For the Brigantine Wilderness Area to achieve the 2018 reasonable progress, the contributing states must take action to implement reasonable control measures. New Jersey expects that the USEPA and the FLMs will require the emission reduction necessary to achieve this goal.

10.2.6.3 Federal Funding to Support Regional Haze Efforts and the Regional Planning Organizations

New Jersey is relying on and expects that the USEPA will continue to provide funds to support Regional Haze efforts and the Regional Planning Organizations, including MANE-VU.

10.2.6.4 Federal Requirement to Obtain Additional Air Pollution Reductions from EGUs, Industrial/Commercial/Institutional (ICI) Boilers and Other Major Sources

New Jersey requests that the USEPA set performance standards for all EGUs, ICI boilers and other major sources to achieve substantially more emission reductions than the CAIR program.

10.2.6.5 CAIR Vacatur

On July 11, 2008 the United States Court of Appeals for the District of Columbia Circuit issued a decision vacating the Clean Air Interstate Rule (CAIR). New Jersey's emissions from local sources will be controlled by State regulations which are not dependent on CAIR. However, emission reductions from regional transport will be affected by the vacatur. New Jersey expects the USEPA to develop requirements to obtain the emission reductions from states whose haze SIPs depend on CAIR.

11.0 PUBLIC PARTICIPATION

New Jersey will document the public participation process, including any formal comments submitted to the State of New Jersey by the Federal Land Manager, in the final submittal of this proposed SIP revision to the USEPA. The Federal Land Manager comments will be available in the docket.