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Alexander B. Grannis
Commissioner

MAR 15 2010

Ms. Judith Enck
Regional Administrator
United States Environmental Protection Agency
Region 2
290 Broadway, 26th Floor
New York, New York 10007-1866

Submission of New York State's
Final Implementation Plan for Regional Haze

Dear Ms. Enck:

On behalf of the Governor of the State of New York, I am submitting for approval by the United States Environmental Protection Agency (EPA) the New York State Implementation Plan for Regional Haze.

This SIP has been developed as required by 40 CFR Sections 51.308 to meet the requirements of the EPA's Regional Haze rules under the requirements set forth in the Clean Air Act. This SIP addresses all of the elements required by 40 CFR Section 51.308, including Best Available Retrofit Technology (BART) requirements, the establishment of Reasonable Progress Goals (RPGs) and the commitment to implement measures that contributing states like New York must take to do their part in meeting RPGs in affected Class I areas. In addition, this SIP addresses Regional Planning, State and Federal Land Manager coordination, and contains a commitment to provide future plan revisions and adequacy determinations as necessary.

As required according to 40 CFR Section 51.308(i) that requires coordination between States, Tribes and the Federal Land Managers (FLMs) in developing each state's implementation plan for Regional Haze, a draft of the New York State Department of Environmental Conservation's (Department) "New York State Implementation Plan for Regional Haze" (RH SIP) was provided to the Federal Land Managers at the National Park Service, the U.S. Forest Service and the U.S. Fish and Wildlife Service for review and comment prior to holding any public hearing.

This document has undergone the required public review process in which a public hearing and the opportunity for public comment were held. The public hearing took place on January 5, 2010. The following documents are enclosed:

1. Copies of the Public Notices published in Newsday, New York Post, The Journal News and the Environmental Notice Bulletin on December 2, 2009.
2. Legislative Hearing Transcript
3. Responsiveness Summary
4. New York's Final Implementation Plan for Regional Haze

Should you have any questions regarding this submission, please do not hesitate to contact Mr. David J. Shaw, Director of the Department's Division of Air Resources at (518) 402-8452 with any questions you may have.

Sincerely,

J. Jared Snyder
Assistant Commissioner
Office of Air Resources, Climate Change and Energy

Enclosure

cc: D. Shaw
J. Higgins
R. Sliwinski
R. Ruvo, EPA Region 2
R. Werner, EPA Region 2

Department of Environmental Conservation
Division of Air Resources

NEW YORK STATE IMPLEMENTATION PLAN FOR REGIONAL HAZE

FINAL FEBRUARY 2010

New York State Department of Environmental Conservation
DAVID A. PATERSON, GOVERNOR ALEXANDER B. GRANNIS, COMMISSIONER

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Executive Summary

As required by 40 CFR Section 51.308 of the Regional Haze Rule, the New York State Department of Environmental Conservation's Division of Air Resources has prepared this State Implementation Plan (SIP) revision demonstrating how reductions in the emissions of visibility impairing pollutants will result in a decrease in the degree of visibility impairment in Class I areas in the northeastern United States.

The overall goal of the Federal Haze Program (64 FR 35714) is to reduce haze to natural, pre-industrial conditions in these areas by 2064. This SIP, however, as required by the Regional Haze Rule deals with the first planning period that ends in 2018. The decrease in New York State emissions, in concert with the efforts of other states, is focused on attaining this goal, decreasing visibility impairment to the necessary degree by 2018 to be on a "glide path" to meet the ultimate 2064 goal.

Although New York State has no Class I areas, emissions in the State contribute to visibility degradation in downwind Class I areas in several other states. These include: the Lye Brook Wilderness Area, VT, Brigantine Wildlife Refuge, NJ, Presidential Range-Dry River Wilderness Area and Great Gulf Wilderness Area, NH, Roosevelt-Campobello International Park, Acadia National Park, Moosehorn Wildlife Refuge, ME, and the Shenandoah National Park in VA. These emissions include sulfates, nitrates, particulate matter, ammonia, and volatile organic compounds (i.e., VOC).

Since emissions must be addressed on a region-wide basis, the Mid-Atlantic Northeast Visibility Union (MANE-VU) was formed by the states, tribes, and federal agencies in the mid-Atlantic and northeast areas to coordinate regional haze planning activities for the region and with the four other Regional Planning Organizations (RPOs) covering other areas of the country. MANE-VU has provided technical analyses and other assistance to the member organizations in affiliation with the Northeast States for Coordinated Air Use Management (NESCAUM) and the Mid-Atlantic Regional Air Management Association (MARAMA).

This SIP revision satisfies the requirements of the federal haze program found in 40 CFR Section 51.308 by evaluating the current and future projected inventory of sources, assessing the progress necessary to reduce emissions to meet the 2018 goal, providing for consultation with other states, tribes and federal land managers (FLMs) in establishing progress goals, and establishing a strategy by which New York's share of regional emission reductions will be implemented. This strategy was arrived at through a consultation process with other states and tribes, FLMs and the Environmental Protection Agency (EPA). The State of New York agrees and commits to implement this strategy as described in this document.

40 CFR Section 51.308(f) requires a State to revise its regional haze implementation plan and submit it to the EPA by July 31, 2018 and every ten years thereafter. Additionally, Section 51.308(g) requires periodic reports evaluating progress toward the

reasonable progress goals established for each mandatory Class I area. In accordance with the requirements listed in Section 51.308(g) of the federal rule for regional haze, New York also commits to submitting both the SIP revision and the periodic report on reasonable progress to the EPA every five years.

Acronyms and Abbreviations

Act	Clean Air Act
AQI	Air Quality Index
BART	Best Available Retrofit Technology
CAA	Clean Air Act Amendments of 1990
CAIR	Clean Air Interstate Rule
CALPUFF	California Puff model
CEM	Continuous Emissions Monitoring
CENRAP	Central Regional Air Planning Association
CFR	Code of Federal Regulations
CMAQ	Congestion Mitigation and Air Quality
CO	Carbon Monoxide
Department	Department of Environmental Conservation
DV	Deciview
ECL	Environmental Conservation Law
EGU	Electric Generating Unit
EMAD	Emissions, Monitoring and Analysis Division (EPA)
EPA	United States Environmental Protection Agency
FLM	Federal Land Manager
FR	Federal Register
FY	Fiscal Year
HAP	Hazardous Air Pollutant
H_2SO_4	Sulfuric Acid
ICI	Industrial/Commercial/Institutional
IMPROVE	Interagency Monitoring of Protected Visual Environments
IPM	Integrated Planning Model
LADCO	Lake Michigan Air Directors Consortium
MANE-VU	Mid-Atlantic / Northeast Visibility Union
MARAMA	Mid-Atlantic Regional Air Management Association
MRPO	Midwest Regional Planning Organization
NAAQS	National Ambient Air Quality Standards
NACAA	National Association of Clean Air Agencies
NEI	National Emissions Inventory
NESCAUM	Northeast States for Coordinated Air Use Management
NH_3	Ammonia
NNSR	Nonattainment New Source Review
NO_x	Oxides of Nitrogen
NO_2	Nitrogen Dioxide
NSPS	New Source Performance Standards
NSR	New Source Review
NYCRR	New York Codes, Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
OAQPS	EPA Office of Air Quality Planning and Standards

OAR	Office of Air and Radiation (EPA)
OC	Organic Carbon
OTB	On The Books
OTC	Ozone Transport Commission
OTW	On The Way
PM	Particulate Matter
$PM_{2.5}$	Fine Particulate Matter less than 2.5 microns
PM_{10}	Particulate Matter less than 10 microns
PSD	Prevention of Significant Deterioration
PTE	Potential To Emit
QA	Quality Assurance
QC	Quality Control
RFP	Reasonable Further Progress
RPG	Reasonable Progress Goal
RPO	Regional Planning Organization
SCC	Source Category Code
SIP	State Implementation Plan
SMOKE	Sparse Matrix Operator Kernel Emissions (Inventory Data Analyzer)
SMP	Smoke Management Plan
SO_2	Sulfur Dioxide
SO_x	Oxides of Sulfur
SOA	Secondary Organic Aerosol
TIP	Tribal Implementation Plan
TPD	Tons Per Day
TPY	Tons Per Year
TSC	Technical Support Committee
TSD	Technical Support Document
USC	United States Code
VIEWS	Visibility Improvement Exchange Web System
VISTAS	Visibility Improvement State and Tribal Association of the Southeast
VOC	Volatile Organic Compound

1.0 Background and Overview of the Federal Regional Haze Regulation

1.1 Haze Characteristics and Effects

Haze refers to the presence of light-inhibiting pollutants in the atmosphere. These particles and gases scatter or absorb light to cause a net effect referred to as "light extinction." This scattering and absorbing occur across the sight path of an observer, thus leading to a hazy condition. Emissions of pollutants such as particulate matter, especially fine particulate matter (particles with a diameter less than 2.5 microns in size), sulfur dioxide, and nitrogen oxides are the primary contributors to visibility problems. Particulate matter can be emitted directly from stationary sources, or comprised in part of nitrate and sulfate particles formed through reactions involving nitrogen oxides and sulfur dioxide in the atmosphere. These constituents of haze are capable of being transported great distances while in the atmosphere. Due to this, sources may contribute to visibility impairment in Class I areas far downwind of their location, requiring a regional solution to the haze problem.

Reduction in visibility-impairing pollutant emissions such as nitrogen oxides (a precursor to ground-level ozone formation) also lead to a reduction in ozone. Ozone can diminish the ability for plants to produce and store food, making them more susceptible to disease, cause crop yield and forest growth to decline, and result in damage to leaves and trees in urban or other recreational areas. Nitrogen oxides and sulfur dioxide can both lead to acid rain, which damages forests and crops, acidifies waterways, and, long-term, alters the natural variety of plant and animal life in an ecosystem. In the Adirondack Mountains of New York State, mineral acidification from atmospheric deposition is responsible for ecosystem damage, including loss of fish populations. A major effect of acid rain on forest health and productivity is a reduction in the available supply of calcium and other base cations (positively charged ions) in soil that are needed for forest growth. The Catskill Mountain region of New York State has among the highest rates of sulfur and nitrogen deposition in the state and the lowest values for soil calcium availability. Significantly, the forested watersheds of the Catskill region provide the New York City water supply.

The inherent reduction of visibility-impairing pollutant emissions will also be protective of public health. While the presence of particulate matter is among the major causes of regional haze, ongoing studies reveal its contribution to a number of health issues, including respiratory irritation; decreased lung function; development or aggravation of respiratory conditions such as bronchitis; irregular heartbeat; and premature mortality. Ozone formed from nitrogen oxide emissions, along with sulfur dioxide and sulfate particles, causes similar respiratory impairment, especially among children whose respiratory systems are still

developing, the elderly, and adults who are active outdoors. By regulating sulfur dioxide, nitrogen oxides and particulate matter, severe respiratory and cardiovascular diseases can be avoided. Reducing nitrogen oxides, an ozone precursor, is of great importance for New York State, which contains multiple areas which are classified as being in nonattainment of the ozone National Ambient Air Quality Standards (NAAQS). New York State also contains a fine particulate matter nonattainment area. Particulate matter consists of microscopic solid or liquid particles and is the major cause of the regional haze issue. Finally, the Department believes that improved visibility will lead to economic and tourism benefits in, for example, the "forever wild" areas in the Adirondacks.

1.2 General Background / History of Federal Regional Haze Rule

In amendments to the Clean Air Act (CAA) in 1977, Congress added Section 169 (42 U.S.C. 7491) setting forth 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.*

Over the following years, modest steps were taken to address the visibility problems in Class I areas. In the time since the CAA was passed, progressively worsening conditions have been witnessed in the nation's Class I areas. The control measures taken mainly addressed plume blight from specific pollution sources, and did little to address regional haze issues in the Eastern United States. In fact, visibility in eastern parks has declined by as much as 83 percent [http://www.epa.gov/oar/visibility/what.html].

When the CAA was amended in 1990, Congress added Section 169B (42 U.S.C. 7492), authorizing further research and regular assessments of the progress made so far. In 1993, the National Academy of Sciences concluded that "current scientific knowledge is adequate and control technologies are available for taking regulatory action to improve and protect visibility."[1]

The EPA's Regional Haze Rule was adopted on July 1, 1999, and went into effect on August 30, 1999. The Regional Haze Rule's aim was to achieve national visibility goals by 2064. This rulemaking addressed the combined visibility effects of various pollution sources over a wide geographic region. This wide reaching pollution net means that many states – even those like New York without Class I areas – are required to participate in haze reduction efforts. The EPA designated

[1] *Protecting Visibility in National Parks and Wilderness Areas*. National Research Council. Washington, DC: 1993

five Regional Planning Organizations (RPOs) to assist with the coordination and cooperation needed to address the haze issue. The Mid-Atlantic / Northeast states, including the District of Columbia, were designated as part of the Mid-Atlantic / Northeast Visibility Union (MANE-VU).[2]

The EPA's adoption of the Regional Haze Rule was not without controversy. On May 24, 2002, the US Court of Appeals, D.C. District Court ruled on the challenge brought by the American Corn Growers Association against the EPA's Regional Haze Rule of 1999, 64 FR 35714. The Court remanded the BART provisions of the rule to the EPA, and denied industry's challenge to the haze rule goals of natural visibility and no degradation requirements. On June 15, 2005, the EPA finalized a rule addressing the Court's remand. The final BART Rule, 70 FR 39104, was published on July 6, 2005.

1.3 Area of Influence for MANE-VU Class I Areas

New York State contains no Class I Areas. However, as required by the haze rule, states that contribute to visibility impairment in Class I areas in other states must be identified and measures taken to reduce the emissions of visibility-impairing pollutants. In order to identify states where emissions are most likely to influence visibility in MANE-VU Class I areas, MANE-VU prepared the *Contributions to Regional Haze in the Northeast and Mid-Atlantic United States* in Appendix A. Based on this analysis, MANE-VU concluded that it was appropriate to define an area of influence including all of the states participating in MANE-VU plus other states that modeling indicated contributed at least 2% of the sulfate ion at MANE-VU Class I areas in 2002. These states are shown in Table 1-1 below. The 2% was arrived at after a review of the back trajectory and modeling results showing that states contributing 2% (or more) make up about 90-95% "of total light extinction. For states contributing 5% (or more), only about 75-80% of total light extinction is accounted for. New York agrees with the 2% criteria, given the high percentage of light extinction for which it accounts. New York believes that the 2% criteria represents a level of contribution for visibility impairment from any state that needs to be assessed for mitigation. Failure to do so will result in Class I areas failing to reach their reasonable progress goals and ultimately delay needed improvements in air quality.

[2]A description of MANE-VU and a full list of its members is found in Section 3 of this document.

Table 1-1 - States That Contribute to Visibility Impairment in the MANE-VU Class I Areas of Acadia, Moosehorn, Great Gulf, Lye Brook and Brigantine

State	RPO	State	RPO
Connecticut	MANE-VU	North Carolina	VISTAS
Delaware	MANE-VU	South Carolina	VISTAS
Maine	MANE-VU	Tennessee	VISTAS
Maryland	MANE-VU	Virginia	VISTAS
Massachusetts	MANE-VU	West Virginia	VISTAS
New Hampshire	MANE-VU	Illinois	MRPO
New Jersey	MANE-VU	Indiana	MRPO
New York	MANE-VU	Michigan	MRPO
Pennsylvania	MANE-VU	Ohio	MRPO
Rhode Island	MANE-VU	New Brunswick, Canada	N/A
Vermont	MANE-VU	Ontario, Canada	N/A
Georgia	VISTAS	Quebec, Canada	N/A
Kentucky	VISTAS		

1.4 Class I Areas Affected

In accordance with 40 CFR Section 51.308(d)(4)(iii), emissions sources within the State of New York contribute to visibility impairment in the following Class I Areas:

Acadia National Park, Maine
Brigantine Wildlife Refuge, New Jersey
Great Gulf Wilderness Area, New Hampshire
Lye Brook Wilderness Area, Vermont
Moosehorn National Wildlife Refuge, Maine
Presidential Range-Dry River Wilderness Area, New Hampshire
Roosevelt-Campobello International Park, Maine/Canada
Shenandoah National Park, Virginia

The effect of New York's emissions and the measures that will be necessary to meet the goals of the Regional Haze program in the above areas are the focus of this document.

Information about procedures by which monitoring data and other information were used in determining the contribution of emissions from within these States to

regional haze visibility impairment at MANE-VU Class I areas is included in Appendix A, *Contributions to Regional Haze in the Northeast and Mid-Atlantic United States*.

2.0 General Planning Provisions

Pursuant to the requirements of 40 CFR Sections 51.308(a) and (b), New York submits this State Implementation Plan (SIP) to meet the requirements of the EPA's Regional Haze rules under the requirements set forth in the Clean Air Act. Elements of this SIP address the core elements required by 40 CFR Section 51.308(d), the Best Available Retrofit Technology (BART) components of 40 CFR Section 50.308(e), the establishment of Reasonable Progress Goals (RPG) and the measures that contributing states like New York must take to take to do their part in meeting the RPG. In addition, this SIP addresses Regional Planning, State and Federal Land Manager coordination, and contains a commitment to provide plan revisions and adequacy determinations as necessary.

2.1 SIP Submission Dates

Section 51.308(b) required that this SIP be submitted by December 17, 2007. As a result of a delay in the notification of New York of the measures needed to meet Class I area reasonable progress goals, it was necessary to wait to make the required submission until the measures had been identified by the Class I states.

The State of New Hampshire notified the Department in a letter dated May 16, 2008 of the completion of the consultation process that resulted in MANE-VU states agreeing to emission management strategies that would meet the reasonable progress goal requirements of Section 40 CFR 51.308(d)(1) of the Clean Air Act. While MANE-VU member states agreed to a course of action that included pursuing the adoption and implementation of the emission management strategies on a June 20, 2007 conference call, discussions and analyses continued into early 2008 before the level of reductions these strategies would attain was determined. It wasn't until the May 16, 2008 letter that the State of New York was informed that this course of action was indeed final.

Another factor seriously disrupting the haze SIP development process was the July 11, 2008 decision from the U.S. Court of Appeals for the District of Columbia Circuit that would vacate the Clean Air Interstate Rule (CAIR) and remand the rule back to EPA. This disruption has resulted in the need for both Class I states and contributing states to reevaluate the control strategies and other elements of their regional haze SIPs, which caused states to delay submissions further. Complicating this matter was EPA's petition for rehearing and the Court's request for a briefing asking if it should stay the mandate until EPA revises the rule in response to the remand. On December 23, 2008, the U.S. Court of Appeals for the District of Columbia Circuit decided to remand the rule back to EPA without vacatur of CAIR, but did not impose a particular schedule by which EPA must alter CAIR.

Section 51.308(f) requires New York to submit a revision to this SIP by July 31, 2018 and every ten years thereafter, at which point additional adjustments to the strategies described in this SIP may take place.

Section 51.308(g) requires New York to submit a report to the EPA every five years evaluating progress toward the reasonable progress goal for each Class I Federal area located outside New York that may be affected by emissions from within New York. The first progress report is due five years from submittal of the initial SIP and must be in the form of a SIP revision. At that time, a new emission inventory and modeling results should be available. Modifications to this SIP can also be done at that time. In accordance with Section 51.308(h), New York will also submit a formal determination of the adequacy of its existing Regional Haze SIP revision at the time the progress report is submitted. The first progress report is due five years from submittal of the initial implementation plan and must be in the form of an implementation plan revision or, if no changes to New York's SIP are necessary, in the form of a negative declaration that further revision of the existing SIP is not needed.

2.2 New York Statutory Authority

New York is proposing this SIP in accordance with State laws and rules, and has the necessary authority, as described below, to adopt the SIP and other required rules and regulations.

Ambient Air Quality Monitoring, Compilation, Analysis and Reporting (110(a)(2)(B))

CAA Section 110(a)(2)(B) requires SIPs to include provisions to provide for the establishment and operation of ambient air quality monitors, collecting and analyzing ambient air quality data, and making these data available to EPA upon request. This information is included in the various SIPs that have been submitted to EPA.

The New York State Department of Environmental Conservation (Department) measures air pollutants at more than 80 sites across the state, using continuous and/or manual instrumentation. These sites are part of the federally-mandated National Air Monitoring Stations Network (NAMS) and the State and Local Air Monitoring Stations (SLAMS) Network. Real time direct reading measurements include gaseous criteria pollutants (ozone, sulfur dioxide, oxides of nitrogen, carbon monoxide), $PM_{2.5}$ (fine particulate with a diameter less than 2.5 microns), and meteorological data. Filter based $PM_{2.5}$, lead, and acid deposition samples are collected manually and shipped to the laboratory for analysis. The information

obtained is compared to the NAAQS and is used to determine the attainment status of areas where these pollutants are monitored.

The near real-time data for gaseous pollutants and $PM_{2.5}$ are used for Air Quality Index (AQI) projection, and can be accessed by interested parties on the Department web site. The Department also provides real-time data to EPA for AIRNow live national ozone mapping. All ambient measurements undergo data validation and are subsequently submitted to EPA's Air Quality System (AQS) for public access.

The Department commits to continue to operate an air quality monitoring network that complies with EPA requirements and to submit this data to EPA's Air Quality System.

Enforcement and Stationary Source Permitting (110(a)(2)(C))

CAA Section 110(a)(2)(C) requires States to include a program providing for enforcement of all SIP measures and the regulation of construction of new or modified stationary sources to meet Prevention of Significant Deterioration (PSD) and nonattainment new source review (NNSR) requirements. On March 12, 2009, New York submitted 6 NYCRR Part 231, New Source Review for New and Modified Facilities, to EPA for approval and inclusion in the SIP. This regulation meets the federal requirements for the application of PSD and New Source Review requirements in New York and is presently in effect in New York. The application of these requirements ensures that major sources of PM2.5 in the state meet the requirements of the federal PSD and NNSR permitting programs as they apply to PM2.5. With PSD and NNSR requirements for PM2.5 now in effect in New York, the Department meets the requirement ensuring that major sources in this state will not cause or contribute to air pollution in excess of the NAAQS in New York or other states.

New York ensures that all applicable federal PSD requirements which are included in PSD permits are incorporated into Title V operating permits, and that all federally-enforceable requirements are applied and enforced. New York therefore affirms that the current NNSR and PSD permitting programs remain in effect and continue to apply to the state's major stationary sources, and that the requirements from these programs are federally enforceable.

Environmental Conservation Law (ECL) Section 19-0305 and Article 71 Sections 71-2103 and 71-2105 authorizes the commissioner of the Department to enforce the codes, rules and regulations of the Department established in accordance with Article 19. The SIP is a compilation of rules and regulations that have been duly promulgated by the Department in accordance with its statutory authority and

consistent with the State Administrative Procedures Act. Therefore, the Department has the authority to enforce all SIP measures.

Assurance of Adequate Resources (110(a)(2)(E))

CAA Section 110(a)(2)(E) requires States to provide (i) necessary assurances that the State will have adequate personnel, funding and authority under State law to carry out its SIP, (ii) requirements that the State comply with the requirements respecting State boards under CAA Section 7428, and (iii) necessary assurances that, where the State has relied on a local or regional government, agency, or instrumentality for the implementation of any plan provision, the State has responsibility for ensuring adequate implementation of such plan provision.

The Division of Air Resources (DAR), with a staff of 264, receives both operating and capital funding. Operating funds are allocated to the Division annually and are used for daily administrative expenses. These expenses include salaries, fringe benefits, indirect and non-personnel services such as travel, supply and equipment costs. Indirect costs are, in turn, allocated to other Departments or divisions that support DAR activities. DAR is allocated operating funds from five sources: General Fund, Utility Environmental Regulatory Account, Co-operative Agreements (i.e., EPA Section 103 and 105 grants) and the Clean Air Fund, which is comprised of the Title V and Mobile Source accounts.

Capital funds are allocated to the Division at the discretion of the State legislature and are used for the financing or acquisition of capital facilities such as the construction of an air monitoring site. The Division is allocated Capital funds from three sources: General Fund, Mobile Source Account and Rehabilitation and Improvement.

Section 110(a)(2)(E)(ii) requires that the state comply with the requirements respecting state boards under CAA Section 7428. New York's Public Officer's Law (POL) satisfies these requirements. Specifically, POL Section 74(2) states "No officer or employee of a state agency, member of the legislature or legislative employee should have any interest, financial or otherwise, direct or indirect, or engage in any business or transaction or professional activity or incur any obligation of any nature, which is in substantial conflict with the proper discharge of his duties in the public interest." POL 74(3)(e) states "No officer or employee of a state agency, member of the legislature or legislative employee should engage in any transaction as representative or agent of the state with any business entity in which he has a direct or indirect financial interest that might reasonably tend to conflict with the proper discharge of his official duties."

Finally, the Department confirms that where the State has relied on a local or

regional government, agency, or instrumentality for the implementation of any plan provision, the State has responsibility for ensuring adequate implementation of such plan provision.

Emergency Powers and Contingency Plans (110(a)(2)(G))

CAA Section 110(a)(2)(G) requires States to provide for authority to address activities causing imminent and substantial endangerment to public health, including contingency plans to implement the emergency episodes in their SIPs. Articles 3 and 19 of the ECL provide this authority to the Department and are included in the SIP.

Among other provisions, ECL Section 3-0301 entitled “General functions, powers and duties of the department and the commissioner” authorizes the Department to prevent and control air pollution emergencies, as defined in subdivision 1 of ECL Section 3. In exercising such prevention and control the Department and the commissioner may limit the consumption of fuels and use of vehicles, curtail or require the cessation of industrial processes and limit or require the cessation of incineration and open burning, and take any other action he may deem necessary to prevent and/or control air pollution emergencies. The Department adopted 6 NYCRR Part 207, Control Measures for an Air Pollution Episode, and EPA approved this regulation as part of the New York SIP (46 FR 55690).

Authority for SIP Revisions for Revised NAAQS (110(a)(2)(H))

CAA Section 110(a)(2)(H) requires States to have the authority to revise their SIPs in response to changes in the NAAQS, availability of improved methods for attaining the NAAQS, or in response to an EPA finding that the SIP is substantially inadequate.

Revisions to the SIP are authorized by Article 19 and Sections 3-0301, 19-0103, 19-0301, 19-0303 and 19-0305 of the ECL. Article 19 of the ECL was adopted to protect New York’s air resources from pollution and to effectuate the policy of the State to maintain a reasonable degree of purity of the air resources, consistent with the public health and welfare and the industrial development of the State. To this end, the Legislature gave the Department specific powers and duties, including the power to promulgate regulations for preventing, controlling, or prohibiting air pollution. The Department also has the specific authority to regulate motor vehicle exhaust and approve air contaminant control systems as well as regulate fuels. Section 71-2103 provides general enforcement authority for the air regulations. Section 71-2105 provides criminal enforcement authority.

This general statement of authority is included in the SIP.

Authority for SIP Revisions for New Nonattainment Areas (110(a)(2)(I))

CAA Section 110(a)(2)(I) requires States to have the authority to revise their SIPs in response to changes in nonattainment areas.

Revisions to the SIP are authorized by the same citations as described in the above paragraph regarding SIP revisions for revised NAAQS.

This general statement of authority is included in the SIP.

Consultation, Public Notification and PSD/Visibility (110(a)(2)(J))

CAA Section 110(a)(2)(J) requires States to meet the applicable requirements of CAA Section 121 relating to consultation, CAA Section 127 relating to public information and Part C relating to PSD and visibility protection.

CAA Section 121 requires States to provide a satisfactory process of consultation with general purpose local governments, designated organizations of elected officials of local governments and any Federal land manager having authority over Federal land to which the State plan applies. On December 22, 2005, the Department reestablished a SIP Coordinating Council consisting of senior policy representatives from 19 state agencies and authorities, and a SIP Task Force consisting of officials from thirty-seven local governments and designated organizations of elected officials. Though there are no Federal lands within New York State to which the State plan applies, the Department has participated in the consultation process of the Regional Haze SIP (40 CFR 51.308) with the Federal Land Managers, States and Tribes of the Mid-Atlantic Northeast Visibility Union (MANE-VU), and other regional planning organizations where emissions from New York are reasonably anticipated to contribute to visibility impairment to Class I areas.

CAA Section 127 requires State plans to contain measures which will be effective to notify the public during any calendar year, on a regular basis, of instances or areas in which any national primary ambient air quality standard is exceeded or was exceeded during any portion of the preceding calendar year to advise the public of the health hazards associated with such pollution, and to enhance public awareness of the measures which can be taken to prevent such standards from being exceeded and the ways in which the public can participate on regulatory and other efforts to improve air quality.

The Department's website, at http://www.dec.ny.gov/chemical/34985.html, contains an Air Quality Index (AQI) for reporting daily air quality to the public. It

describes how clean or polluted the air is, and what associated health effects might be a concern. It was created as a way to correlate levels of different pollutants to one scale; the higher the AQI value, the greater the health concern. When levels of ozone and/or fine particles are expected to exceed an AQI value of 100, an Air Quality Health Advisory is issued alerting sensitive groups to take the necessary precautions. The Department, in cooperation with the New York State Department of Health, posts warnings on the above-referenced website if dangerous conditions are expected to occur. These warnings are also aired through the media, and are available on the toll-free Ozone Hotline at 1-800-535-1345. The Air Quality Forecast displays the predicted AQI value for eight regions in New York State. It also displays the observed values for the previous day. Air quality measurements from New York's statewide continuous monitoring network are updated hourly where available. Parameters monitored include ozone, fine particulate, carbon monoxide, sulfur dioxide, nitrogen oxides, methane/nonmethane hydrocarbons, and meteorological data. Additional ozone information to enhance public awareness is located at http://www.dec.ny.gov/chemical/8400.html.

Air Quality Modeling / Data (110(a)(2)(K))

CAA Section 110(a)(2)(K) requires States to provide for the performance of such air quality modeling as the Administrator may prescribe for the purpose of predicting the effect on ambient air quality of any emissions of any air pollutant for which the Administrator has established a NAAQS. It also requires States to submit, upon request, data related to such air quality modeling to the Administrator.

The Department certifies that the air quality modeling and analysis used in SIPs complies with EPA's guidance* on the use of models in attainment demonstrations, and commits to continue to use air quality models in accordance with EPA's approved modeling guidance and to submit data to the Administrator if requested.

* US EPA 200. "Guidance on the use of models and other analyses for demonstrating attainment of air quality goals for ozone, $PM_{2.5}$ and regional haze." EPA-454/B-07-002.

Consultation / Participation by Affected Local Entities (110(a)(2)(M))

CAA Section 110(a)(2)(M) requires States to provide for consultation and participation by local political subdivisions affected by the plan.

The Department established an Inter-agency Consultation Group (ICG) pursuant

to 6 NYCRR Part 240, “Conformity to State or Federal Implementation Plans of Transportation Plans, Programs, and Projects Developed, Funded or Approved under Title 23 U.S.C. or the Federal Transit Laws.” Members of this group include the Federal Transit Administration, Federal Highway Administration, the New York State Department of Transportation, the United States Environmental Protection Agency, the New York State Department of Environmental Conservation, and several Metropolitan Planning Organizations statewide. The ICG is central to the entire transportation conformity process, and serves as the underpinning for conformity determinations and as the primary mechanism for ensuring early coordination and negotiation among all parties affected by transportation conformity, including the general public, the business community, and other interested parties.

Additional consultation and participation by local political subdivisions are provided through the SIP Task Force established on December 22, 2005, which consists of officials from thirty-seven local governments and designated organizations of elected officials.

The Department commits to continue to provide for consultation and participation by local political subdivisions.

3.0 Regional Planning

In 1999, EPA and affected States and Tribes agreed to create five Regional Planning Organizations (RPOs) to facilitate interstate coordination on Regional Haze SIP/TIPs. The State of New York is a member of the Mid-Atlantic / Northeast Visibility Union (MANE-VU) RPO. Members of MANE-VU are listed in Table 3-1 below.

Table 3-1 - MANE-VU RPO Members

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	National Park Service*
New Jersey	U.S. Fish and Wildlife Service*
New York	U.S. Forest Service*

* Non-voting members

New York's Regional Haze SIP utilizes data analysis, modeling results and other technical support documents prepared for MANE-VU members. By coordinating with MANE-VU and other RPOs, New York State has worked to ensure that its long term strategy, control measures and BART determinations provide sufficient reductions to mitigate impacts of sources from New York State in affected Class I areas.

Since its inception on July 24, 2001, MANE-VU has established an active committee structure to address both technical and non-technical issues related to regional haze. The primary committees are the Technical Support Committee (TSC), charged with assessing the nature and magnitude of the regional haze problem within MANE-VU, interpreting the results of technical work, and reporting on such work to the MANE-VU Board; and the Communications Committee which is charged with developing approaches to inform the public about the regional haze problem in the region and making any recommendations to the MANE-VU Board to facilitate that goal. The Communications Committee has

become an effective means to develop outreach tools both for stakeholders and the public regarding regional issues within MANE-VU's member states. Ultimately, policy decisions are made by the MANE-VU Board. In addition to the formal working committees, there are also three standing working groups of the TSC. They are broken down by topic area: Emissions Inventory, Modeling, and Monitoring/Data Analysis Workgroups.

MANE-VU has also established a Policy Advisory Group to facilitate communication with Federal Land Managers, between the Technical and Communications Committees, and with MANE-VU staff. The Policy Advisory Group provides advice to decision-makers on policy questions.

MANE-VU's work is managed by the Ozone Transport Commission (OTC) and carried out by the OTC, the Mid-Atlantic Regional Air Management Association (MARAMA) and the Northeast States for Coordinated Air Use Management (NESCAUM). The states, along with federal agencies and professional staff from OTC, MARAMA and NESCAUM, are members of the various committees and workgroups.

The following are highlights of many of the ways MANE-VU member states and tribes have cooperatively addressed regional haze, most of which New York State has participated in.

- Budget Prioritization: MANE-VU developed a process to coordinate MARAMA, OTC and NESCAUM staff in developing budget priorities, project rankings, and the eventual federal grant requests.

- Issue Coordination: MANE-VU established a set conference call and meeting schedule for each of its committees and workgroups. In addition, its Air Directors regularly discuss pertinent issues.

- SIP Policy and Planning: MANE-VU has initiated a process to track the key milestones needed for SIP development and developed a SIP template with the assistance of MANE-VU states/tribes.

- Capacity Building: To educate its staff and members, MANE-VU included technical presentations on conference calls and organized workshops with nationally recognized experts. Presentations on data analysis, BART work, inventory topics, modeling, control measures etc. were an effective education and coordination tool.

- Routine Operations: MANE-VU staff at OTC, MARAMA and NESCAUM established routine operations to address the following topics: budget, grant deliverables/ due dates, workgroup meetings, inter-RPO feedback, haze rule

development, etc.

4.0 Federal Land Manager Coordination

40 CFR Section 51.308(i) requires coordination between States, Tribes and the Federal Land Managers (FLMs). As a part of the development of this SIP, opportunities have been provided by MANE-VU for FLMs to review and comment on each of the technical documents developed by MANE-VU as well as this document. New York State provided agency contacts to the Federal Land Managers as required (pp. 35747-48 of the 1999 Regional Haze Rule).

As required by Section 51.308(i)(2), New York State provided the FLMs an opportunity for consultation, in person and at least 60 days prior to holding any public hearing on an implementation plan or plan revision, and also provided the FLMs the opportunity to provide their:

- Assessment of the impairment of visibility in any Class I areas,
- Recommendations for states containing Class I areas on the development of reasonable progress goals, and
- Recommendations on the development and implementation of strategies to address visibility impairment.

A copy of the draft SIP was provided to the FLMs for their review. New York State received comments regarding this SIP from the FLMs after their review. The FLM's comments and New York State's responses are included in Appendix B, *Summary of Federal Land Manager Comments and Responses*, of this plan, in accordance with 40 CFR 51.308(i)(3).

Section 51.308(i)(4) requires procedures for continuing consultation between the State and FLMs on the implementation of the visibility protection program. The FLMs must be consulted in the following instances:

- Development and review of implementation plan revisions,
- Review of 5-year progress reports, and
- Development and implementation of other programs that may contribute to impairment of visibility in Class I areas.

The Department commits to continue to coordinate and consult with the FLMs during the development of future progress reports and plan revisions, as well as during the implementation of programs having the potential to contribute to visibility impairment in the mandatory Class I areas. New York State will consult with the FLMs on the status of the following implementation items:

- Implementation of emissions strategies identified in the SIP as contributing to achieving improvement in the worst-day visibility,
- Summary of major new source permits issued,

- Status of State actions to meet commitments for completing any future assessments or rulemakings on sources identified as likely contributors to visibility impairment, but not directly addressed in the most recent SIP revision,
- Any changes to the monitoring strategy or monitoring stations status that may affect tracking of reasonable progress,
- Work underway for preparing the 5-year review and/or 10-year revision.
- Items for FLMs to consider or provide support for in preparation for any visibility protection SIP revisions (based on a 5-year review or the 10-year revision schedule under EPA's Regional Haze Rule), and
- Summaries of topics (discussion meetings, emails, other records) covered in ongoing communications between the State and FLMs regarding implementation of the visibility program.

These consultations will be coordinated with the designated visibility protection program coordinators for the National Park Service, U.S. Fish and Wildlife Service and the U.S. Forest Service. The frequency and the form of the consultation will be determined during the initial contacts after the approval of this document.

5.0 Assessment of Baseline and Natural Conditions

Under Section 169A(b)(2)(B) of the Clean Air Act, the initial Regional Haze SIPs must contain measures to make reasonable progress toward the goal of achieving natural visibility. Comparing natural visibility levels to current baseline conditions helps determine how much progress should be made in the next five to 10 years. Determining natural visibility conditions is a SIP element and each state containing a Class I area (in consultation with Federal Land Managers and other states) was required to estimate natural visibility levels. New York State contains no Class I areas and, as such, this assessment is not required. However, it is presented here for informational purposes.

Additionally, Section 51.308(d)(4)(iii) of the EPA's Regional Haze Rule, 40 CFR 51.308 requires the inclusion in the SIP of a description of procedures by which monitoring data and other information are used in determining the contribution of emissions from within the state to regional haze visibility impairment at mandatory Class I Federal areas both within and outside the state. The Interagency Monitoring of Protected Visual Environments (IMPROVE) program was developed in 1985 to establish current visibility conditions, track changes in visibility, and help determine the causes and sources of visibility impairment in Class I areas.

IMPROVE data was used to calculate baseline and natural conditions for MANE-VU Class I areas. Data from the following IMPROVE monitors (see Table 5-1 below) is representative of Class I areas in and near MANE-VU.

Table 5-1- IMPROVE Information for MANE-VU Class I Areas

Class I Area	IMPROVE Site	Location (latitude and longitude)	State
Acadia National Park	ACAD1	44.38, -68.26	Maine
Moosehorn National Wildlife Refuge	MOOS1	45.13, -67.27	Maine
Roosevelt/Campobello International Park	MOOS1	45.13, -67.27	Maine
Great Gulf Wilderness Area	GRGU1	44.31, -71.22	New Hampshire
Presidential Range/Dry River Wilderness	GRGU1	44.31, -71.22	New Hampshire
Lye Brook Wilderness Area	LYBR1	43.15, -73.13	Vermont

Brigantine Wilderness Area	BRIG1	39.47, -74.45	New Jersey

Source: VIEWS (http://vista.circa.colostate.edu/views/), prepared on 7/06/06

5.1 Natural Conditions

In September 2003, the EPA issued guidance for a calculation of natural background and baseline visibility conditions. EPA guidance gives states a "default" method to estimate natural visibility. Natural visibility represents the visibility for each Class I area that is representative of existing conditions before human activities affected air quality in the area. MANE-VU estimated natural visibility using the default method for the 20% best and worst days, and also evaluated ways to refine the estimates. Potential refinements included increasing the multiplier used to calculate impairment attributed to carbon, adjusting the formula used to calculate the 20% best and worst visibility days, and accounting for visibility impairment due to sea salt at coastal sites. However, MANE-VU found that these refinements did not significantly improve the accuracy of the estimates and MANE-VU states desired a consistent approach. Therefore, default estimates were used.

Once the technical analysis was complete, MANE-VU provided an opportunity to comment to federal agencies and stakeholders. After serious consideration of the comments that were received, in December 2006, MANE-VU recommended adoption of the alternative reconstructed extinction equation for use in the Regional Haze SIPs. Therefore, default estimates were used with the understanding that this would be reconsidered as better scientific understanding warranted.

Notwithstanding the above, New York State does not contain any Class I areas and so is not required to estimate reasonable progress goals. However, as described in Section 3, the Department has coordinated with states containing Class I areas which are affected by emissions from sources located in New York as those states assessed baseline, natural and current visibility conditions in their respective Class I areas. The results of this work were used to determine the control measures whose implementation would be necessary by New York and other contributory states to meet reasonable progress goals for each Class I area.

5.2 Baseline Visibility

A five-year average (2000 to 2004) baseline visibility in deciviews was calculated by MANE-VU for each Class I Area for the 20 percent best and 20 percent worst days in accordance with 40 CFR 51.308(d)(2) and as detailed in Appendix L of the document entitled *Baseline and Natural Background Visibility Conditions*

(NESCAUM, December 2006). The deciview visibility for these worst and best days are based on calculations and data included in Appendix C, *Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Rule* of this SIP submission.

Table 5-2 presents the IMPROVE program calculations for the 20 percent worst and best baseline (2000-2004) visibility conditions for each IMPROVE monitoring site at MANE-VU Class I Areas. These values are posted on the Visibility Information Exchange Web System (VIEWS) operated by the Regional Planning Organizations (available online at http://vista.cira.colostate.edu/views/).

Table 5-2 - Baseline Visibility for the 20 Percent Worst Days and 20 Percent Best Days for Five Years (from 2000-2004) in MANE-VU Class I Areas

Class I Area (IMPROVE Monitor)	Year	20 Percent Worst Days Deciviews (dv)	20 Percent Best Days Deciviews (dv)
Acadia National Park (ACAD1)	2000	21.64	8.89
	2001	23.28	8.87
	2002	23.91	8.77
	2003	23.65	8.77
	2004	21.98	8.56
Five Year Average		22.89	8.77
Moosehorn National Wildlife Refuge and Roosevelt/Campobello International Park (MOOS1)	2000	20.63	8.93
	2001	22.13	9.3
	2002	23.06	9.12
	2003	22.5	9.48
	2004	20.28	8.93
Five Year Average		21.72	9.15
Great Gulf Wilderness Area and Presidential Range/Dry River Wilderness (GRGU1)	2000	*	*
	2001	23.29	8.26
	2002	24.84	7.77
	2003	21.59	6.94
	2004	21.56	7.68
Five Year Average		22.82	7.66
Lye Brook Wilderness Area (LYBR1)	2000	23.45	6.49
	2001	26.32	6.47
	2002	25.52	6.43
	2003	24.02	5.83
	2004	22.91	6.61
Five Year Average		24.45	6.36
Brigantine Wilderness Area (BRIG1)	2000	28.95	14.26
	2001	28.38	13.82
	2002	29.31	14.83
	2003	29.79	14.39
	2004	28.59	14.36
Five Year Average		29.01	14.33

*Data does not exist for the Great Gulf Wilderness Area IMPROVE site for the year 2000, however, according to the EPA document entitled, *Guidance for Tracking Progress Under the Regional Haze Rule*, states that, "…a minimum of three years of data meeting these completeness requirements is sufficient to

calculate the 5-year averages within each 5-year period…the three year completeness criterion allows for the calculation of baseline conditions at sites with less than five years of data."

Source: VIEWS (http://vista.circa.colostate.edu/views/), prepared on 10/16/07

5.3 Comparison of Natural and Baseline Conditions

Table 5-3 compares the baseline visibility for the 20 percent worst and the 20 percent best visibility days based on the five-year average for 2000-2004, natural visibility for the 20 percent worst and the 20 percent best visibility days, and the difference between baseline and natural visibility conditions for each MANE-VU Class I area. These differences provide the beginning and endpoints of the "glide path" that indicates the progress that must be made over the term of the Regional Haze Program out to 2064. This information is also useful in determining the reasonable progress goals (RPGs) that will be established for the term of this SIP extending out to 2018, as well as the control measures that contributing states like New York will need to implement to meet these goals.

Reasonable progress goals are discussed in detail in Section 9 of this SIP.

Table 5-3 - Summary of Baseline Visibility and Natural Conditions for the 20 Percent Worst and 20 Percent Best Visibility Days

Class I Area	2000-2004 Baseline (dv)		Natural Conditions (dv)		Difference (dv)	
	Worst 20%	Best 20%	Worst 20%	Best 20%	Worst 20%	Best 20%
Acadia National Park	22.89	8.77	12.43	4.66	10.46	4.11
Moosehorn National Wildlife Refuge	21.72	9.15	12.01	5.01	9.71	4.14
Roosevelt/Campobello International Park	21.72	9.15	12.01	5.01	9.71	4.14
Great Gulf Wilderness Area	22.82	7.66	11.99	3.73	10.83	3.93
Presidential Range/Dry River Wilderness	22.82	7.66	11.99	3.73	10.83	3.93
Lye Brook Wilderness Area	24.45	6.36	11.73	2.79	12.72	3.57
Brigantine Wilderness Area	29.01	14.33	12.24	5.51	16.77	8.82

Source: VIEWS (http://vista.cira.colostate.edu/views/) prepared on 6/22/2007

6.0 Monitoring Strategy

Visibility conditions representative of those within the Class I areas is monitored by the IMPROVE program. In the mid-1980's, the IMPROVE program was established to measure visibility impairment in mandatory Class I areas throughout the United States. The monitoring sites are operated and maintained through a formal cooperative relationship between the EPA, National Park Service, U.S. Fish and Wildlife Service, Bureau of Land Management, and U.S. Forest Service. In 1991, several additional organizations joined the effort: State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control (which now is called the National Association of Clean Air Agencies) Officials, Western States Air Resources Council, Mid-Atlantic Regional Air Management Association, and Northeast States for Coordinated Air Use Management.

A Quality Assurance Project Plan (QAPP) for the IMPROVE program, dated March 2002, can be found at:

http://vista.cira.colostate.edu/improve/Publications/QA_QC/IMPROVE_QAPP_R0.pdf

6.1 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 the visual air quality of 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 anthropogenic visibility impairment,
- Document long-term trends for assessing progress toward the national visibility goals,
- Provide regional haze monitoring representing all visibility-protected federal Class I areas where practical, as required by the EPA's Regional Haze Rule.

6.2 New York's Monitoring Responsibilities

Section 51.308(d)(4)(iii) of the EPA's Regional Haze Rule requires the inclusion of procedures by which monitoring data and other information are used in determining the contribution of emissions from within the State to regional haze visibility impairment at mandatory Class I Federal areas both within and outside

the State. MANE-VU and New York State accept the contribution assessment analysis completed by NESCAUM entitled, *Contributions to Regional Haze in the Northeast and Mid-Atlantic United States* (Appendix A). New York State agrees that NESCAUM is providing appropriate technical information by using the IMPROVE program data and the VIEWS site. Information about the use of the default and alternative approaches to the calculation of baseline and natural background conditions can be found in Section 5 of this SIP.

New York, however, does not contain any Class I areas. Therefore, no monitoring plan is required to be submitted with this SIP under the EPA's Regional Haze Rule.

6.3 Monitoring Information for MANE-VU Class I Areas[3]

Although New York does not contain any Class I areas, this section provides a description and location for the IMPROVE monitors in the Class I areas to which New York contributes to regional haze.

6.3.1. Acadia National Park, Maine (Figures 6-1 and 6-2)

The IMPROVE monitor for the Acadia National Park (indicated as ACAD1) is located at Acadia National Park Headquarters in Maine at an elevation of 157 meters, a latitude of 44.38˚ and a longitude of -68.26˚.

Monitoring Strategy

The ACAD1 site is considered to be adequate for assessing reasonable progress goals of the Acadia National Park by the State of Maine and no additional monitoring sites or equipment are necessary at this time. Maine routinely participates in the IMPROVE monitoring program by sending regional representatives to the IMPROVE meetings.

[3]All maps in this section are derived from maps found at:
http://www.nationalatlas.gov/printable/fedlands.html#list

Figure 6-1 - Locational Map of the Acadia National Park, the Moosehorn National Wildlife Refuge, and the Roosevelt Campobello International Park

Figure 6-2 - Detailed Map of Acadia National Park

6.3.2 Moosehorn National Wildlife Refuge, Maine (Figures 6-1 and 6-3)

The haze data for Moosehorn National Wildlife Refuge is collected by an IMPROVE monitor (MOOS1) that is operated and maintained by the U.S. Fish & Wildlife Service. The IMPROVE monitor for the Moosehorn National Wildlife Refuge is located near McConvey Road, about one mile northeast of the National Wildlife Refuge Baring Unit Headquarters in Maine at an elevation of 78 meters, a latitude of 45.13˚ and a longitude of -67.27˚.

Monitoring Strategy

The State of Maine considers the MOOS1 site as the only current IMPROVE monitoring site in Maine adequate for assessing reasonable progress goals of the Moosehorn National Wildlife Refuge and no additional monitoring sites or equipment are necessary at this time. Maine routinely participates in the

IMPROVE monitoring program by sending regional representatives to the IMPROVE meetings.
This monitor also represents the Roosevelt/Campobello International Park in New Brunswick, Canada.

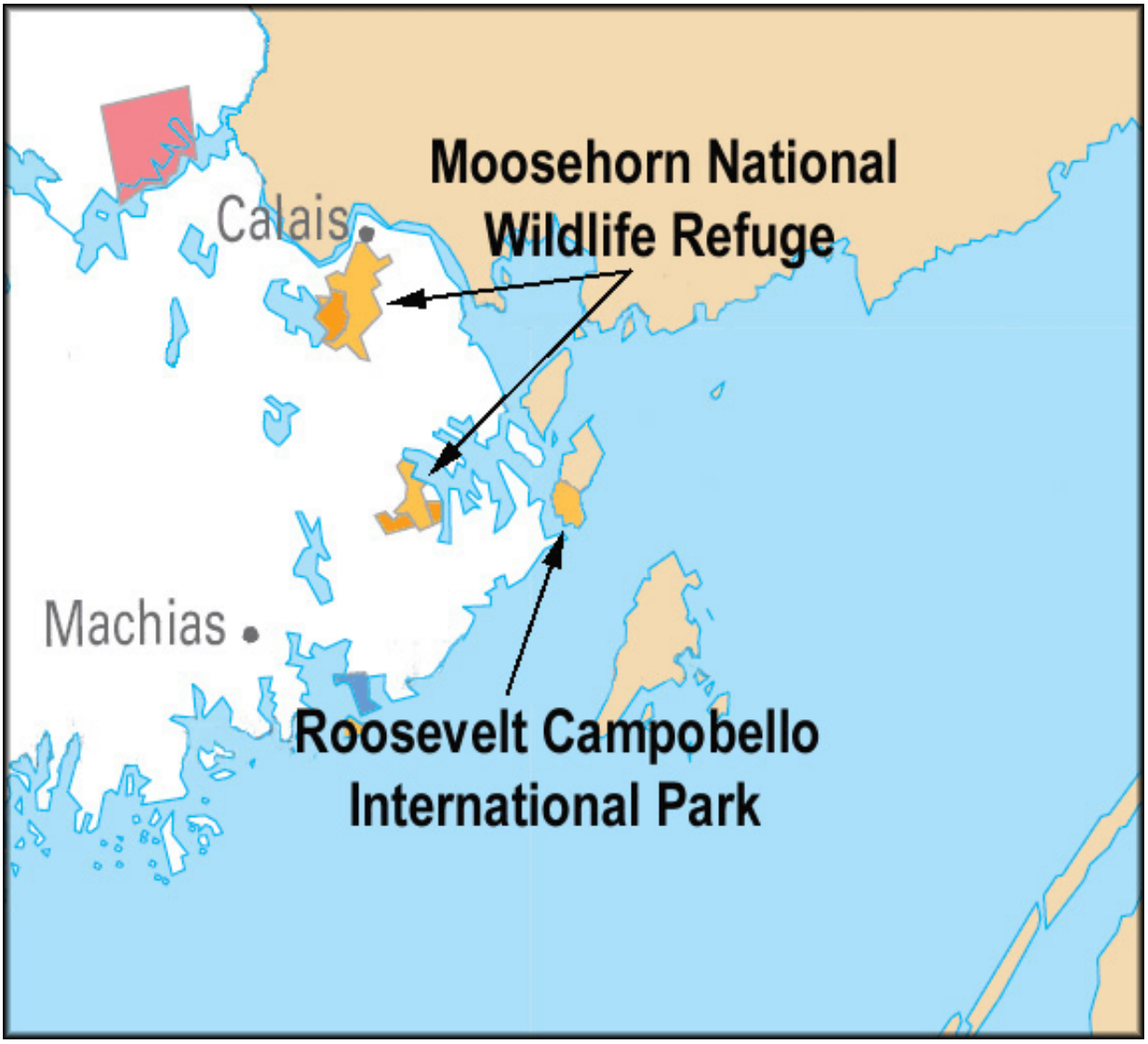
6.3.3. Roosevelt/Campobello International Park, New Brunswick, Canada (Figure 6-3)

The haze data for Roosevelt/Campobello International Park is collected by the IMPROVE monitor (MOOS1) that is operated and maintained by the U.S. Fish & Wildlife Service. The IMPROVE monitor for the Moosehorn National Wildlife Refuge is also the monitor for Roosevelt/Campobello International Park. The monitor is located near McConvey Road, about one mile northeast of the Moosehorn National Wildlife Refuge Baring Unit Headquarters in Maine at an elevation of 78 meters, a latitude of 45.13˚ and a longitude of -67.27˚.

Monitoring Strategy

The State of Maine considers the MOOS1 site as the only current IMPROVE monitoring site in Maine or Canada adequate for assessing reasonable progress goals of the Roosevelt/Campobello International Park. No additional monitoring sites or equipment are necessary. Maine routinely participates in the IMPROVE monitoring program by sending regional representatives to the IMPROVE meetings.

Figure 6-3 - Detailed Map of the Moosehorn National Wildlife Refuge Areas and the Roosevelt Campobello International Park



6.3.4. Brigantine Wilderness Area, New Jersey (Figures 6-4 and 6-5)

The haze data for Brigantine Wilderness Area is collected by an IMPROVE monitor (BRIG1) that is operated and maintained by the U.S. Fish & Wildlife Service. The IMPROVE monitor for the Brigantine Wilderness Area is located at 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˚.

Monitoring Strategy

The State of New Jersey considers the BRIG1 site as adequate for assessing reasonable progress goals of the Brigantine Wilderness Area and no additional monitoring sites or equipment are necessary at this time. New Jersey routinely participates in the IMPROVE monitoring program by sending regional representatives to the IMPROVE meetings.

Figure 6-4 - Locational Map of the Brigantine Wilderness Area

Figure 6-5 - Detailed Map of the Brigantine Wilderness Area

6.3.5 Great Gulf Wilderness Area, New Hampshire (Figures 6-6 and 6-7)

The haze data for Great Gulf Wilderness Area is collected by an IMPROVE monitor (GRGU1) that is operated and maintained by the U.S. Forest Service. The IMPROVE monitor for the Great Gulf Wilderness Area is located at Camp Dodge, which is located in the mid northern area of Greens Grant, just east and south of where Route 16 crosses the Greens Grant/Martins Location boundary in the White Mountain National Forest, South of Gorham, New Hampshire, at an elevation of 454 meters, a latitude of 44.31˚ and a longitude of -71.22˚.

Monitoring Strategy

The State of New Hampshire considers the GRGU1 site as adequate for assessing reasonable progress goals of the Great Gulf Wilderness Area and no

additional monitoring sites or equipment are necessary at this time. New Hampshire routinely participates in the IMPROVE monitoring program by sending regional representatives to the IMPROVE meetings.

This monitor also represents the Presidential Range/Dry River Wilderness Area in New Hampshire.

6.3.6 Presidential Range/Dry River Wilderness Area, New Hampshire (Figures 6-6 and 6-7)

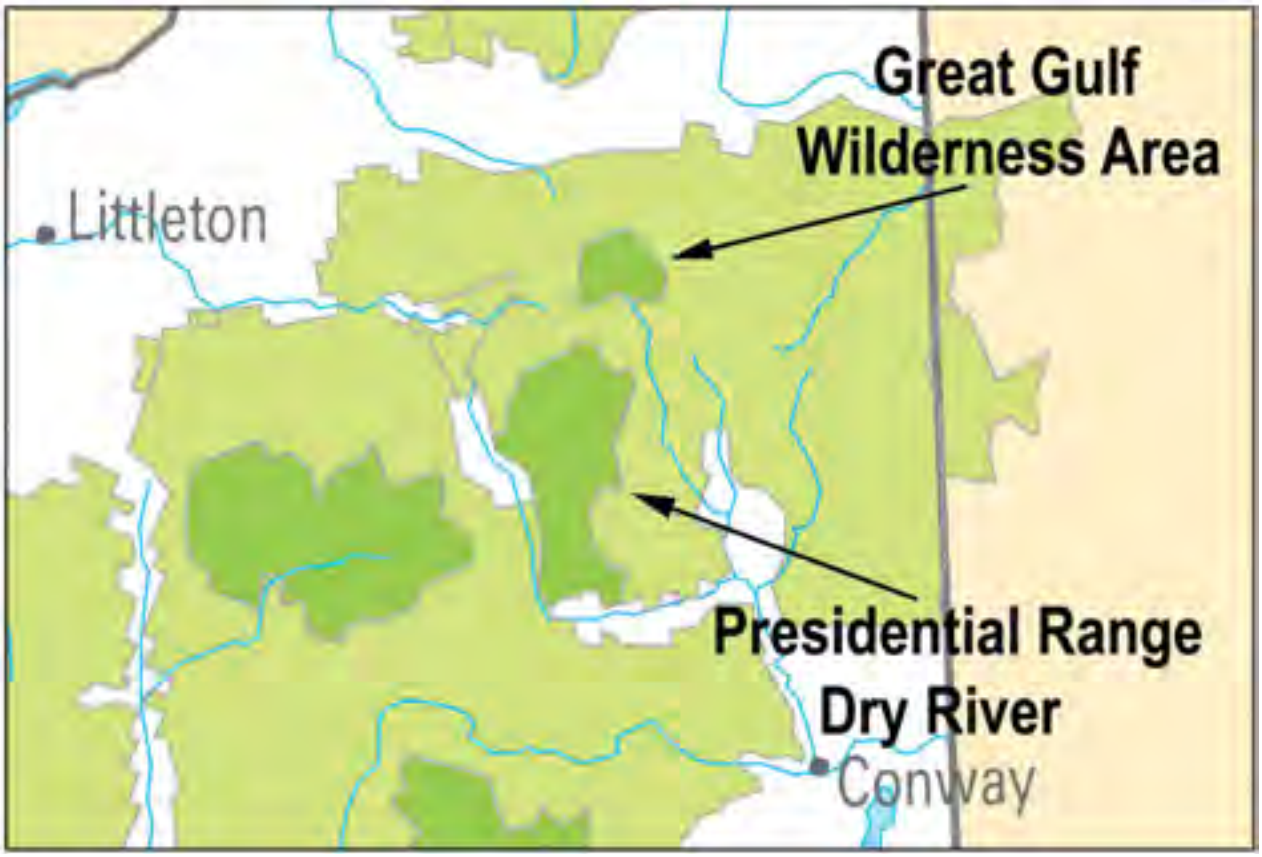
The haze data for Presidential Range/Dry River Wilderness Area is collected by an IMPROVE monitor (GRGU1) that is operated and maintained by the U.S. Forest Service. The IMPROVE monitor for the Great Gulf Wilderness Area also represents the Presidential Range/Dry River Wilderness Area. The Presidential Range/Dry River Wilderness Area monitor is located at Camp Dodge, White Mountain National Forest, South of Gorham, New Hampshire, at an elevation of 454 meters, a latitude of 44.31˚ and a longitude of -71.22˚.

Monitoring Strategy

The State of New Hampshire considers the GRGU1 site as adequate for assessing reasonable progress goals of the Presidential Range/Dry River Wilderness Area and no additional monitoring sites or equipment are necessary. New Hampshire routinely participates in the IMPROVE monitoring program by sending regional representatives to the IMPROVE meetings.

Figure 6-6 - Locational Map of the Great Gulf Wilderness and Presidential Range Dry River Areas

Figure 6-7 - Detailed Map of the Great Gulf Wilderness and Presidential Range Dry River Areas



6.3.7 Lye Brook Wilderness, Vermont (Figures 6-8 and 6-9)

The haze data for Lye Brook Wilderness Area is collected by an IMPROVE monitor (LYBR1) that is operated and maintained by the U.S. Forest Service. The IMPROVE monitor for the Lye Brook Wilderness Area is located on Mount Equinox at the windmills in Manchester, Vermont. The monitor is not in the Wilderness Area but is located on a mountain peak across the valley to the west of the wilderness area. The Lye Brook Wilderness Area is at high elevation in the mountains and the IMPROVE site across the valley is at about the same height as the Wilderness Area at an elevation of 1015 meters, a latitude of 43.15˚ and a longitude of -73.13˚.

Monitoring Strategy

The State of Vermont considers the LYBR1 site as adequate for assessing

reasonable progress goals of the Lye Brook Wilderness Area and no additional monitoring sites or equipment are necessary at this time. Vermont routinely participates in the IMPROVE monitoring program by sending regional representatives to the IMPROVE meetings.

Figure 6-8 - Locational Map of the Lye Brook Wilderness Area

Figure 6-9 – Detailed Map of the Lye Brook Wilderness Area

7.0 Emission Inventory

Section 51.308(d)(4)(v) of the EPA's Regional Haze Rule, 40 CFR 51.308 requires the establishment of a statewide emission inventory of pollutants that are reasonably anticipated to cause or contribute to visibility impairment in any mandatory Class I area. The pollutants inventoried by New York include volatile organic compounds, nitrogen oxides, fine particles ($PM_{2.5}$), coarse particles (PM_{10}), ammonia, carbon monoxide and sulfur dioxides. The information for New York was provided to MANE-VU, which conducted the modeling of visibility impacts for the MANE-VU region. This section provides information on the development of baseline and future emission inventories that were used in modeling visibility for the purposes of this SIP.

7.1 Baseline and Future Year Emission Inventories for Modeling

Section 51.308(d)(3)(iii) of the EPA's Regional Haze Rule requires the State of New York as well as other states to identify a baseline emission inventory upon which future emission projections will be based and from which the necessary emission reductions for meeting reasonable progress goals can be determined.

Based on EPA guidance entitled, *2002 Base Year Emission Inventory SIP Planning: 8-hour Ozone, PM $_{2.5}$, and Regional Haze Programs*, found at the following link:

http://www.epa.gov/ttnchie1/eidocs/2002baseinven_102502new.pdf

which identifies the anticipated baseline emission inventory year for regional haze, MANE-VU and the State of New York are using 2002 as the baseline year. From this, future year inventories were developed for 2009, 2012 and 2018 based on this base year. These future year emission inventories include emissions growth due to projected increases in population and economic activity as well as the emissions reductions due to the implementation of control measures.

7.1.1 Baseline Inventory

The 2002 emissions inventory data were first generated by individual states in the MANE-VU area. MARAMA then coordinated and quality-assured the 2002 inventory data, and projected it for the relevant control years. The 2002 emissions from non-MANE-VU areas within the modeling domain were obtained from other Regional Planning Organizations for their corresponding areas. These Regional Planning Organizations included the Visibility Improvement State and Tribal Association of the Southeast (VISTAS), the Midwest Regional Planning Organization (MRPO) and the Central Regional Air Planning

Association (CENRAP).

Version 3 of the 2002 base year emission inventory was used in the regional modeling exercise. A technical support document for the MANE-VU 2002 base inventory is presented in Appendix H, *Technical Support Document (TSD) for 2002 MANE-VU SIP Modeling Inventories, Version 3*. This document explains the data sources, methods, and results for preparing this version of the 2002 base year criteria air pollutant and ammonia emissions inventory. Documentation for the future year estimations is presented in Appendix E, *Development of Emission Projections for 2009, 2012 and 2018 for NonEGU Point, Area, and Nonroad Sources in the MANE-VU Region* of this document. The inventory and supporting data prepared includes the following:

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

The mass emissions inventory files were converted to the National Emissions Inventory Input Format Version 3.0. The modeling inventory files were processed in Sparse Matrix Operator Kernel Emissions/Inventory Data Analyzer (SMOKE). The inventories include annual emissions for oxides of nitrogen (NO_X), volatile organic compounds (VOC), carbon monoxide, ammonia, particles with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM10) and PM2.5. Temporal profiles prepared for MANE-VU were used to calculate daily emissions for all MANE-VU states.

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

Work on Version 2 (covering the period from April through September 2005) involved incorporating revisions requested by some MANE-VU state/local agencies on the point, area, and onroad inventories. Work on Version 3 (completed on November 20, 2006) included additional revisions to the point, area, and onroad inventories as requested by some states. Thus, the Version 3 inventory for point, area, and onroad sources was built upon Versions 1 and 2. This work also included development of the biogenics inventory. In Version 3, the nonroad inventory was completely redone because of changes that the EPA made to the NONROAD2005 model. Emissions inventory data files are available on the MARAMA website at:

http://www.marama.org/visibility/EI_Projects/index.html

7.1.2 Future Year Emission Control Inventories

An inventory technical support document for these future inventories is included in Appendix E, *Development of Emission Projections for 2009, 2012 and 2018 for NonEGU Point, Area, and Nonroad Sources in the MANE-VU Region* of this document and explains the data sources, methods, and results for future year emission forecasts for three years; four emission sectors; two emission control scenarios; seven pollutants; and eleven states plus the District of Columbia. The following is a summary of the future year inventories that were developed:

The three projection years are 2009, 2012, and 2018;

- The five source sectors are Electric Generating Units (EGUs), non-electrical generating units (non EGUs), point sources, area sources, and nonroad mobile sources. MANE-VU prepared EGU projections using the Integrated Planning Model (IPM) and onroad mobile source projections using the SMOKE emission modeling system.

- The two emission control scenarios are:

    - A combined “on-the-books/on-the-way” (OTB/OTW) control strategy accounting for emission control regulation already in place, as well as some emission control regulations that will be instituted as a result of this SIP.

    - A beyond on the way (BOTW) scenario to account for controls from potential new regulations that may be necessary to meet visibility and other regional air quality goals.

(Note that these measures are described in detail in Section

10, and that emission reductions based on currently expected measures to which New York is committing are presented at the end of this section).

- The inventories were developed for seven pollutants, which are SO_2, NO_X, VOCs, carbon monoxide, PM_{10} – Primary (sum of the filterable and condensable components), $PM_{2.5}$ – Primary (sum of the filterable and condensable components), and ammonia.

- The states are those that comprise the MANE-VU region. In addition to the District of Columbia, the other 11 MANE-VU states are Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.

7.2 Inventories for Specific Source Types

There are five emission source classifications in the emissions inventory as follows; Stationary point, Stationary area, Off-road mobile, On-road mobile, and Biogenic.

Stationary point sources are large sources that emit greater than a specified tonnage per year. Stationary area sources are those sources whose emissions are relatively small but due to the large number of these sources, the collective emissions could be significant (i.e., dry cleaners, service stations, agricultural sources, fire emissions, etc.). Off-road mobile sources are equipment that can move but do not generally use roadways, (i.e., lawn mowers, construction equipment, railroad locomotives, aircraft, etc.). On-road mobile sources are automobiles, trucks, and motorcycles that use the roadway system. The emissions from these sources are estimated by vehicle type and road type. Biogenic sources are natural sources like trees, crops, grasses and natural decay of plants. Stationary point sources emission data is tracked at the facility, point and process level. For all other source types, emissions are summed on the county level.

7.2.1 Stationary Point Sources

Point source emissions are emissions from large individual sources. Generally, point sources have permits to operate and their emissions are individually calculated based on source specific factors on a regular schedule. The largest point sources are inventoried annually. These are considered to be major sources having emissions of 100 tons per year (TPY) of a criteria pollutant, 25 tpy of NOx and VOC in the New York City Metropolitan Area, 10 tpy of a single hazardous air pollutant (HAP), or 25 tpy total HAPs. Emissions from smaller sources are also calculated individually but less frequently. Point sources are grouped into EGU sources and other industrial point sources, termed as non-

EGU point sources.

7.2.1.1 Electric Generating Units

The base year inventory for EGU sources used 2002 continuous emissions monitoring (CEM) data reported to the EPA in compliance with the Acid Rain program or 2002 hourly emission data provided by stakeholders. These data provide hourly emissions profiles that can be used in the modeling of emissions of SO_2 and NO_x from these large sources. Emission profiles are used to estimate emissions of other pollutants (volatile organic compounds, carbon monoxide, ammonia, fine particles) based on measured emissions of SO_2 and NO_x.

Future year inventories of EGU emissions for 2009 and 2018 were developed using the IPM model 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, the State of New York did not directly rely upon the closure of any particular plant in establishing the 2018 inventory upon which the reasonable progress goals were set. This results in a conservative (higher) future year emission estimate.

7.2.1.2 Non-EGU Point Sources

The non-EGU category used annual emissions as reported for the base year 2002 in MANE-VU Version 3. These emissions were temporally allocated to month, day, and source category code (SCC) based allocation factors. The general approach for estimating future year emissions was to use growth and control data consistent with EPA's CAIR analyses. This data was supplemented with site-specific growth factors as appropriate.

7.2.2 Stationary Area Sources

Stationary area sources include sources whose individual emissions are relatively small but due to the large number of these sources, the collective emissions are significant. Some examples include the combustion of fuels for heating, dry cleaners, and service stations. Emissions are estimated by multiplying an emission factor by some known indicator of collective activity, such as fuel usage, or number of households or population. The general approach for estimating future year emissions was to use growth and control data consistent with EPA's CAIR analyses. This data was supplemented with state-specific growth factors as appropriate.

7.2.3 Off-Road Mobile Sources

Off-road mobile sources are equipment that can move but do not use the roadways, such as construction equipment, aircraft, railroad locomotives, and lawn and garden equipment. For the majority of the off-road mobile sources, the emissions for base year 2002 were estimated using the EPA's nonroad model. The nonroad model assumes that a certain number of off-road sources will be replaced every year by newer, less polluting vehicles that meet the new EPA standards for off-road sources. These lower emissions have been built into the 2018 inventory as well as the benefits received from lower sulfur gasoline in off-road vehicles. Aircraft engines, railroad locomotives and commercial marine vessels are not included in the nonroad model.

7.2.4 Highway Mobile Sources

For on-road vehicles, EPA's MOBILE6.2 was used to estimate emissions. For future year emissions the MOBILE6.2 model considers that a certain number of the vehicle fleet in each State will be replaced every year by newer, less polluting vehicles that meet the California Low Emission Vehicle standards promulgated by New York State as 6NYCRR Part 218. 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. All new mobile source measures and standards, as well as any benefits from implementation of individual State Inspection and Maintenance programs, were used in developing the 2018 inventory.

7.2.5 Biogenic Emission Sources

Biogenic emissions were estimated using SMOKE-BEIS3 (Biogenic Emission Inventory System 3 version 0.9) preprocessor. Further information on Biogenic emissions estimation is contained in the modeling section of this document.

7.3 Emission Processor Selection and Configuration (SMOKE)

The mass emissions inventory files were converted to the National Emissions Inventory Input Format Version 3.0. The modeling inventory files were processed in Sparse Matrix Operator Kernel Emissions/Inventory Data Analyzer (SMOKE). The SMOKE Processing System was selected for the modeling analysis. SMOKE is principally an emissions processing system, as opposed to a true emissions inventory preparation system, in which emissions estimates are simulated from "first principles." This means that, with the exception of mobile and biogenic sources, its purpose is to provide an efficient, modern tool for converting emissions inventory data into the formatted emissions files required for a photochemical air quality model. Inside the MANE-VU region, the modeling inventories were processed by the Department using the SMOKE (Version 2.1)

processor to provide inputs for the CMAQ model. A detailed description of all SMOKE input files such as area, mobile, fire, point and biogenic emissions files and the SMOKE model configuration are provided in the *Technical Support Document on Agricultural and Forestry Smoke Management in the MANE-VU Region*, Appendix I. The MANE-VU member states selected several control strategies for inclusion in the modeling. Emission reduction requirements mandated by the Clean Air Act were also included in projecting future year emissions. In addition, Section 51.308(d)(3)(v)(D) requires the State of New York to consider source retirement and replacement schedules in developing the future inventories and long-term strategy.

7.4 Sources of Visibility Impairing Pollutants in MANE-VU

This section explores the origin and quantity of haze-forming pollutants emitted in the eastern and the mid-Atlantic United States. Section 51.308(d)(4)(v) of EPA's Regional Haze Rule requires a statewide emission inventory of pollutants that are reasonably anticipated to cause or contribute to visibility impairment in any mandatory Class I area. The pollutants that affect fine particle formation, and thus contribute to regional haze, are sulfur oxides (SO_X), nitrogen oxides (NO_X), volatile organic compounds (VOC), and ammonia (NH_3). Particles with an aerodynamic diameter less than or equal to 10 and 2.5 µm (i.e., primary PM_{10} and $PM_{2.5}$) can be directly emitted from various sources.

The emissions dataset illustrated below is the 2002 MANE-VU Version 2 regional haze emissions inventory. The emission inventories include carbon monoxide (CO), but it is not considered here as it does not contribute to regional haze. The MANE-VU regional haze emissions inventory version 3.0, released in April 2006, has superseded version 2.0 for modeling purposes. This inventory update was developed through the Mid-Atlantic Regional Air Management Association (MARAMA) for the MANE-VU RPO. The trends among recent emission inventories presented here use the 1996 EPA NET and 1999 NEI and Version 2 of the MANE-VU inventory. This section describes emission characteristics by pollutant and source type (e.g., point, area, and mobile).

7.5 Emission Inventory Characteristics

This section reviews trends in emissions of SO_2, VOC, NO_x, PM and ammonia. The trends among recent emission inventories presented here use the 1996 EPA NET and 1999 NEI and Version 3.0 of the 2002 MANE-VU inventory.[1] This section describes emission characteristics by pollutant and source type (e.g., point, area, and mobile). As described later, this data was superseded by more up-to-date data for modeling purposes, but this data shows trends in emissions.

7.5.1 Sulfur Dioxide (SO_2)

SO_2 is the primary precursor pollutant for sulfate particles. Sulfate particles commonly account for more than 50 percent of particle-related light extinction at northeastern Class I areas on the clearest days and for as much as or more than 80 percent on the haziest days. Hence, SO_2 emissions are an obvious target of opportunity for reducing regional haze in the eastern United States. Combustion of coal and, to a lesser extent, of certain petroleum products accounts for most anthropogenic SO_2 emissions. In fact, in 1998 a single source category, coal-burning power plants, was responsible for two-thirds of total SO_2 emissions nationwide (NESCAUM, 2001a). Figure 7-1 shows SO_2 emissions trends in the MANE-VU states extracted from the NEI for the years 1996, 1999, and the 2002 MANE-VU inventory (EPA 2005 and MARAMA, 2004).

Most of the states (with the exception of Maryland) show declines in year 2002 annual SO_2 emissions as compared to 1996 emissions. Some of the states show an increase in 1999 followed by a decline in 2002 and others show consistent declines throughout the entire period. The upward trend in emissions after 1996 probably reflects electricity demand growth during the late 1990s combined with the availability of banked emissions allowances from initial over-

[4] EPA's Emission Factor and Inventory Group (EFIG) (EPA/OAR (Office of Air and Radiation)/OAQPS (Office of Air Quality Planning and Standards)/EMAD (Emissions, Monitoring and Analysis Division) prepares a national database of air emissions information with input from numerous state and local air agencies, from tribes, and from industry. This database contains information on stationary and mobile sources that emit criteria air pollutants and their precursors, as well as hazardous air pollutants (HAPs). The database includes estimates of annual emissions, by source, of air pollutants in ach area of the country on an annual basis. The NEI includes emission estimates for all 50 states, the District of Columbia, Puerto Rico, and the Virgin Islands. Emission estimates for individual point or major sources (facilities), as well as county level estimates for area, mobile and other sources, are available currently for years 1985 through 1999 for criteria pollutants, and for years 1996 and 1999 for HAPs. Data from the NEI help support air dispersion modeling, regional strategy development, setting regulation, air toxics risk assessment, and tracking trends in emissions over time. For emission inventories prior to 1999, the National Emission Trends (NET) database maintained criteria pollutant emission estimates and the National Toxics Inventory (NTI) database maintained HAP emission estimates. Beginning with 1999, the NEI began preparing criteria and HAP emissions data in a more integrated fashion to take the place of the NET and the NTI.

compliance with control requirements in Phase 1 of the EPA Acid Rain Program. This led to relatively low market prices for allowances later in the decade, which encouraged utilities to purchase allowances rather than implement new controls as electricity output expanded.

The observed decline in the 2002 SO_2 emissions inventory reflects implementation of the second phase of the EPA Acid Rain Program, which in 2000 further reduced allowable emissions and extended emissions limits to more power plants. Figure 7-2 shows the percent contribution from different source categories to 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, and smaller industrial facilities) 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 (NESCAUM, 2001).

Figure 7-1 - State Level Sulfur Dioxide Emissions

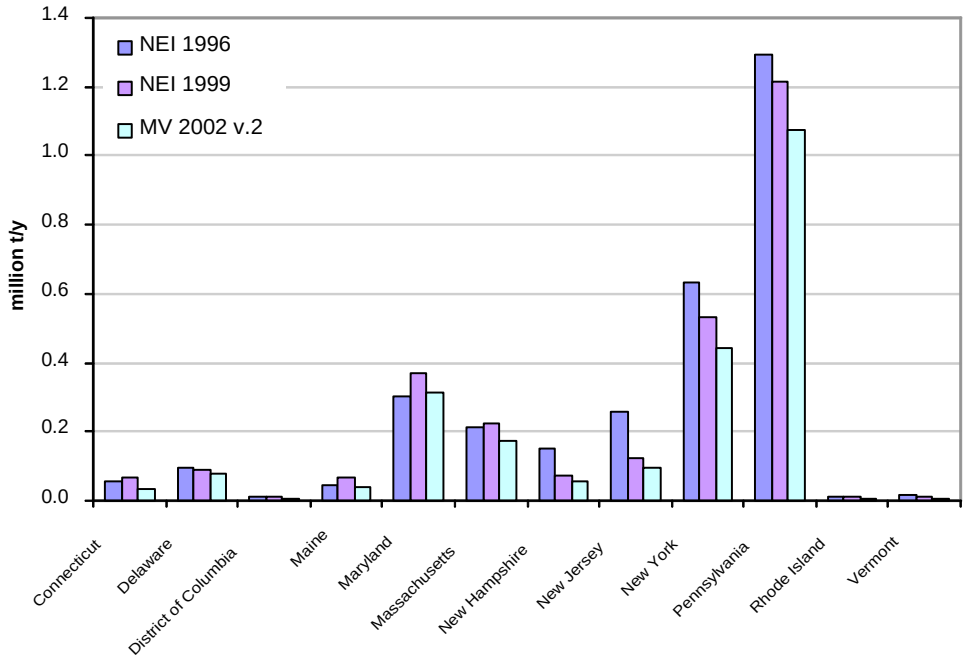
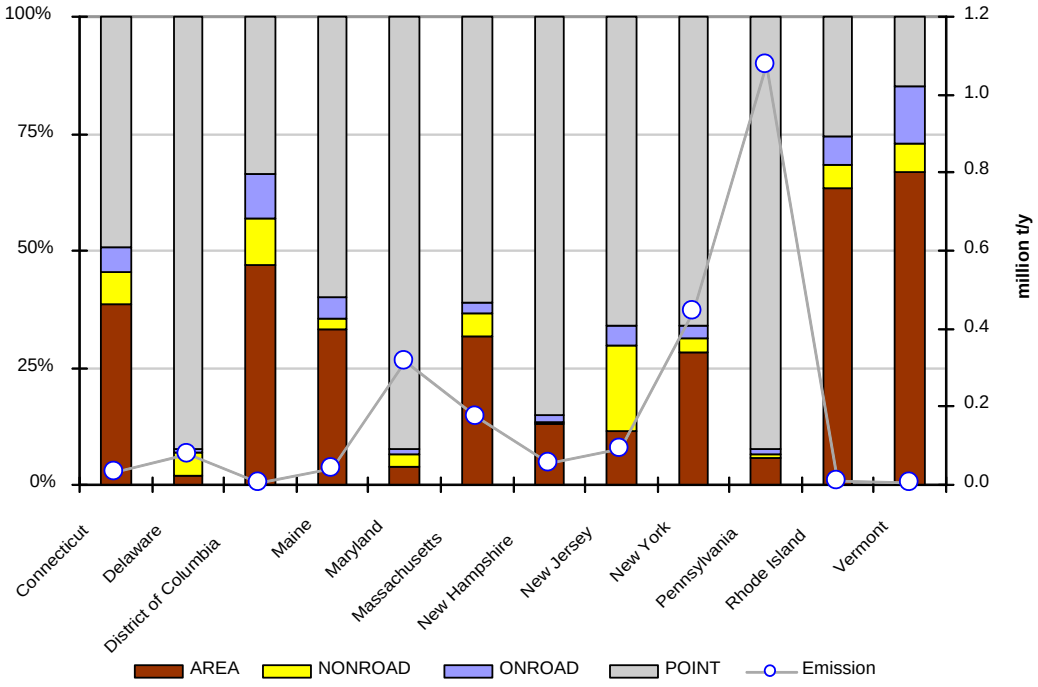


Figure 7-2 - 2002 SO_2 Emissions (Bar graph: Percentage fraction of four source categories, Circle: Annual emissions amount in million (10^6) tons per year



7.5.2 Volatile Organic Compounds (VOCs)

Existing emission inventories generally refer to “volatile organic compounds” (VOCs) as hydrocarbons whose volatility in the atmosphere makes them particularly important from the standpoint of ozone formation. 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. Thus, the VOC inventory category is of interest primarily from the organic carbon perspective of $PM_{2.5}$. After sulfate, organic carbon generally accounts for the next largest share of fine particle mass and particle-related light extinction at northeastern Class I sites. The term organic carbon encompasses a large number and variety of chemical compounds that may come directly from emission sources as a part of primary PM or may form in the atmosphere as secondary pollutants. The organic carbon present at Class I sites includes a mix of species, including pollutants originating from anthropogenic (i.e., manmade) sources as well as biogenic hydrocarbons emitted by vegetation. Recent efforts to reduce manmade organic carbon emissions have been undertaken primarily to address summertime ozone formation in urban centers. Future efforts to further reduce organic carbon emissions may be driven by programs that address fine particles and visibility. These efforts are discussed in Section 10 of this document.

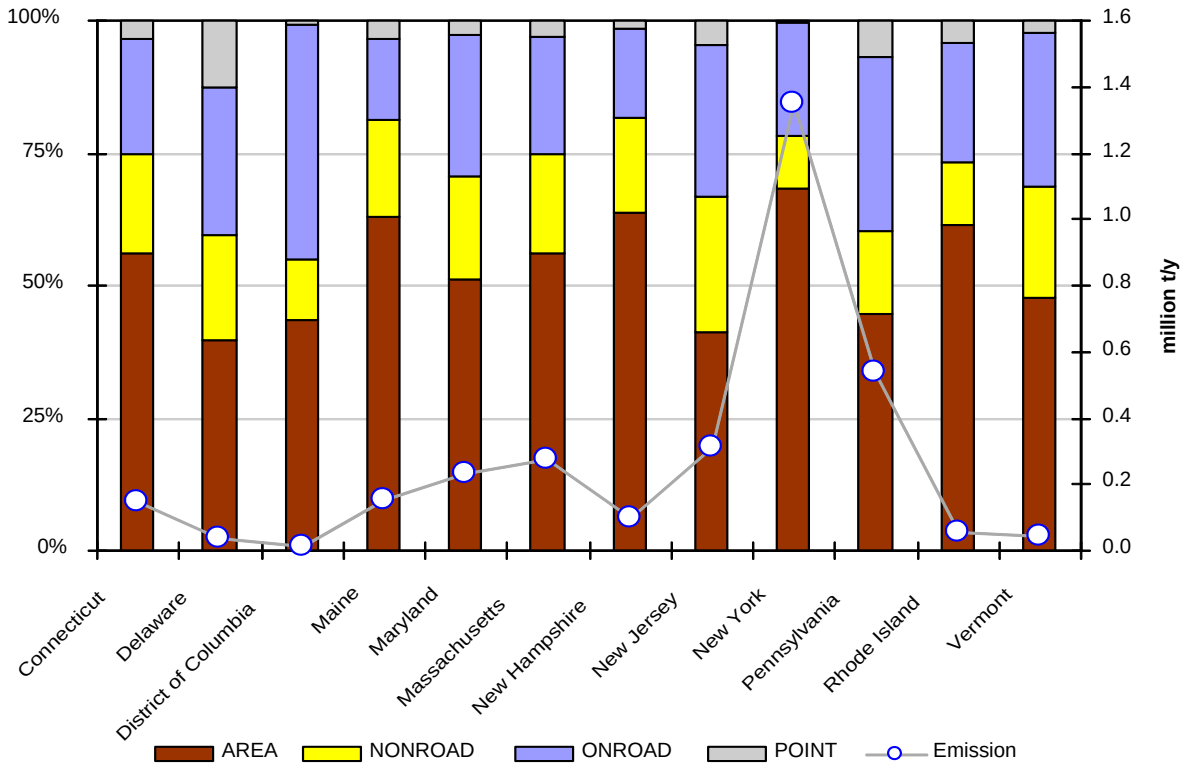
Understanding the transport dynamics and source regions for organic carbon in northeastern Class I areas is likely to be more complex than for sulfate. This is partly because of the large number and variety of organic carbon (OC) species, the fact that their transport characteristics vary widely, and the fact that a given species may undergo numerous complex chemical reactions in the atmosphere. Thus, the organic carbon contribution to visibility impairment at most Class I sites in the East is likely to include manmade pollution transported from a distance, manmade pollution from nearby sources, and biogenic emissions, especially terpenes from coniferous forests.

As shown in Figure 7-3, the VOC inventory is dominated by mobile and area sources. On-road mobile sources of VOCs include exhaust emissions from gasoline passenger vehicles and diesel-powered 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).

Biogenic VOCs may play an important role within the rural settings typical of Class I sites. The oxidation of hydrocarbon molecules containing seven or more carbon atoms is generally the most significant pathway for the formation of light-scattering organic aerosol particles (Odum et al., 1997). Smaller reactive hydrocarbons that may contribute significantly to urban smog (ozone) are less

likely to play a role in organic aerosol formation, though it was noted that high ozone levels can have an indirect effect on visibility by promoting the oxidation of other available hydrocarbons, including biogenic emissions (NESCAUM, January 2001). In short, further work is needed to characterize the organic carbon contribution to regional haze in the Northeast and Mid-Atlantic states and to develop emissions inventories that will be of greater value for visibility planning purposes.

Figure 7-3 - 2002 VOC Emissions (Bar graph: Percentage fraction of four source categories, Circle: Annual emissions in 10^6 tons per year)



7.5.3 Oxides of Nitrogen (NO_X)

NO_X emissions contribute to visibility impairment in the eastern U.S. by forming light-scattering nitrate particles. Nitrates generally account for a substantially smaller fraction of fine particle mass and related light extinction than sulfates and organic carbon at northeastern Class I sites. Notably, nitrates 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 (NESCAUM 2001a). Figure 7-4 shows NO_X emissions in the MANE-VU region at the state level. Since 1980, nationwide emissions of NO_X from all sources have

shown little change. In fact, emissions increased by 2 percent between 1989 and 1998 (EPA, 2000a). 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. Most states in the MANE-VU region experienced declining NO_X emissions from 1996 through 2002, except Massachusetts, Maryland, New York, and Rhode Island, which show an increase in NO_X emissions in 1999 before declining to levels below 1996 emissions in 2002. Power plants and mobile sources generally dominate state and national NO_X emissions inventories. Nationally, power plants account for more than one-quarter of all NO_X emissions, amounting to more than six million tons. The electric sector plays an even larger role, however, in parts of the industrial Midwest where high NO_X emissions have a particularly significant power plant contribution. By contrast, mobile sources dominate the NO_X inventories for more urbanized Mid-Atlantic and New England states to a far greater extent, as shown in Figure 7-5. In these states, on-road mobile sources - a category that mainly includes highway vehicles - represent the most significant NO_X source category. Emissions from non-road (i.e., off-highway) mobile sources, primarily diesel-fired engines, also represent a substantial fraction of the inventory. While there are fewer uncertainties associated with available NO_X estimates than in the case of other key haze-related pollutants - including primary fine particle and ammonia emissions - further efforts could improve current inventories in a number of areas (NESCAUM, 2001a).

In particular, better information on the contribution of area and non-highway mobile sources may be of most interest in the context of regional haze planning. First, available emission estimation methodologies are weaker for these types of sources than for the large stationary combustion sources. Moreover, because SO_2 and NO_X emissions must mix with ammonia to participate in secondary particle formation, emissions that occur over large areas at the surface may be more efficient in secondary fine particulate formation than concentrated emissions from isolated tall stacks (Duyzer, 1994).

Figure 7-4 - State Level Nitrogen Oxides Emissions

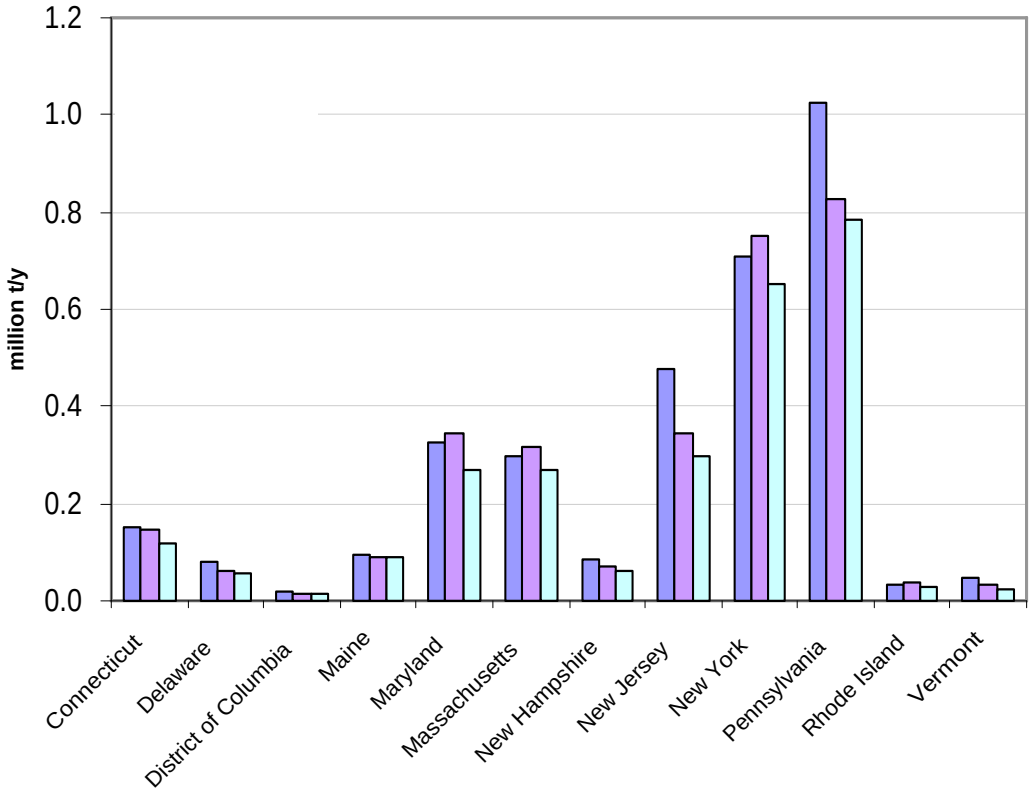
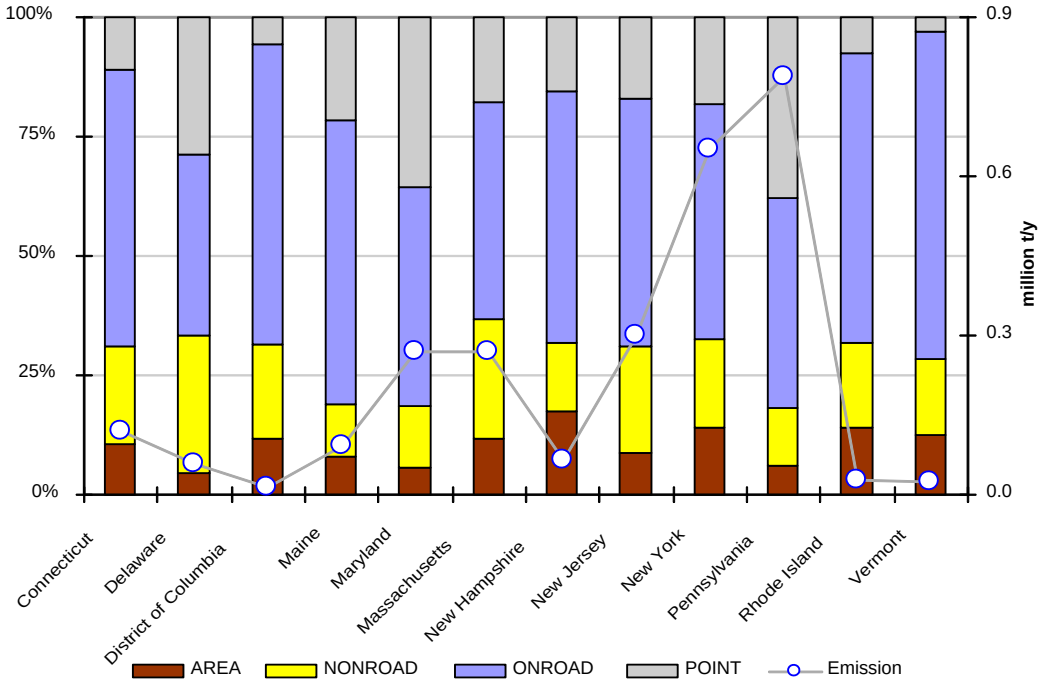


Figure 7-5 - 2002 NO_X Emissions (Bar graph: Percentage fraction of four source categories, Circle: Annual emissions amount in 10^6 tons per year)



7.5.4 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 7-6 and Figure 7-7 show PM_{10} and $PM_{2.5}$ emissions for the MANE-VU states for the years 1996, 1999, and 2002. Note that for PM_{10} the inventory values are drawn from the 2002 NEI. Most states show a steady decline in annual PM_{10} emissions over this time period.

By contrast, emission trends for primary $PM_{2.5}$ are more variable. Crustal sources are significant contributors of primary PM emissions. This category includes fugitive dust emissions from construction activities, paved and unpaved roads, and agricultural tilling. Typically, monitors estimate PM_{10} emissions from these types of sources by measuring the horizontal flux of particulate mass at a fixed downwind sampling location within perhaps 10 meters of a road or field. Comparisons between estimated emission rates for fine particles using these types of measurement techniques and observed concentrations of crustal matter in the ambient air at downwind receptor sites suggest that physical or chemical

processes remove a significant fraction of crustal material relatively quickly. As a result, it rarely entrains into layers of the atmosphere where it can transport to downwind receptor locations. Because of this discrepancy between estimated emissions and observed ambient concentrations, modelers typically reduce estimates of total $PM_{2.5}$ emissions from all crustal sources by applying a factor of 0.15 to 0.25 to the total $PM_{2.5}$ emissions before including it in modeling analyses. From a regional haze perspective, crustal material generally does not play a major role. On the 20 percent best-visibility days during the baseline period (2000-2004), it accounted for six to eleven percent of particle-related light extinction at MANE-VU Class 1 sites. On the 20 percent worst-visibility days, however, crustal material generally plays a much smaller role relative to other haze-forming pollutants, ranging from two to three percent. Moreover, the crustal fraction includes material of natural origin (such as soil or sea salt) that is not targeted under the Regional Haze Rule.

Of course, the crustal fraction can be influenced by certain human activities, such as construction, agricultural practices, and road maintenance (including wintertime salting) — thus, to the extent that these types of activities are found to affect visibility at northeastern Class I sites, control measures targeted at crustal material may prove beneficial. Experience from the western United States, where the crustal component has generally played a more significant role in driving overall particulate levels, may be helpful to the extent that it is relevant in the eastern context. In addition, a few areas in the Northeast, such as New Haven, Connecticut and Presque Isle, Maine, have some experience with the control of dust and road-salt as a result of regulatory obligations stemming from their past non-attainment status with respect to the NAAQS for PM_{10}.

Current emissions inventories for the entire MANE-VU area indicate residential wood combustion represents 25 percent of primary fine particulate emissions in the region. This implies that rural sources can play an important role in addition to the contribution from the region's many highly populated urban areas. An 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 such as construction waste burning. Limiting burning to times when favorable meteorological conditions can efficiently disperse resulting emissions can manage many of these types of sources.

Figure 7-8 and Figure 7-9 show that area and mobile sources dominate primary PM emissions. (The NEI inventory categorizes residential wood combustion and some other combustion sources as area sources.) The relative contribution of 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. At the same time,

pollution control equipment commonly installed at large point sources is usually more efficient at capturing coarse-mode particles.

Figure 7-6 - State Level Primary PM_{10} Emissions

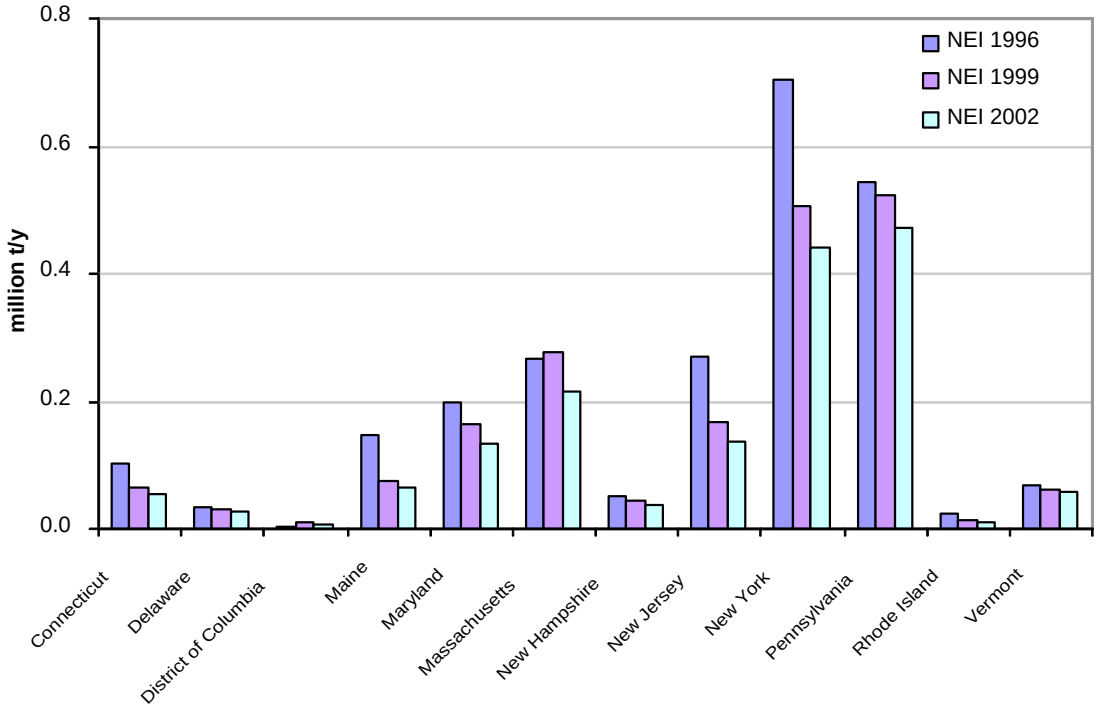


Figure 7-7 - State Level Primary $PM_{2.5}$ Emissions

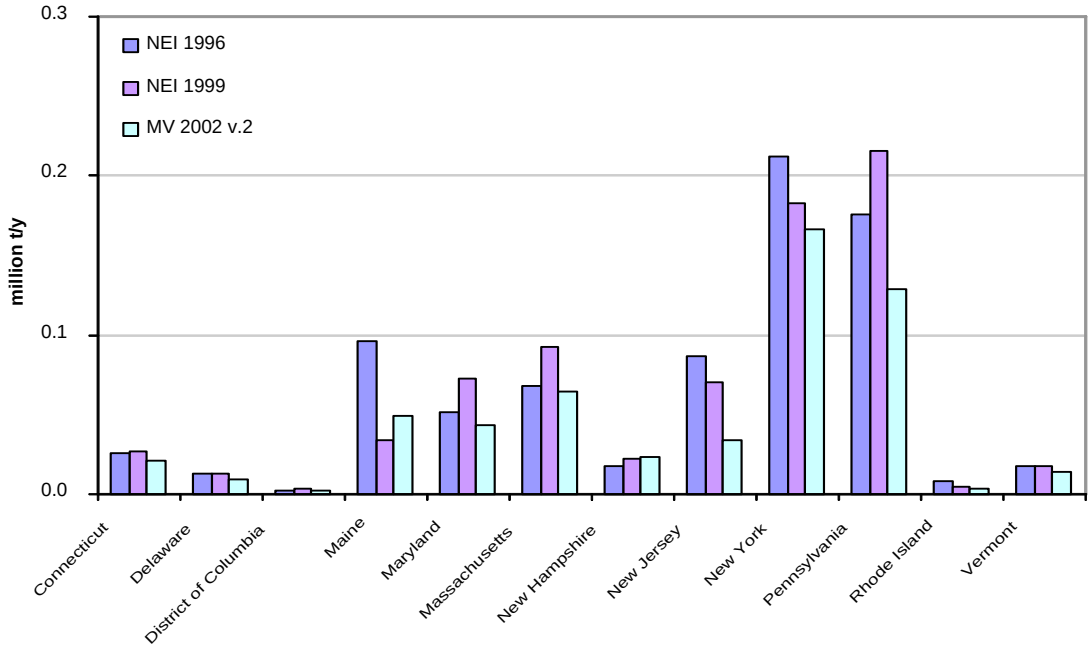


Figure 7-8 - 2002 Primary PM_{10} Emissions (Bar graph: Percentage fraction of four source categories, Circle: Annual emissions amount in 10^6 tons per year)

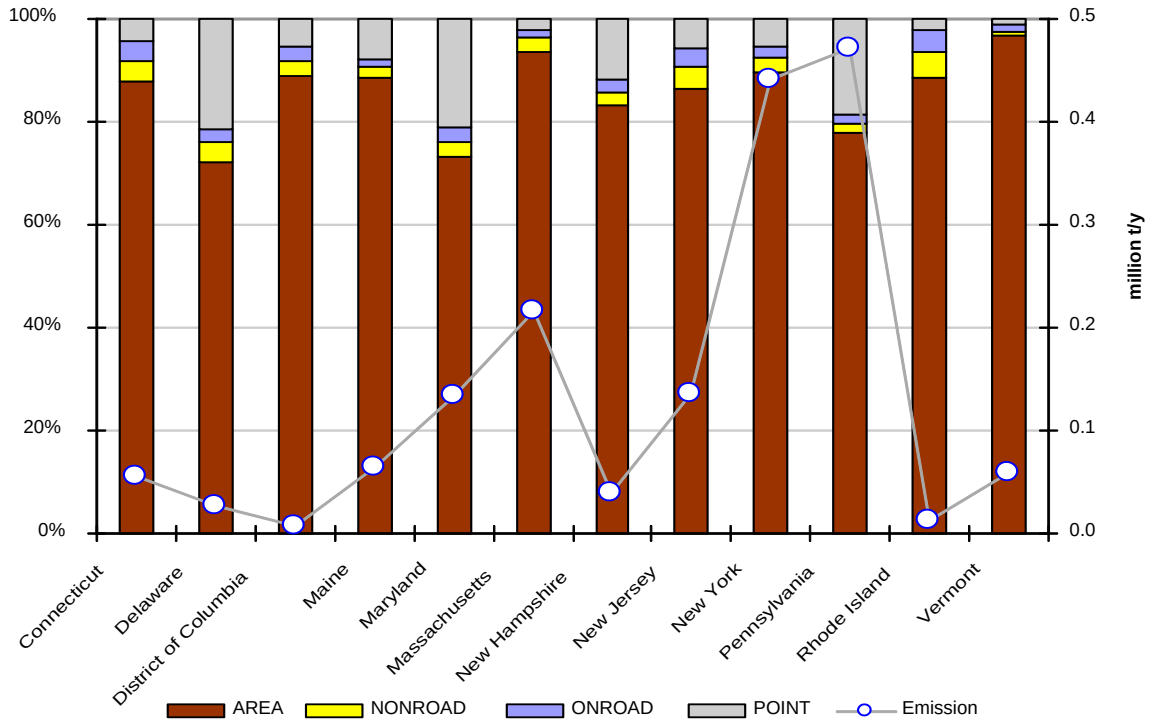
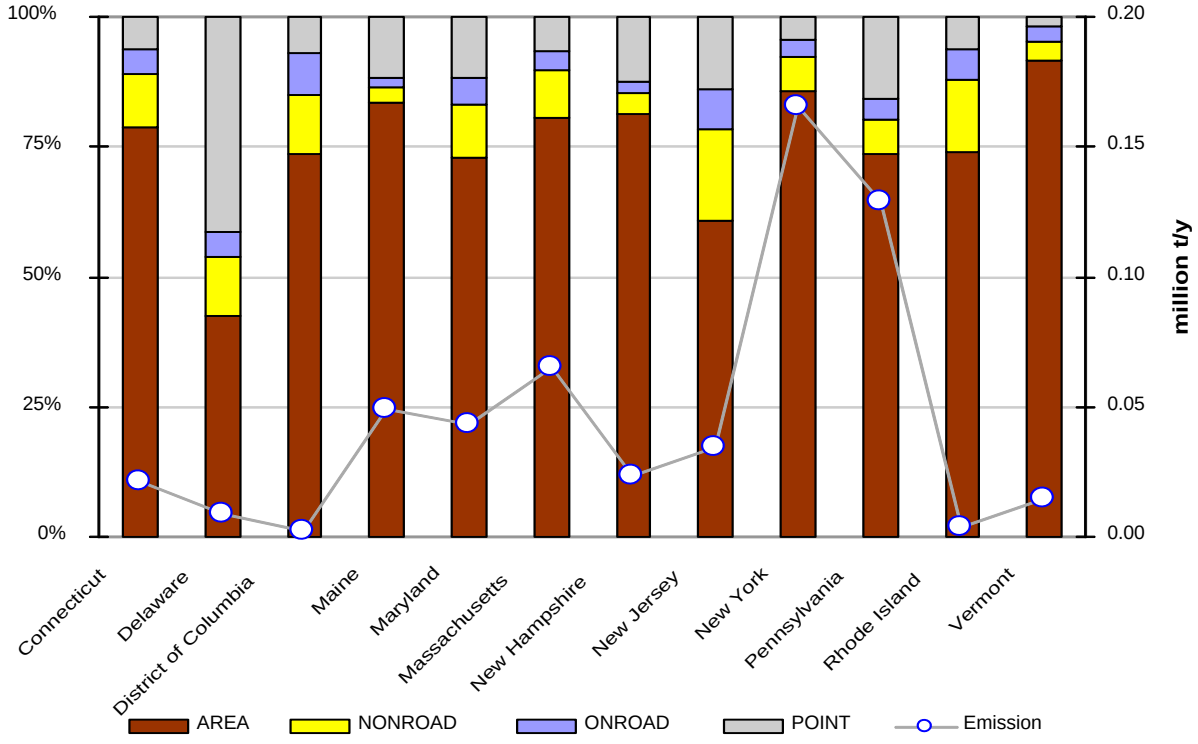


Figure 7-9 - 2002 Primary $PM_{2.5}$ Emissions (Bar graph: Percentage fraction of four source categories, Circle: Annual emissions amount in 10^6 tons per year)



7.5.5 Ammonia Emissions (NH_3)

Knowledge of ammonia emission sources will be necessary in developing effective regional haze reduction strategies because of the importance of ammonium sulfate and ammonium nitrate in determining overall fine particle mass and light scattering. Identifying emissions from ammonia sources is necessary to help develop regional haze reduction strategies. According to 1998 estimates, livestock agriculture and fertilizer use accounted for approximately 86 percent of all ammonia emissions to the atmosphere (EPA, 2000b). However, better ammonia inventory data is needed for the photochemical models used to simulate fine particle formation and transport in the eastern United States. States were not required to include ammonia in their air emissions data collection efforts until fairly recently (see consolidated emissions reporting rule, 67 FR 39602; June 10, 2002), and so it will take time for the quality of ammonia inventory data to match the quality of the data for the other criteria pollutants.

Ammonium ions (formed from ammonia emissions to the atmosphere) are an important constituent of airborne particulate matter, typically accounting for 10–20 percent of total fine particle mass. Reductions in ammonium ion concentrations

can be extremely beneficial because a more-than-proportional reduction in fine particle mass can result. Ansari and Pandis (1998) showed that a one mg/m^3 reduction in ammonium ion could result in up to a four mg/m^3 reduction in fine particulate matter. Decision makers, however, must weigh the benefits of ammonia reduction against the significant role it plays in neutralizing acidic aerosols.[5]

To address the need for improved ammonia inventories, MARAMA, NESCAUM and EPA funded researchers at Carnegie Mellon University (CMU) in Pittsburgh to develop a regional ammonia inventory (Davidson et al., 1999). 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 data in a variety of formats[6] and can make updates easily, allowing additional ammonia sources to be added or emissions factors to be replaced as better information becomes available (Strader et al., 2000; NESCAUM, 2001b). Figure 7-10 shows that estimated ammonia emissions were fairly stable in the 1996, 1999, and 2002 NEI for MANE-VU states, with some increases observed for Massachusetts, New Jersey and New York. Area and on-road mobile sources dominate according to Figure 7-11. 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 a significant emissions contribution are wastewater treatment systems and gasoline exhaust from highway vehicles.

[5] SO_2 reacts in the atmosphere to form sulfuric acid (H_2SO_4). Ammonia can partially or fully neutralize this strong acid to form ammonium bisulfate or ammonium sulfate. If planners focus future control strategies on ammonia and do not achieve corresponding SO_2 reductions, fine particles formed in the atmosphere will be substantially more acidic than those presently observed.

[6] 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.

Figure 7-10 - State Level Ammonia Emissions

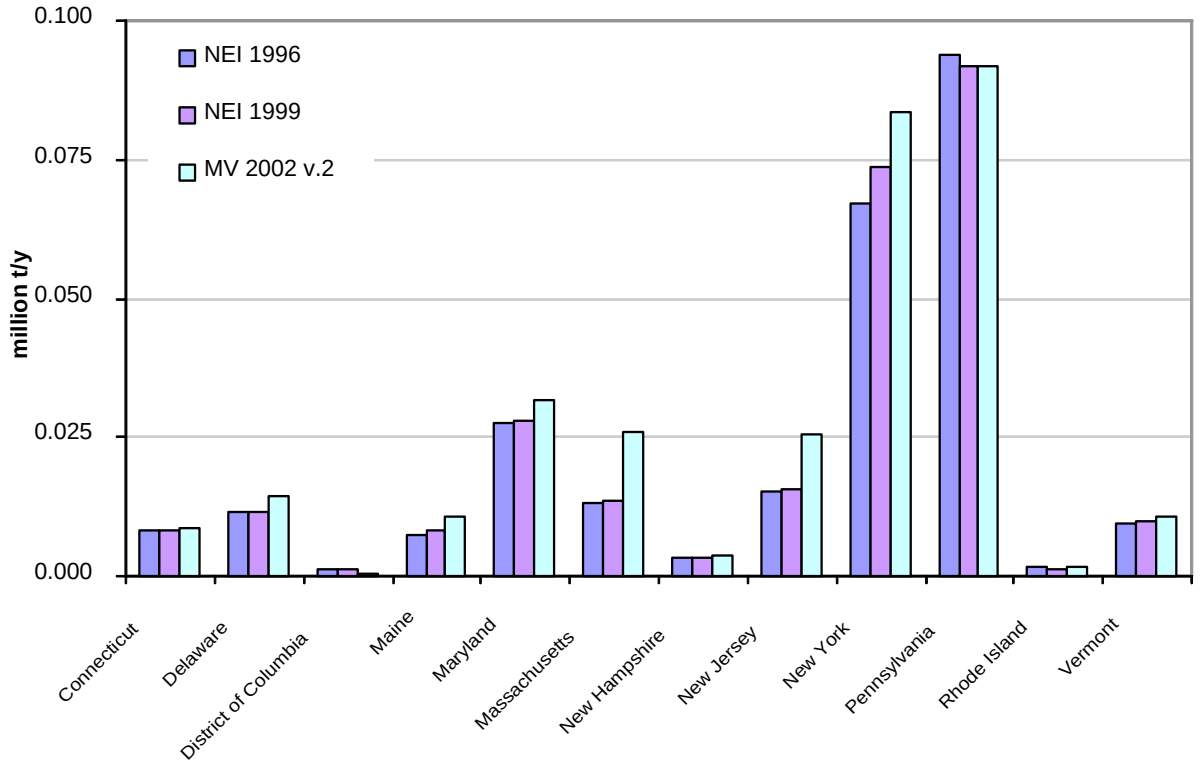


Figure 7-11 - 2002 NH_3 Emissions (Bar graph: Percentage fraction of

7.5.6 Further Discussion

Figures 7-1, 7-4, 7-6, 7-7, and 7-10 show SO2, NOx, PM10, PM2.5 and ammonia emissions trends in the MANE-VU states extracted from the NEI for the years 1996, 1999, and the 2002 MANE-VU inventory. Comparing emissions from each year, these figures provide an indication of whether there is an identifiable trend in emissions prior to the base year, as well as the ability to show the relative emissions on a state-specific basis for these three years. It is thus possible to compare the relative emissions from each state as well as to assess whether a trend in emissions is evident over this period. This information is useful in determining what air program-related changes might have been effective in influencing the levels of these pollutants in recent years, and is suggestive of what trends might be seen in the first planning period. For example, the figures related to SO2 suggests that most states show declines in year 2002 as compared tn 1996 emissions. Where it occurred. the upward trend in emissions after 1996 likely reflects electricity demand growth during the late 1990s combined with the availability of banked emissions allowances from initial overcompliance with control requirements in Phase 1 of the EPA Acid Rain Program. Understanding the material presented in these graphs if useful in determining how to project emissions and judging whether projections are reasonable. The specific interpretation of each graph is discussed in detail in the adjacent portions of section 7.

7.6 Summary of Emission Inventories

The tables below summarize the 2002 and 2018 emissions as developed by the methods described above, and used in the modeling for haze impacts through the period of this SIP. Tables 7-1 and 7-2 present the MANE-VU-wide figures, with the percent changes over the period for the entire MANE-VU region shown in Table 7-3. Likewise, Tables 7-4 and 7-5 summarize the emissions for New York State, with Table 7-6 showing the percent changes over time.

For MANE-VU, while both PM2.5 and PM10 emissions are shown to increase slightly, the emission of the precursors for particulate matter VOC, NOx and SO2 decrease significantly. With sulfate being the predominate contributor to regional haze, the reductions are dramatic, contribuing to the expected meeting of the reasonable progress goals for the Class I areas within MANE-VU.

In the case of New York's emissions, PM2.5 emissions are predicted to decrease slightly but, as is the case with MANE-VU emissions as a whole, VOC, NOx and SO2 emissions are expected to decrease significantly as well.

7.6.1 Summary of MANE-VU Emissions Inventories

Table 7-1 - MANE-VU 2002 Emissions Inventory Summary (TPY)

Sector	VOC	NOx	PM2.5	PM10	NH3	SO2
Point	97,300	673,660	55,447	89,150	6,194	1,907,634
Area	1,528,141	262,477	332,729	1,455,311	249,795	316,357
On-Road Mobile	789,560	1,308,233	22,107	31,561	52,984	40,091
Non-Road Mobile	572,751	431,631	36,084	40,114	287	57,257
Biogenics	2,575,232	28,396	-	-	-	-
TOTAL	5,562,984	2,704,397	446,367	1,616,136	309,260	2,321,339

Source: Pechan, 2006. "Technical Support Document for 2002 MANE-VU SIP Modeling Inventories, Version 3." November 2006.
Available online: http://www.marama.org/visibility/Inventory%20Summary/2002EmissionsInventory.htm

Table 7-2 - MANE-VU 2018 Emissions Inventory Summary (TPY)

Sector	VOC	NOx	PM2.5	PM10	NH3	SO2
Point	115,052	413,021	93,580	129,315	11,134	657,018
Area	1,387,882	284,535	345,419	1,614,476	341,746	305,437
On-Road Mobile	269,981	303,955	9,189	9,852	66,476	8,757
Non-Road Mobile	380,080	271,185	23,938	27,059	369	8,643
Biogenics	2,575,232	28,396	-	-	-	-
TOTAL	4,728,227	1,301,092	472,126	1,780,702	419,725	979,855

Source: MACTEC, 2007. "Development of Emission Projections for 2009, 2012, and 2018 for non-EGU Point, Area, and Nonroad Sources in the MANE-VU Region." February 28, 2007.

Available online:
http://www.marama.org/visibility/Inventory%20Summary/FutureEmissionsInventory.htm
EGU Point Emissions: VISTAS_PC_If IPM Run (Alpine Geophysics, 2008)

Table 7-3 - Change in MANE-VU Emissions 2002 to 2018 (*Percent)

Sector	VOC	NOx	PM2.5	PM10	NH3	SO2
Point	18.2	-38.7	68.8	45.1	79.8	-65.6
Area	-9.2	8.4	3.8	10.9	36.8	-3.4
On-Road Mobile	-65.8	-76.8	-58.4	-68.8	25.5	-78.2
Non-Road Mobile	-33.6	-37.2	-33.7	-32.5	28.6	-84.9
Biogenics	0.0	0.0	--	--	--	--
TOTAL	-15.0	-51.9	5.8	10.2	35.7	-57.8

*Negative percent indicates a decrease in emissions

7.6.2 Summary of New York 2002 Emissions Inventories

Table 7-4 - New York 2002 Emissions Inventory Summary (TPY)

Sector	CO	NOx	VOC	NH3	SO2	PM10	PM25
Area	356,287	98,804	514,425	67,422	113,978	369,595	85,841
Point	53,563	584,450	134,363	1,861	686,426	10,326	25,075
Nonroad	1,205,509	119,808	158,121	79	13,288	9,605	9,000
Onroad	2,942,730	313,888	179,731	14,439	10,229	7,599	5,402
Biogenic	63,436	8,313	492,483	-	-	-	-
Totals	4,621,525	1,125,263	1,479,123	83,801	823,921	397,125	125,318

Source: NOx, SO2 and PM2.5: NYSDEC's Proposed PM2.5 Attainment Demonstration (May 2008)
CO and VOC :NYSDEC's Proposed 8-Hour Ozone Attainment Demonstration (Feb 2008)
Others: MACTEC, 2007. "Development of Emission Projections for 2009, 2012, and 2018 for non-EGU Point, Area, and Nonroad Sources in the MANE-VU Region." February 28, 2007.
Available online: http://www.marama.org/visibility/Inventory%20Summary/FutureEmissionsInventory.htm

7.6.3 Summary of New York 2018 Emissions Inventories

Table 7-5 - New York 2018 Emissions Inventory Summary (TPY)

Sector	CO	NOx	VOC	NH3	SO2	PM10	PM25
Area	307,659	108,444	457,421	96,078	141,408	392,027	86,422
Point	101,118	55,681	13,091	2,767	118,936	17,062	13,460
Nonroad	1,474,727	72,400	104,562	103	1,686	5,830	5,349
Onroad	1,694,820	78,365	68,104	19,167	1,794	2,775	2,542
Biogenic	63,436	8,313	492,483	--	--	--	--
Totals	3,641,760	323,203	1,135,571	118,115	263,824	417,694	107,773

Source: MACTEC, 2007. "Development of Emission Projections for 2009, 2012, and 2018 for non-EGU Point, Area, and Nonroad Sources in the MANE-VU Region." February 28, 2007. Available online: http://www.marama.org/visibility/Inventory%20Summary/FutureEmissionsInventory.htm

Table 7-6 - Change in New York Emissions 2002 to 2018 (*Percent)

Sector	CO	NOx	VOC	NH3	SO2	PM10	PM25
Area	-13.6	9.8	-11.1	42.5	24.1	6.1	0.7
Point	88.8	-90.5	-90.3	48.7	-82.7	65.2	-46.3
Nonroad	22.3	-39.6	-33.9	30.4	-87.3	-39.3	-40.6
Onroad	-42.4	-75.0	-62.2	32.7	-82.5	-63.5	-52.9
Biogenic	0.0	0.0	0.0	--	--	--	--
Totals	-21.2	-71.3	-23.2	40.9	-68.0	5.2	-14.0

*Negative percent indicates a decrease in emissions

8.0 Best Available Retrofit Technology (BART) Requirements

As mandated by 40 CFR Section 51.308(e), the State of New York, along with other states, is required to submit an implementation plan containing emission limitations representing BART and schedules for compliance with BART for each BART-eligible source that may reasonably be anticipated to cause or contribute to any impairment of visibility in any Class I Federal area. BART requirements are intended to reduce emissions specifically from large sources that, due to age, were exempted from new source performance standards (NSPS) requirements of the Clean Air Act. BART controls must be implemented unless the Department demonstrates that an emissions trading program or other alternative will achieve greater reasonable progress toward natural visibility conditions.

New York State, with the help of the MANE-VU Regional Planning Organization, has developed a strategy to implement the requirements of BART that includes the adoption of a state rule that will contain the requirements for BART controls. BART-eligible sources and the associated control requirements will be identified as a result of the promulgation of this rule, which will also define the applicability of BART controls, include provisions for a schedule by which controls must be installed, and provide for the establishment of enforceable permit conditions and limits to ensure compliance.

8.1 BART and the Clean Air Interstate Rule

The BART-eligible electricity generating units (EGUs) in MANE-VU represent the largest emissions reduction potential among the various BART-eligible source categories. The population of BART-Eligible EGUs within the MANE-VU domain can be broadly divided into four groups.

- CAIR States (year-round): Those in states eligible for participation in the EPA Clean Air Interstate Rule (CAIR) program on a year round basis (Delaware, District of Columbia, Maryland, New Jersey, New York, and Pennsylvania for SO2 and NOx), and
- CAIR States (seasonal): Those in states that participate in the seasonal CAIR program only (Connecticut and Massachusetts for summertime NOx), and
- Opt-out States: Those in states that are not eligible to participate in the annual CAIR program and choose not to participate in the seasonal CAIR program (Rhode Island and New Hampshire), and
- Non-CAIR States: Those in states which are not eligible to participate in the CAIR program (Maine and Vermont).

EPA determined that the application of CAIR will satisfy BART for those EGUs in states that participated in the CAIR program. The reason for this is that EPA

contends that CAIR will achieve reductions that are "better-than-BART." EPA supported this position in the final BART rule, detailed in Appendix O: *Supplemental Air Quality Modeling Technical Support Document (TSD) for the Clean Air Interstate Rule (CAIR), May 2004*. This applied for all BART-eligible EGUs in Pennsylvania, Delaware, Maryland, the District of Columbia, New Jersey, and New York. Those EGUs located in Connecticut and Massachusetts were also included in the CAIR program, but only with respect to their emissions of ozone season NOx.

Though New York implemented (CAIR) through the promulgation of 6 NYCRR Parts 243, 244 and 245, it is requiring BART-eligible EGU's to undergo a BART determination in accordance with the provisions of the federal BART Rule (see Section 8.3). Given that EPA will be required to revise its rules to respond to the CAIR remand, performing the BART determinations at this time will complete this requirement and not make it subject to another BART review after EPA responds to the CAIR remand.

The BART Guidelines (40 CFR Appendix Y) provide criteria for determining if other programs will produce reductions equivalent to BART. These criteria, sometimes referred to as the "better-than-BART-test," consist of:

- A determination if the geographic distribution of emissions reductions from the two programs is expected to be similar, the comparison can be made based on emissions alone, or

- If the distribution of emissions reductions is anticipated to be significantly different, then a two-pronged visibility improvement test is employed. The first prong is that the alternative program must not result in a degradation of visibility at any Class I area. The second prong is that the alternative program must result in greater visibility improvement overall, based on an average across all affected Class I areas.

Section (e)(2) of the Regional Haze Rule provides that a state may opt to implement an emissions trading program or other alternative measure rather than to require sources subject to BART to install, operate and maintain BART. To do so, the State must demonstrate that this emissions trading program or other alternative measure will achieve greater reasonable progress than would be achieved through the installation and operation of BART. To make this demonstration, the State must submit an implementation plan containing the elements listed in Section (e)(2).

8.2 Large Electrical Generating Units

Under 40 CFR §51.308(e)(1)(i)(B) of the Regional Haze Rule, the determination

of BART for fossil fuel fired power plants having a total generating capacity of greater than 750 megawatts must be made pursuant to the guidelines of Appendix Y of this part of the CFR (Guidelines for BART Determinations under the Regional Haze Rule). The EPA adopted those guidelines on July 6, 2005. The guidelines provide a process for making BART determinations that States can use in implementing the regional haze BART requirements on a source-by-source basis, as provided in 40 CFR 51.308(e)(1). States must follow the guidelines in making BART determinations on a source-by-source basis for power plants of greater than 750 megawatts (MW) but are not required to use the process in the guidelines when making BART determinations for other types of sources.

8.3 The Federal BART Rule

The EPA finalized the federal BART facility-by-facility requirements of the Regional Haze Rule on June 15, 2005. The BART program requires states to develop an inventory of sources within each state or tribal jurisdiction that would be eligible for controls as described above. The rule contains elements that:

- Outline methods to determine if a source is eligible for the application of controls
- Outline methods to determine if these sources are "reasonably anticipated to cause or contribute to haze"
- Define the methodology for conducting BART control analysis
- Provide presumptive limits for electricity generating units (EGUs) larger than 750 Megawatts, and
- Provide a justification for the use of the Clean Air Interstate Rule (CAIR) as BART for CAIR affected EGUs.

The first step in the BART process is identifying sources that are "BART-eligible." BART-eligible sources are those that:

- Fall into one of 26 specific source categories identified in the Clean Air Act;
- Have units that were in existence on August 7, 1977, but had not been in operation for more than fifteen years as of that date (prior to August 7, 1962); and
- Have a potential to emit (PTE) 250 tons per year (TPY) or more of any single visibility impairing pollutant. These pollutants include SO_2, NOx, VOCs, PM_{10} and ammonia. States are allowed flexibility in addressing ammonia and VOC sources. New York State has chosen not to include controls for ammonia and VOC's as a part of its BART and regional haze programs.

Many facilities in the MANE-VU region that were potentially BART-eligible were

relatively small emission sources with potential emissions that exceed the statutory threshold of 250 tons per year or more, but with actual emissions of visibility impairing pollutants of well under 250 tons in any year. Facilities such as these can accept a permit limitation, restricting their emissions to less than 250 tons per year. Any otherwise BART-eligible facility may "cap-out" of BART. New York will provide for this through the placement of emission restrictions in each facility's Title V permit. Figure 8-1 shows tentative NYS BART sources.

According to 40 CFR §51.308(e)(1)(ii)(C) of the Regional Haze Rule, states are not required to make a determination of BART for SO2 or for NOx if a BART eligible source has the potential to emit less than 40 tons per year of such pollutants, or for PM10 if a BART eligible source emits less than 15 tons per year of such pollutant.

As allowed by 40 CFR §51.308(e)(1)(iii) of the Regional Haze Rule, if it is determined in establishing BART that technological or economic limitations exist on the applicability of measurement methodology to a particular source which would make the imposition of an emission standard infeasible, a design, equipment, work practice, or other operational standard, or combination thereof, requiring the application of BART may be proposed by the facility owner. Such standard, to the degree possible, is to set forth the emission reduction to be achieved by implementation of such design, equipment, work practice or operation, must provide for compliance by means which achieve equivalent results, and must be approved by the Department.

Once a source is found to be "eligible" under the BART program, states must determine if that facility causes or contributes to the formation of haze at any Class I area. Three methods can be used to determine if a source reasonably causes or contributes to regional haze in any Class I area, including:

- Individual source assessment (Exemption Modeling) – This assessment uses CALPUFF or other EPA approved modeling methods. Results of modeling would be compared to natural background conditions. The EPA defined "cause" as an impact of 1.0 deciview or more and "contribute" as an impact of 0.5 deciview or more. However, states have the discretion to set lower thresholds for contribution.

- Cumulative assessment of all BART "eligible sources" – Under this approach, all eligible sources can be determined to be subject to BART. This method could also be used to analyze an area's contribution to visibility impairment and demonstrate that no sources are subject, based on cumulative modeling.

- Assessment based on model plants – This assessment allows states to

exempt sources with common characteristics that are determined not to impair visibility at Class I areas.

The EPA provided the states with a great deal of flexibility in implementing the BART program. The Department's BART rule will provide for the assessment of individual source contributions (Option 1 above). New York has preliminarily identified several sources that are considered to be "BART-eligible" based on modeling conducted by MANE-VU. However, New York's BART rule is expected to provide source owners with the opportunity to conduct "exemption modeling" that demonstrates that the candidate sources do not cause or contribute to visibility impairment in Class I areas. The criteria (i.e., threshold by deciview) by which a source may be shown to cause or contribute are also a part of New York's draft rule.

Owners of sources that have been identified as BART-eligible, and have been found to cause or contribute to haze in a Class I area, must conduct an engineering review to determine if the installation of new control requirements is appropriate. This review must take into consideration five factors:

- Cost
- Energy and non-air environmental impacts
- Existing controls at the source
- Remaining useful life of source
- Visibility improvement reasonably expected from the technology

Once this assessment has been completed, BART controls for each source are identified. In some cases, the installation of controls or other emission reduction measures may need to be undertaken. Another possibility is that controls already in place may be determined to qualify as BART, due, in most cases, to a higher-than-reasonable cost associated with installing additional controls. Other outcomes may include a determination that the source may be shutting down or that the impact of controls would be insufficient to require the reduction of emissions.

8.4 New York State's BART Rule (6 NYCRR Part 249)

The Department is in the process of adopting a regulation to codify the BART requirements. As provided in 40 CFR §51.308(e)(1)(iv), BART must be in operation for each applicable source as expeditiously as practicable but in no event later than five years after approval of the Regional Haze SIP revision by the EPA. The Department's BART rule will require that each source subject to BART must submit its plan detailing how it will comply with the BART requirements by October 1, 2010. The plan must show that the required BART controls will be installed by a July 1, 2013 deadline. July 1, 2013 is also the date

by which sources that wish to avoid BART controls must "cap out" or shut down. The requirement to implement BART by July 1, 2013 is within the 5-year requirement for the installation of controls.

Requirements for implementing BART controls or achieving emission reductions from a BART-eligible source, along with compliance schedules, will be placed in each source's air quality permit. Most of these sources operate under Title V permits per 6 NYCRR Part 201 and 40 CFR Part 70. Under New York's Title V permitting program, conditions placed in permits must have a basis in a regulation containing the requirements for BART controls, necessitating the promulgation of a BART rule as mentioned above. State-level BART rulemaking will provide New York with the necessary authority to require BART analyses, install controls, develop compliance schedules, recordkeeping, reporting and other elements required under the federal haze program. The rule mirrors the federal BART regulation except as it pertains to certain CAIR sources, and will require that cost, energy and non-air environmental impacts, existing controls at the source, remaining useful life of source and visibility improvement reasonably expected from the technology be considered in the BART analysis.

The area in which New York's BART rule will vary from the federal rule is that CAIR sources that meet the criteria for being "BART eligible" will not be exempted from the BART rule. Those sources meeting these criteria that cause or contribute to haze in Class I areas will be required to conduct a review to determine if the installation of new control requirements is appropriate.

As provided in 40 CFR §51.308(e)(1)(v), the Title V operating permits for BART sources must include a requirement that each source maintain the control equipment and establish procedures to ensure such equipment is properly operated and maintained. This requirement will be included in the Title V operating permit for each source subject to BART.

The projected schedule for completing this rulemaking is as follows:

Proposal in the NY State Register:	October, 2009
Package to Environmental Board:	February, 2010
File Regulation with the Secretary of State:	April, 2010
Regulation Effective Date:	May, 2010

This schedule is included in the comprehensive rulemaking timeline that appears in Table 10-5 of this document.

After the rulemaking is complete, the final list of BART-eligible facilities will be identified and the applicability of BART controls determined. During this period, FLMs will be provided a 60-day review period for the BART determinations,

including any BART exemption modeling demonstrations. The permits for these facilities will be modified to include the installation of the necessary controls and a schedule for the operation of any required control equipment developed. The installation of controls, the shutdown of the affected sources, or the imposition of an emission cap accepted by the facility to avoid the need for BART controls will be required to be in place within five years of the EPA's approval of New York's Haze SIP.

Figure 8-1 Tentative NYS BART Sources

The non-EGU sources the are potentially subject to BART requirements are located at the following facilities:

Alcoa Massena Operations (West Plant)

Massena, NY

Kodak Park Division
Rochester, NY

Lafarge Building Materials Inc
Ravena, NY

Lehigh Northeast Cement Company
Glens Falls, NY

Owens-Corning Delmar Plant
Feura Bush, NY

St Lawrence Cement Corp-Catskill Quarry
Catskill, NY

International Paper Ticonderoga Mill
Ticonderoga, NY

EGU sources that are potentially subject to BART requirements are located at the following facilities:

Arthur Kill Generating Station
Staten Island, NY

Bowline Point Generating Station
West Haverstraw, NY

Con Ed-59th St Station
New York, NY

Danskammer Generating Station
Newburgh, NY

Roseton Generating Station
Newburgh, NY

EF Barrett Power Station
Island Park, NY

Northport Power Station
Northport, NY

Oswego Harbor Power
Oswego, NY

Poletti Power Project
Astoria, NY

Port Jefferson Energy Center
Port Jefferson, NY

Ravenswood Generating Station
Queens, NY

Samuel A Carlson Generating Station
Jamestown, NY

Trigen Syracuse Energy Corporation
Syracuse, NY

8.5 Anticipated Visibility Improvement as a Result of BART

MANE-VU conducted modeling analyses of BART-eligible sources using CALPUFF in order to provide a regionally consistent foundation for assessing the degree of visibility improvement which could result from installation of BART controls. It is anticipated that, once BART analyses as required by New York's regulation have been conducted, and the applicable emission controls are installed, a significant reduction in emissions of visibility impairing pollutants will occur. Although New York has no Class I areas, the emissions from its sources are contributory to regional haze in several states that contain Class I areas. Through the collaborative effort described in Section 9, these Class I states have identified control measures that should be applied in order to meet the Reasonable Progress Goals out until 2018. These measures include the application of Best Available Retrofit Technology (BART) to eligible facilities to which New York State is committed through this SIP. The implementation of these measures will, according to the analyses conducted by the Class I areas that developed the "Ask", provide the necessary visibility improvement to meet the Reasonable Progress Goals that will allow the required visibility level for the initial period (i.e., 2018) to be achieved, as well as the natural visibility levels in 2064.

9.0 Reasonable Progress Goals (RPGs)

40 CFR Section 51.308(d)(1) of the EPA's Regional Haze Rule requires each state containing a Class I area to establish, for each Class I area within the state, visibility goals (expressed in deciviews) that provide for reasonable progress toward achieving natural visibility. In addition, the EPA released guidance on June 7, 2007 to use in setting reasonable progress goals. The goals must provide improvement in visibility for the most impaired days, and ensure no degradation in visibility for the least impaired days over the initial SIP period. Each Class I state must also provide an assessment of the number of years it would take to attain natural visibility conditions if improvement continues at the rate represented by the reasonable progress goal (RPG).

This SIP covers the first planning period which ends in 2018.

Under 40 CFR Section 51.308 (d)(1)(iv) consultation is required in developing reasonable progress goals. 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 toward natural visibility conditions."

In developing RPGs, Class I states must consider four factors (cost, time needed, energy and non-air quality environmental impacts, and remaining useful life). The Class I states also must show that they considered the uniform rate of improvement and the emission reduction measures needed to achieve the RPG for the period covered by the implementation plan. If the state proposes a rate of progress slower than the uniform rate of progress, it must assess the number of years it would take to attain natural conditions if visibility improvement continues at the rate proposed.

9.1 Consultation and Agreement with Other States' Goals

The MANE-VU states of New Jersey, New Hampshire, Maine and Vermont sent letters to New York in the spring of 2007 stating that, based on 2002 emissions and modeling results, New York contributed to visibility impairment in Class I areas in those states. While New York has no Class I areas, these MANE-VU Class I states asked for New York State's continued participation in further consultation with these states during the summer of 2007. New York agreed in

written responses back to these states. Consistent with the Regional Haze Rule requirements, New York State has consulted, and continues to consult, with states containing Class I areas that are or may be impacted by emission sources within New York State as they established reasonable progress goals for each Class I area within their state. More detail on consultation is provided in Appendix F, *Summary of Consultation Meetings and Conferences*.

As a result of the consultation process, it was the Department's expectation that each state whose Class I areas are affected by emissions in New York would formally provide a notification by letter of the measures that they expected would be taken by New York to meet the reasonable progress goals for the initial period of the SIP (i.e., 2018) as well as attaining natural haze conditions by 2064. Since the consultation process began with a letter from MANE-VU Class I states advising New York that its emissions caused or contributed to regional haze within each state's Class I areas and requesting participation in the consultation process, it was anticipated that the Department would receive a similar letter from each of these states (New Jersey, New Hampshire, Maine and Vermont) advising that the consultation process had resulted in the recommendation that certain, specific measures would be required in order to meet the reasonable progress goals for each Class I area in these states. Although not all of the Class I states whose visibility is affected by emissions from New York have provided such a letter, the Department received a letter dated May 16, 2008 from the State of New Hampshire summarizing New York State's consultation process via MANE-VU. The information in New Hampshire's consultation letter (Appendix X), is indicative of the measures that must be taken.

Except as provided below, the reasonable progress modeling used by MANE-VU states to establish reasonable progress goals reflect the G2 and Base K 2018 emissions inventories for the VISTAS and Midwest RPO regions, respectively. Based on consultation with those regions, those inventories reflected the measures States in those regions consider to be reasonable to implement by 2018 including CAIR, BART, and other federal and state requirements.

With the implementation of the measures described in Section 9.4, New York will meet the Reasonable Progress Goals and long-term strategy requirements developed for New York's regional haze SIP at MANE-VU's Class I areas. New York commits to satisfying its responsibilities under the Regional Haze Program, the Act, and this SIP.

MANE-VU's Contribution Assessment (Appendix A) indicated that the dominant contributor to visibility impairment is SO2. Control of SO2 emissions, therefore, will yield the greatest near-term benefit. It has been determined that the control measures listed above and the costs of compliance are reasonable, based on available control technologies. New York State is committed to reducing emissions at least equal to those predicted in the model, through the measures

described above. These are reasonable measures designed to meet our CAA Section 110(a)(2)(D) obligations.

Except as provided below, the reasonable progress modeling used by MANE-VU states to establish reasonable progress goals reflects the G2 and Base K 2018 emissions inventories for the VISTAS and Midwest RPO regions, respectively. Based on consultation with those regions, those inventories reflect the measures states in those regions consider to be reasonable to implement by 2018 including CAIR, BART, and other federal and state requirements.

Reasonable progress goals are based on an analysis of visibility conditions, including a comparison of baseline conditions to natural visibility conditions, which quantifies the improvement necessary to achieve natural visibility conditions by the year 2064 (*Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Rule*, Appendix C). The uniform rate of improvement per year needed to achieve natural background visibility conditions is also shown in Table 9-1 below.

Table 9-1 - Uniform Rate of Progress

Class I Area (2000-2004)	2000-2004 Baseline Visibility (deciviews) (20% Worst Days)	Natural Visibility Condition (deciviews) (20% Worst Days)	Deciview Improvement Needed by 2018 from 2004	Deciview Improvement Needed by 2064	Uniform Rate of Improvement Annually
Acadia National Park, Maine	22.9	12.4	2.4	10.5	0.174
Moosehorn National Wildlife Refuge, Maine	21.7	12.0	2.3	9.7	0.162
Roosevelt/Campobello International Park, Maine & New Brunswick, Canada	21.7	12.0	2.3	9.7	0.162
Great Gulf Wilderness Area, New Hampshire	22.8	12.0	2.5	10.8	0.180
Presidential Range/Dry River Wilderness Area, New Hampshire	22.8	12.0	2.5	10.8	0.180
Lye Brook Wilderness Area, Vermont	24.5	11.7	3.0	12.8	0.212
Brigantine Wilderness Area, New Jersey	29.0	12.2	3.9	16.8	0.280

Source: VIEWS (http://vista.circa.colostate.edu/views/), prepared on 7/06/06

States containing Class I areas are required to show that visibility improvements will ultimately meet the 2064 goal. States without Class I areas contribute to

visibility in these areas as well, and so their emissions must be included in the analysis. The State of New York does not contain any Class I areas.
In determining the reasonable progress goal for each Class I area, both natural conditions and baseline visibility for the 5-year period from 2000 through 2004 were calculated in conformance with an alternative method recommended by the IMPROVE Steering Committee.[7] As explained below, the reasonable progress goals established for the Class I area(s) affected by emissions from New York provide for at least as much visibility improvement by 2018 as would be achieved by the uniform rate of progress shown above.

9.2 Reasonable Progress Goals for Class I Areas

In accordance with the requirements of 40 CFR Section 51.308(d)(1), this Regional Haze SIP addresses the necessary measures that New York State must take to meet the reasonable progress goals for each Class I area located in MANE-VU for the period of the implementation plan. Tables 9-2a and 9-2b below provide a summary of Reasonable Progress Goals located within MANE-VU states in which Class I areas are located.

Table 9-2a - Reasonable Progress Goals—20 Percent Worst Days

Class I Area	Baseline Visibility (deciviews) (20% worst days 2000-2004)	Reasonable Progress Goals, 20% worst days (Expected deciview level by 2018)	Deciview improve-ment expected by 2018	Natural Visibility Conditions (20% worst days)
Acadia National Park	22.9	19.4	3.5	12.4
Roosevelt/Campobello International Park	21.7	19.0	2.7	12.0
Moosehorn National Wildlife Refuge	21.7	19.0	2.7	12.0
Presidential Range/Dry River Wilderness Area	22.8	19.1	2.7	12.0
Great Gulf Wilderness Area	22.8	19.1	2.7	12.0
Lye Brook Wilderness Area, Vermont	24.5	20.9	3.6	11.7
Brigantine Wilderness Area, New Jersey	29.0	25.1	3.9	12.2

[7] "Baseline and Natural Visibility Conditions, Considerations and Proposed Approach to the Calculation of Baseline and Natural Visibility Conditions at MANE-VU Class I Areas," NESCAUM, December 2006

Table 9-2b - Reasonable Progress Goals—20 Percent Best Days

Class I Area	Baseline Visibility (deciviews) (20% Best Days)	Reasonable Progress Goals, 20% best days (deciviews) (expected by 2018)	Deciview improvement expected by 2018	Natural Visibility (20% best days) (deciviews)
Acadia National Park	8.8	8.3	0.5	4.7
Roosevelt/Campobello International Park	9.2	8.6	0.6	5.0
Moosehorn National Wildlife Refuge	9.2	8.6	0.6	5.0
Presidential Range/Dry River Wilderness Area	7.7	7.2	0.5	3.7
Great Gulf Wilderness Area	7.7	7.2	0.5	3.7
Lye Brook Wilderness	6.4	5.5	0.9	2.8
Brigantine Wilderness	14.3	12.2	2.1	5.5

Both natural conditions and baseline visibility for the 5-year period from 2000 through 2004 were calculated in conformance with an alternative method recommended by the IMPROVE Steering Committee.[8] Progress toward the 2018 target will be calculated based on 5-year averages calculated in a manner consistent with the EPA's *Guidance for Tracking Progress Under the Regional Haze Rule* (EPA-454/B-03-004, September 2003) as updated by the alternative method for calculating regional haze recommended by the IMPROVE Steering Committee.

To determine the RPG in deciviews, MANE-VU conducted modeling with certain control measure assumptions. The control measures reflected in these

[8]"Baseline and Natural Visibility Conditions, Considerations and Proposed Approach to the Calculation of Baseline and Natural Visibility Conditions at MANE-VU Class I Areas," NESCAUM, December 2006.

reasonable progress goals are summarized below in Table 9-3. In establishing the reasonable progress goals for 2018, contributing states have the flexibility to submit SIP revisions between now and 2018 as they are able to adopt control measures to implement these goals. This long-term strategy to reduce and prevent regional haze will allow each state up to 10 years to pursue adoption and implementation of reasonable and cost-effective NOx and SO2 control measures as appropriate and necessary.

9.2.1 Consideration of Other Air Quality Requirements

40 CFR Section 51.308 (d)(1)(vi) of EPA's Regional Haze Rule requires that reasonable progress goals represent at least the visibility improvement expected from implementation of other Clean Air Act programs during the applicable planning period.

As documented in the emissions inventory and long term strategy sections of this SIP, the modeling that formed the basis for reasonable progress goals in MANE-VU Class I Areas included an estimate of all of the other programs required by the Clean Air Act. Further information may be found in those sections of this SIP and in the documentation for the MANE-VU modeling.

9.2.2 Rationale for Determining Reasonable Controls

40 CFR 51.308(d)(1)(i)(A) of EPA's Regional Haze Rule 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. The SIP must include a demonstration showing how these factors were taken into consideration in setting the RPGs. These factors are sometimes termed the "four statutory factors," since their consideration is required by the Clean Air Act.

MANE-VU conducted a Contribution Assessment (Appendix A) and developed a conceptual model that showed the dominant contributor to visibility impairment at all MANE-VU Class I areas during all seasons in the base year was particulate sulfate formed from emissions of SO2. While other pollutants, including organic carbon, will need to be addressed in order to achieve the national visibility goals, MANE-VU's contribution assessment suggested that an early emphasis on SO2 would yield the greatest near-term benefit. Therefore, it is reasonable to conclude that the additional measures considered in setting reasonable progress goals require reductions in SO2 emissions.

The MANE-VU Contribution Assessment indicates that emissions from within

MANE-VU in 2002 were responsible for approximately 25 percent of the sulfate at MANE-VU Class I Areas. Sources in the Midwest and Southeast regions were responsible for about 15 to 25 percent each. Point sources dominated the inventory of SO2 emissions. Therefore, MANE-VU's long-term strategy includes additional measures to control sources of SO2 both within the MANE-VU region and in other states that were determined to contribute to regional haze at MANE-VU Class I Areas.

The Contribution Assessment documented the source categories most responsible for visibility degradation at MANE-VU Class I Areas. As described in Section 10, Long Term Strategy, there was a collaborative effort between the Ozone Transport Commission and MANE-VU to evaluate a large number of potential control measures. Several measures that would reduce SO2 emissions were identified for further study.

These efforts led to production of the MANE-VU report by MACTEC Federal Programs, Inc., "*Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas*," Final, July 9, 2007, otherwise known as the Reasonable Progress Report (Appendix J). This report provides an analysis of the four statutory factors for five major source categories: electrical generating units (EGUs); industrial, commercial, and institutional (ICI) boilers; cement and lime kilns; heating oil combustion; and residential wood combustion. Table 9-3 summarizes the results of MANE-VU's four-factor analysis for the source categories considered.

Table 9-3 - Summary of Results from Four-Factor Analysis of Different Source Categories

Source Category	Primary Regional Haze Pollutant	Control Measure(s)	Average Cost in 2006 dollars (per ton of pollutant reduction)	Compliance Timeframe	Energy and Non-Air Quality Environmental Impacts	Remaining Useful Life
Electric Generating Units	SO_2	Switch to a low-sulfur coal (generally <1% sulfur); switch to natural gas (virtually 0% sulfur); coal cleaning; flue gas desulfurization (FGD), including wet, spray-dry, or dry.	$775-$1,690 based on IPM® v.2.1.9 * $170-$5,700 based on available literature	2-3 years following SIP submittal	Fuel supply issues, possible permitting issues, reduced electricity production capacity, wastewater issues	50 years or more
Industrial, Commercial, Institutional Boilers	SO_2	Switch to a low-sulfur coal (generally <1% sulfur); switch to natural gas (virtually 0% sulfur); switch to a lower-sulfur oil; coal cleaning; combustion controls; flue gas desulfurization (FGD), including wet, spray-dry, or dry.	$130-$11,000 based on available literature; dependent on size.	2-3 years following SIP submittal	Fuel supply issues, potential permitting issues, control device energy requirements, wastewater issues	10-30 years
Cement and Lime Kilns	SO_2	Fuel switching; flue gas desulfurization (FGD), including wet, spray-dry, or dry; advanced flue gas desulfurization (FGD).	$1,900-$73,000 based on available literature; dependent on size.	2-3 years following SIP submittal	Control device energy requirements, wastewater issues	10-30 years
Heating Oil	SO_2	Switch to lower-sulfur fuel (varies by state)	$550-$750 based on available literature; high degree of uncertainty with this cost estimate	Currently feasible; capacity issues may influence timeframe for implementation of new fuel standards	Increased furnace/boiler efficiency, reduced furnace/boiler maintenance requirements	18-25 years
Residential Wood Combustion	PM	State implementation of NSPS, ban on resale of uncertified devices, installer training certification or inspection program, pellet stoves, EPA Phase II certified RWC devices, retrofit requirement, accelerated changeover requirement or inducement	$0-$10,000 based on available literature	Several years, depending on mechanism for emission reductions	Increased efficiency of combustion device, reduced greenhouse gas emissions	10-15 years

The MANE-VU states reviewed the four-factor analyses presented in the Reasonable Progress Report, consulted with one another about possible control

measures, and concluded by adopting the statements known as the MANE-VU "Ask." These statements identify the control measures that would be pursued toward improving visibility in the region. The following discussions focus on the four basic control strategies chosen by MANE-VU and included in the modeling to establish the reasonable progress goals:

1. Best Available Retrofit Technology (BART),
2. Low-sulfur fuel oil requirements,
3. Emission reductions from specific EGUs, and
4. Additional measures determined to be reasonable.

9.3 Controls Within MANE-VU

In accordance with draft EPA guidance, states must establish baselines from which reasonable progress will be measured. The progress sought is in visibility improvement. However, emission reductions are effectively used as a surrogate for this progress, with visibility improvement assessed over the first five years of the implementation of the haze SIP. If mid-course adjustments are appropriate at that time, the SIP will be revised to provide for any necessary corrections. The baseline year for emissions reductions used by MANE-VU is 2002.

Sulfates have been identified as the major pollutant contributing to visibility impairment in the MANE-VU region, and a number of programs are already in place that include measures to reduce the emission of sulfates and their precursors. Several of these are as follows:

- NYS Acid Deposition Reduction Program
- 6 NYCRR Part 225, Fuel Composition and Use
- The Acid Rain Program
- 2004 Clean Air Nonroad Diesel Rule
- 2007 Clean Diesel Trucks and Buses Rule
- California Low Emission Vehicle Standards
- Emission standards for other engines (highway and non-highway use)
- National Clean Diesel Campaign

These are discussed in detail in Section 10 of this document.

As a part of the haze SIP development effort, MANE-VU, through its contractor MACTEC, conducted a contribution assessment to identify the sources that are significant contributors to visibility impairment in the MANE-VU area and looked for additional control reduction opportunities to reduce the level of haze in Class I areas (See *Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas*, Appendix J).

After beginning the assessment with a more extensive list, the following source categories were selected for further consideration:

- Coal and oil-fired Electric Generating Units (EGUs);
- Point and area source industrial, commercial and institutional boilers (ICI boilers);
- Cement kilns;
- Lime kilns;
- The use of heating oil; and
- Residential wood combustion.

In assessing each of these categories, MACTEC conducted an analysis of economic and environmental impacts of potential control scenarios that could be implemented by MANE-VU states. The purpose of this analysis was to develop information that could be used by the states in producing implementation plans to address regional haze. Each category was evaluated with respect to the four factors described in Section 169A of the Clean Air Act. The factors are:

1. Cost;
2. Compliance timeframe;
3. Energy and non-air quality environmental impacts; and
4. Remaining useful life for affected sources.

The results of this analysis were used to develop the final list of measures that were recommended by Class I states in MANE-VU as being necessary to meet the reasonable progress goal requirements. These measures focus primarily on the reduction of sulfates and particulate matter as a first step during the initial planning period toward reducing visibility reductions to pre-industrial levels.

9.4 Controls Within MANE-VU Selected by Class I States to Meet Reasonable Progress Goals

The reasonable progress goals shown above in Tables 9-2a and 9-2b represent implementation of the regional strategy adopted by MANE-VU on June 20, 2007 entitled, *Statement of the Mid-Atlantic/Northeast Visibility Union (MANE-VU) Concerning a Course of Action Within MANE-VU Toward Assuring Reasonable Progress*" (See Appendix K). These actions, consisting of control and other measures intended to reduce the emissions of visibility impairing pollutants and their precursors, are referred to in the SIP as the "Ask." As such, these goals are intended to reflect the pursuit by MANE-VU States, including New York, of a course of action including pursuing the adoption and implementation of the following "emission management" strategies, as appropriate and necessary:

a. Timely implementation of BART requirements, and

b. A 90 percent or greater reduction in sulfur dioxide (SO2) emissions from each of the electric generating unit (EGU) stacks identified by MANE-VU (Appendix P- *List of Top 167 Sources*, dated June 20, 2007) as reasonably anticipated to cause or contribute to impairment of visibility in each mandatory Class I Federal area in the MANE-VU region. If it is infeasible to achieve that level of reduction from a unit, alternative measures will be pursued in such State; and

c. A low sulfur fuel oil strategy in the inner zone states (New Jersey, New York, Delaware, and Pennsylvania, or portions thereof) to reduce the sulfur content of:

   i. Distillate oil to 0.05 percent sulfur by weight (500 ppm) by no later than 2012,
   ii. #4 residual oil to 0.25 percent sulfur by weight by no later than 2012,
   iii. #6 oil to 0.3 – 0.5 percent sulfur by weight by no later than 2012, and
   iv. Further reduce the sulfur content of distillate oil to 15 ppm by 2016; and

d. A low sulfur fuel oil strategy in the outer zone states (the remainder of the MANE-VU region) to reduce the sulfur content of:

   i. Distillate oil to 0.05 percent sulfur by weight (500 ppm) by no later than 2014,
   ii. #4 residual oil to 0.25 percent-0.50 percent sulfur by weight by no later than 2018,
   iii. #6 oil to no greater than 0.5 percent sulfur by weight by no later than 2018, and
   iv. Further reduce the sulfur content of distillate oil to 15 ppm by 2018; and

e. Continued evaluation of other control measures including energy efficiency, alternative clean fuels, and other measures to reduce SO2 and NOx emissions from all coal-burning facilities by 2018 and new source performance standards for wood combustion. These measures and other measures identified will be evaluated during the consultation process to determine if they are cost effective and reasonable.

As stated above, this long-term strategy to reduce and prevent regional haze will allow each state up to 10 years to pursue adoption and implementation of reasonable and cost-effective NOx and SO2 control measures as appropriate and necessary. See Section 9.5, below for a description of how these assumptions were modeled in order to estimate the visibility impact of the MANE-VU "Ask."

9.4.1 New York State Measures

Although New York has no Class I areas, the emissions from its sources are contributory to regional haze in several states that contain Class I areas. Through the collaborative effort described above, these Class I states have identified control measures that should be applied in order to meet the Reasonable Progress Goals out until 2018. These measures include the application of Best Available Retrofit Technology (BART) to eligible facilities as expeditiously as practicable, but no later than January 1, 2013, sulfate reductions from specific source sectors defined in the Clean Air Act, a low-sulfur oil strategy for all sectors (commercial, industrial, and residential), an EGU strategy that targets a 90% sulfate reduction from each of the stacks impacting any MANE-VU Class I area, or a reduction equivalent to that amount within each State, as well as continued evaluation of other control measures to reduce SO2 and NOx emissions.

Specifically, New York State anticipates meeting these goals as follows:

a. Timely implementation of BART requirements

New York is in the process of promulgating 6 NYCRR Part 249 which will contain the requirements for the federal BART rule. This rule will provide the state authority necessary to require BART controls for eligible sources, and will require BART-eligible EGUs to apply BART by July 1, 2013. Promulgation of this rule is expected to be completed by May 2010.

After promulgation is completed, BART requirements will be applied in New York to eligible sources in accordance with federal requirements, including the Class I areas' requested control measures.

b. Ninety percent or greater reduction in sulfur dioxide (SO2) emissions from the 167 electric generating unit (EGU) stacks.

A 90 percent or greater reduction in sulfur dioxide (SO2) emissions from each of the electric generating unit (EGU) stacks identified by MANE-VU comprising a total of 167 stacks as reasonably anticipated to cause or

contribute to impairment of visibility in each mandatory Class I Federal area in the MANE-VU region. If it is infeasible to achieve that level of reduction from a unit, alternative measures will be pursued in such State.

Table 9-4 below identifies the facilities and units in New York State that are contained in the list of 167 stacks. A complete listing of the 167 sources can be found in Appendix P, *List of Top 167 Sources*. Emission reductions for SO2 that are presently expected to occur for the New York sources in Table 9-4 by 2018 range from 100% (for those units shutting down) to 0% (at the present time) for the Oswego facility. Based on present expectations, most other units expect SO2 emission reductions in the 80-95% range.

Other measures, will reduce emissions from those facilities even further, including:

- The reduction of fuel sulfur limits for most types of fuel oil, as discussed below and in Section 10.3,
- The revisions to 6 NYCRR Part 227 that will require RACT for major sources of PM2.5 (those greater than 100 tpy),
- Part 231: New Source Review in Nonattainment Areas and Ozone Transport Region (revisions adopted January 15, 2009),
- MACT under Section 112 of the 1990 CAA Amendments,
- NOx RACT measures for High Electricity Demand Day Units,
- Emission reductions resulting from consent orders, and
- The continued evaluation of other control measures including energy efficiency, alternative clean fuels, and other approaches.

Each of these measures is described in detail in Section 10.3.

Finally, the replacement of equipment at these facilities, such as the construction of a new facility, will result in additional reductions by 2018.

Overall, these measures will reduce emissions significantly, approaching the required 90%. As such, in aggregate, it is expected that the necessary reductions will be achieved to meet this portion of the MANE-VU Class I states' "Ask."

9.4.2 New York State Modeling Reductions

Modeling of emission control strategies for the low sulfur fuel oil strategy outlined above produced the following projections of emissions reductions for 2018:

- A reduction in sulfur from 500 ppm to 15 ppm results in emissions reductions of 7,444 tons per year (TPY). Reducing sulfur content of #4/#6 oil results in 12,385 TPY fewer emissions. Starting with no sulfur controls as a baseline, then reducing the sulfur to 500 ppm results in a 51,929 TPY reduction. Thus, the total TPY reduced as a result of reduced sulfur in oil reductions is 71,759 TPY.

- Point source reductions resulting from BART controls are 19,942 TPY.

- Area source reductions resulting from controls are 51,817 TPY.
- The total emissions being modeled after controls are applied are 13,955 TPY.

Table 9-4 - Units in New York Included in the List of 167 Stacks Identified by MANE-VU for Which 90 Percent or Greater Reductions in Sulfur Dioxide (SO2) Emissions are Recommended

Plant Name	Type	Unit(s)	NOx Control		SO2 Control	
			Existing	Planned	Existing	Planned
C R HUNTLEY[1]	Coal Steam	67,68	LNB	SNCR	Low Sulfur Coal	Low S Coal, Trona Injection and Baghouse (w/ 63 - 66 80 % control) with Dunkirk 14,169 ton cap
C R HUNTLEY[1]	Coal Steam	63 through 66	LNB	Shutdown	Low Sulfur Coal	Shutdown
DANSKAMMER	O/G Steam	4	LNB & OFA	Nothing additional planned	None	Trona Injection and Baghouse
DUNKIRK[1]	Coal Steam	3,4	LNB & OFA	SNCR	Low Sulfur Coal	Low S Coal, Trona Injection and Baghouse (80 % control) with Huntley 14,169 ton cap
GOUDEY	Coal Steam	11,12,13	Burners out of service	SCR	None	FGD Scrubber (95 % control)
GREENIDGE	Coal Steam	6	SNCR/SCR	SNCR/SCR Hybrid	Dry scrubber w/lime injection	FB Dry Scrubber (95 % control)
NORTHPORT	O/G Steam	3	OFA System-wide averaging	New plant to be constructed	Low S Fuel	New plant to be constructed
OSWEGO	O/G Steam	5	Emission limit	Emission limit	Fuel S Limit (Oil)	Fuel S Limit (Oil)

ROCHESTER 7	Coal Steam	3,4	SNCR	Shutdown	None	Shutdown
ROSETON	O/G Steam	1	System-wide averaging	Nothing planned	Fuel S Limit	Trona Injection and Baghouse (w/ 63 - 66 80 % control)
ROSETON	O/G Steam	2	System-wide averaging	Nothing planned	Fuel S Limit	Trona Injection and Baghouse (w/ 63 - 66 80 % control)

Notes: [1]Consent order requires NOx and SO2 emissions reductions by 2013. Controls not yet determined.

c. Low sulfur fuel oil strategy in New York

A low sulfur fuel oil reduction strategy will be implemented to reduce the sulfur content to specific limits by 2012 and 2016. 6 NYCRR Part 225, which contains the state's fuel sulfur limits, will be revised to incorporate these lower fuel sulfur limits, thus implementing this strategy. The expected schedule for promulgation of these measures is as follows:

Proposal in State Register:	July 1, 2011
Package to Environmental Board:	October 1, 2011
File Regulation with the Secretary of State:	November 14, 2011
Regulation Effective Date:	December 31, 2011

This schedule is based on EPA approval of the SIP within a year after it is submitted. If the EPA does not approve the SIP within a year, the schedule is subject to change.

d. Continued evaluation of other measures

The evaluation of other control measures, including energy efficiency, alternative clean fuels, and other measures to reduce SO2 and NOx emissions from all coal-burning facilities by 2018 and new source performance standards for wood combustion, will be continued. This is expected to take place on an ongoing basis, and will be more formally assessed during the five-year reassessment of the effectiveness of the regional haze SIP required under 40 CFR Section 51.308(g). For example, MANE-VU considered how to best deal with residential wood combustion and outdoor wood boilers. Although neither have significant sulfate emissions, both of these source categories are sources of organic carbon and direct particulate matter that also impact visibility. Because of the nature of these sources and the varied rates of use among states, it was recommended that the regulation of woodburning appliances be left to each state rather than being part of a regional strategy. New York State is currently developing a rulemaking and regulatory program to control

outdoor wood boilers to address a category of sources that is of concern to many states, especially those in the Northeast.

In addition to the above measures, a number of measures intended to reduce the emissions of VOCs will be implemented as a part of the ozone SIPs that have been submitted to EPA. VOCs are precursors to some of the pollutants that cause regional haze and, as such, this reduction will also have a positive impact on the impairment of visibility in Class I areas as well as others. Although these measures are not part of New York's commitments for the purposes of this SIP, additional VOC control measures are expected to have a positive effect on visibility impairment.

Table 9-5 below lists the New York State On-The-Books (OTB) and On-The-Way (OTW) VOC control measures.

Table 9-5 - New York State OTB/OTW VOC Control Measures in the 8-Hour Ozone SIP

OTB/OTW Control Measures
6 NYCRR Part 228- Adhesives and Sealants -effective 7/2010
6 NYCRR Part 241- Asphalt Formulation -effective 7/2010
6 NYCRR Part 212.10- Asphalt Production -effective 8/2010
6 NYCRR Part 235- Consumer Products -effective 10/15/09
6 NYCRR Part 239- Portable Fuel Containers -effective 7/30/09

9.5 Visibility Impacts of Additional Reasonable Controls

40 CFR Section (d)(1)(i)(A) of the EPA's Clean Air Visibility Rule requires that in establishing reasonable progress goals for each Class I area, each Class I 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. The analysis performed by the Class I states impacted by emissions from New York is presented in Appendix N, *MANE-VU Basis for Reasonable Controls*, of this document for reference.

Preliminary modeling was conducted by NESCAUM on behalf of the MANE-VU Class I states to estimate the impact of various elements of the MANE-VU "Ask"

as described above. This modeling is described in NESCAUM's report entitled *MANE-VU Modeling for Reasonable Progress Goals: Model Performance Evaluation, Pollution Apportionment, and Control Measure Benefits* (February 2008, Appendix R).

NESCAUM also conducted additional revised modeling to assess combined impacts. This modeling is described in NESCAUM's report entitled *2018 Visibility Projections* (March 2008, Appendix V). The following information about the effects of specific strategies is taken from those reports.

NESCAUM evaluated the visibility benefits of the potential control strategies that go beyond the "On the Books/On the Way" controls already required by actions to implement other requirements of the Clean Air Act. This section explains assumptions used to model the impact of potential control strategies and describes the combined potential visibility benefits of all the strategies based on CMAQ modeling. As with all modeling, emissions estimates and modeling results for 2018 entail uncertainty, and further evaluation may be conducted as part of the SIP report required in five years under 40 CFR Section 51.308(g). If reasonable progress requirements are not met, New York will submit a revision of its Regional Haze SIP with the necessary corrections as prescribed in the Federal rule.

Appendix N, *MANE-VU Basis for Reasonable Controls,* of this document discusses the basis for determining that the measures described in the MANE-VU "Ask" are considered to be reasonable.

9.5.1 Model Performance

CMAQ modeling was conducted for 2002 by cooperative modeling efforts from NYSDEC, UMD, NJDEP, Rutgers, VADEP, and NESCAUM and performance for PM2.5 species and visibility was examined. Measurements from IMPROVE and STN networks were paired with model predictions by location and time for evaluation. These comparisons showed that predicted PM2.5 sulfate and measured sulfate were in a good 1:1 linear relationship. Paired organic carbon (OC) concentrations exhibited a weak linear distribution. CMAQ tended to overestimate elemental carbon (EC) and fine soil concentrations. The emission inventory data may be the main cause for the weaker linear relationships between prediction and measurement.

Because sulfate is the dominant PM2.5 species, modeled PM2.5 showed a relatively strong near 1:1 linear relationship. Generally, the northern region of the area modeled displayed stronger correlations than did the southern region. For the MANE-VU region, CMAQ was shown to perform best for PM2.5 sulfate, followed by PM2.5, EC, nitrate, OC, and then fine soil.

Regional haze modeling also required a CMAQ performance evaluation for aerosol extinction coefficient (Bext) and the haze index. Modeled daily aerosol extinction at each IMPROVE site was calculated following the IMPROVE formula with modeled daily PM2.5 species concentration and relative humidity factors from IMPROVE. The approaches used here and throughout the analysis have used natural background visibility estimates and the haze index following EPA Guidance.

A paired comparison between prediction and measurement of daily Bext showed a near 1:1 linear relationship. CMAQ prediction of the Bext agreed well with IMPROVE observation because CMAQ performed well on sulfate, which dominates aerosol extinction. Further, the modeled haze index (HI) was calculated based on modeled Bext. A paired comparison between CMAQ prediction and IMPROVE measurement for 2002 of HI values at seven Class I sites in the eastern U.S.. Acadia and Moosehorn showed the best model performance. The poorest model performance occurred at Lye Brook, which is the closest area to New York State, and Shenandoah. However, since sulfates comprise the largest contribution to visibility impairment, it would be reasonable to expect that modeling results would provide good estimates of the effectiveness of the control strategies proposed in New York's SIP for both 2002 and the 2018 planning year.

A state-specific assessment of the performance of the models that were used is not available and would not be meaningful given the role that transport plays over very long distances. All modeling was done on a regional basis. However, given the good performance of the models as they relate to the impacts of SO2 emissions on haze, which has been shown to be overwhelmingly the most significant, it is possible to infer each states' contributions in a general sense by examining the relative emissions in New York to the total for the region. These emissions appear in Tables 7-1 through 7-6 which present the relative emissions from New York State sources compared to MANE-VU sources in total.

9.6 Modeling Impacts of BART Controls on Former Non-CAIR Sources in MANE-VU

Although many states had not completed BART determinations for non-CAIR BART-eligible sources at the time regional modeling was conducted, NESCAUM did include in the modeling a reasonable estimate of the effect of BART on other (non-CAIR) sources within MANE-VU.

To assess the impacts of the implementation of BART on non-CAIR sources in MANE-VU, NESCAUM estimated reductions for eight BART-eligible facilities. A survey of state staff indicated that these eight units would likely be controlled

under BART alone. These states provided potential control technologies and levels of control, which were in turn incorporated into the 2018 emission inventory projections.

Table 9-6 lists the emissions for the BART-eligible sources at eight facilities that were included in modeling used to set reasonable progress goals.

9.7 Controls Outside of MANE-VU Selected to Meet Reasonable Progress Goals

The reasonable progress goals shown above represent implementation of the statement adopted by MANE-VU on June 20, 2007 and entitled, *Statement of the Mid-Atlantic/Northeast Visibility Union (MANE-VU) Concerning a Request for a Course of Action by States Outside MANE-VU Toward Assuring Reasonable Progress* (See Appendix S).

The states outside MANE-VU to whom this request was addressed were identified in the MANE-VU Contribution Assessment as those states contributing at least 2 percent of the sulfates at MANE-VU Class I areas in 2002. This includes the following states outside MANE-VU: Georgia, Illinois, Indiana, Kentucky, Michigan, North Carolina, Ohio, South Carolina, Tennessee, Virginia, and West Virginia.[9]

The MANE-VU June 20, 2007 Statement requested that the above-listed states outside MANE-VU pursue the adoption and implementation of the following control strategies, as appropriate and necessary:

- Timely implementation of BART requirements;

- A 90 percent or greater reduction in sulfur dioxide (SO2) emissions from each of the electric generating unit (EGU) stacks identified by MANE-VU (See Appendix P, *List of Top 167 Sources*, dated June 20, 2007) as reasonably anticipated to cause or contribute to impairment of visibility in each mandatory Class I Federal area in the MANE-VU region. If it is infeasible to achieve that level of reduction from a unit, alternative measures will be pursued in such State;

- The application of reasonable controls on non-EGU sources resulting in a 28 percent reduction in non-EGU SO2 emissions relative to on-the-books, on-the-way 2018 projections used in regional haze planning,

[9] 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.

by 2018, which is equivalent to the projected reductions MANE-VU will achieve through its low sulfur fuel oil strategy; and

- Continued evaluation of other measures including measures to reduce SO2 and NOx emissions from all coal-burning facilities by 2018 and promulgation of new source performance standards for wood combustion. These measures and other measures identified will be evaluated during the consultation process to determine if they are reasonable.

These measures and other measures identified were evaluated prior to and during the consultation process and the above course of action was determined to be reasonable. Assumptions about the implementation of these measures are represented by the inventory and modeling assumptions described in this section. As stated above, this long-term strategy to reduce and prevent regional haze will allow each state up to 10 years to pursue adoption and implementation of reasonable and cost-effective NOx and SO2 control measures as appropriate and necessary.

In addition to the above controls in the U.S., the MANE-VU Class I states determined that it was reasonable to include anticipated emissions reductions in Canada in the modeling used to set reasonable progress goals. Six coal-burning EGUs in Canada totaling 6500MW are scheduled to be shut down and replaced with nine natural gas turbine units with Selective Catalytic Reduction (SCR) before 2018.

See Section 9.5 for a description of how these emissions controls were modeled in order to estimate the visibility impact of the MANE-VU “Ask.”

Table 9-6 - Estimated SO2 Emissions from Non-EGU BART-Eligible Facilities Located in New York Used in Final Modeling

State	Facility Name	Unit Name	SCC Code	Plant ID (from the MANE-VU Inventory)	Point ID (from the MANE-VU Inventory)	Facility Type	2002 SO2 Emissions (tons)	2018 SO2 Emissions (tons)
NY	KODAK PARK DIVISION	U00015	10200203	8261400205	U00015	Chemical Manufacturer	23798	14216
NY	LAFARGE BUILDING MATERIALS INC	41000	30500706	4012400001	041000	Portland Cement	14800	4440

9.8 Implementation of MANE-VU's Low Sulfur Fuel Strategy

The MANE-VU states agreed through consultations to pursue a low sulfur fuel strategy within the region. This phased strategy would be implemented in two steps. However, both components of the strategy are to be fully implemented by 2018.

NESCAUM initially analyzed both steps of the program as separate strategies, but it is the combined benefit of implementing the program that is relevant to the question of program benefits in 2018. To estimate the total 2018 emissions reductions from this strategy, 2018 OTB/OTW SO_2 emissions were reduced from all MANE-VU non-EGU sources burning #1, #2, #4, #5, or #6 oil. Emissions reductions reflected lowering the sulfur content in fuel from its original level to 0.015 percent for #1 and #2 oil; to 0.25 percent for #4 oil; and to 0.5 percent for #5 and #6 oil.

The first phase of the MANE-VU low sulfur fuel strategy requires the lowering of fuel-sulfur content in distillate (No. 2 oil) from current levels that range between 2,000 and 2,300 ppm down to 500 ppm by weight. It also restricts the sale of heavier blends of residual oil (No. 4 fuel oil and No. 6 bunker fuels) that have sulfur content greater than 0.25 percent sulfur and 0.5 percent sulfur by weight, respectively.

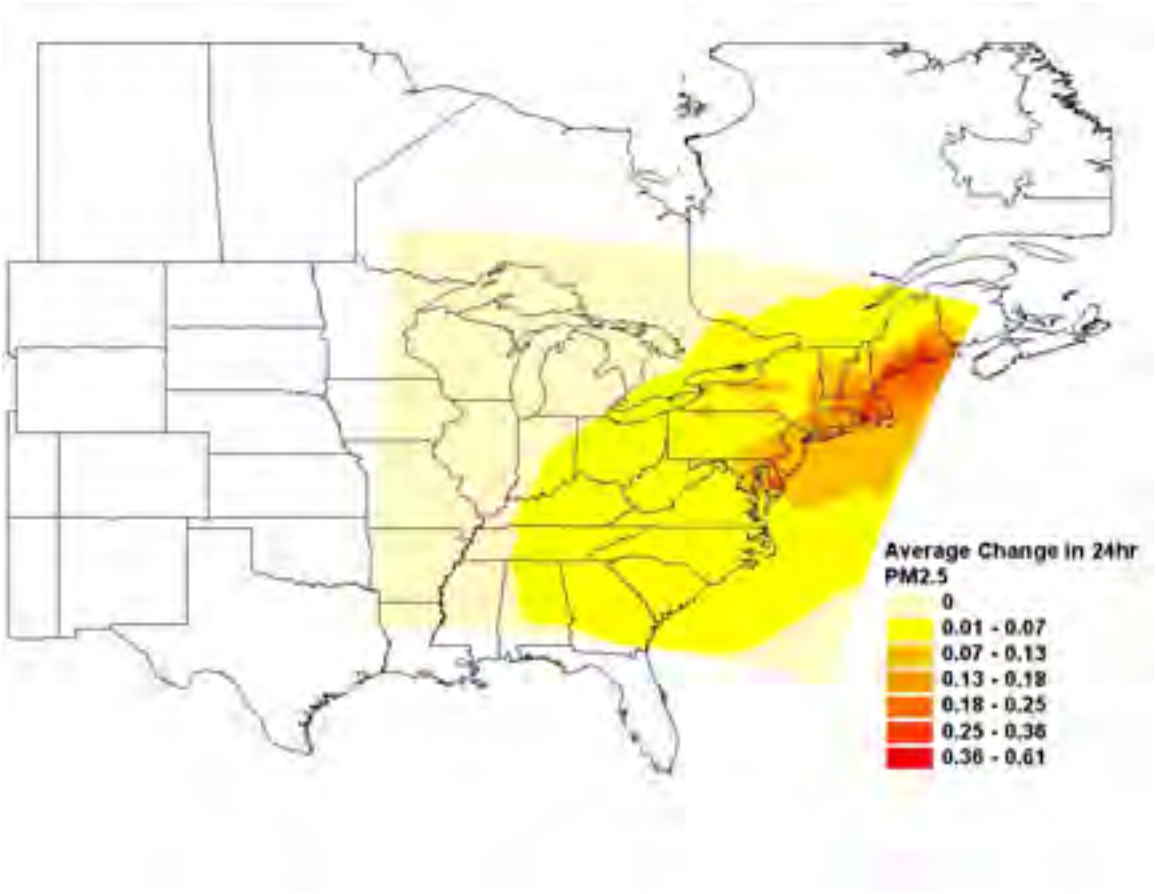
The second phase of the strategy further reduces the fuel-sulfur content of the distillate fraction to 15 ppm sulfur by weight. The two phases of the MANE-VU low sulfur fuel strategy are to be implemented in sequence with slightly different timing for an "inner zone"[10] generally corresponding to the I-95 corridor and the remainder of MANE-VU. All states, however, have agreed to pursue reductions that would take place no later than 2018. Based on the fuel sulfur limits within the first phase of the strategy, MANE-VU estimated a decrease of 140,000 tons of SO2 emitted from distillate combustion and a decrease of 40,000 tons of SO2 from residual combustion in MANE-VU.

The second phase of the MANE-VU low sulfur fuel strategy further reduces the sulfur content of distillate from 500 ppm to 15 ppm while keeping the sulfur limits on residual oils to 0.25 percent and 0.5 percent for No. 4 and No. 6 oils, respectively. By lowering the distillate fuel sulfur limit from 500 ppm to 15 ppm, MANE-VU estimates an additional reduction of 27,000 tons of SO2 emissions in MANE-VU from distillate combustion in 2018.

[10] The inner zone includes New Jersey, Delaware, New York City, and potentially portions of eastern Pennsylvania.

Figure 9-1 shows the full benefit of the MANE-VU fuel strategies being considered relative to the “On The Books/On The Way” baseline. NESCAUM used the concentration changes illustrated in Figure 9-1 to estimate the visibility benefits for this strategy. Because the fuel sulfur program only affects sources within MANE-VU, that region sees the largest $PM_{2.5}$ reduction and the greatest visibility benefits.

Figure 9-1 - Average Change in 24-hr $PM_{2.5}$ Due to Low Sulfur Fuel Strategies Relative to OTB/OTW (ug/m^3)



9.9 Impacts of Reducing Emissions of SO2 from 167 EGU Stacks

SO2 emissions from power plants are the single largest sector contributing to the visibility impairment experienced in the Northeast's Class I areas. The SO2 emissions from power plants continue to dominate the inventory. Sulfate formed through atmospheric processes from SO2 emissions are responsible for over half the mass and approximately 70-80 percent of the extinction on the worst visibility days (NESCAUM's Contribution Assessment and Conceptual Model).

In order to ensure that EGU controls are targeted at those EGUs with the greatest impact on visibility in MANE-VU, a modeling analysis was conducted to determine which sources those were. A list of 167 EGU stacks was developed that includes the 100 largest impacts at each MANE-VU Class I site during 2002. Emissions from the list of 167 EGU stacks can be found in Figure A-2 of Appendix A

(Appendix W of this document) of the report entitled, *Documentation of 2018 Emissions from Electric Generating Units in the Eastern United States for MANE-VU's Regional Haze Modeling*. MANE-VU requested 90 percent control on all units emitting from those stacks by 2018 as part of consultations within MANE-VU and with other RPOs.

Preliminary modeling showed that requiring SO2 emissions from these 167 EGU stacks to be reduced by 90 percent could reduce 24-hour PM2.5 concentrations. NESCAUM modeled 2018 emissions for the 167 EGU stacks in the Northeast, Southeast, and Midwest at levels equal to 10 percent of their 2002 emissions. NESCAUM used CMAQ to model sulfate concentrations in 2018 after implementation of this control program and converted sulfate concentrations to $PM_{2.5}$ concentrations. Figure 9-2 displays the average change in 24-hr PM2.5.

Figure 9-2 - Preliminary Estimate of Average Change in 24-hr PM2.5 Due to 90 Percent Reduction in SO2 Emissions from 167 EGU Stacks Affecting MANE-VU

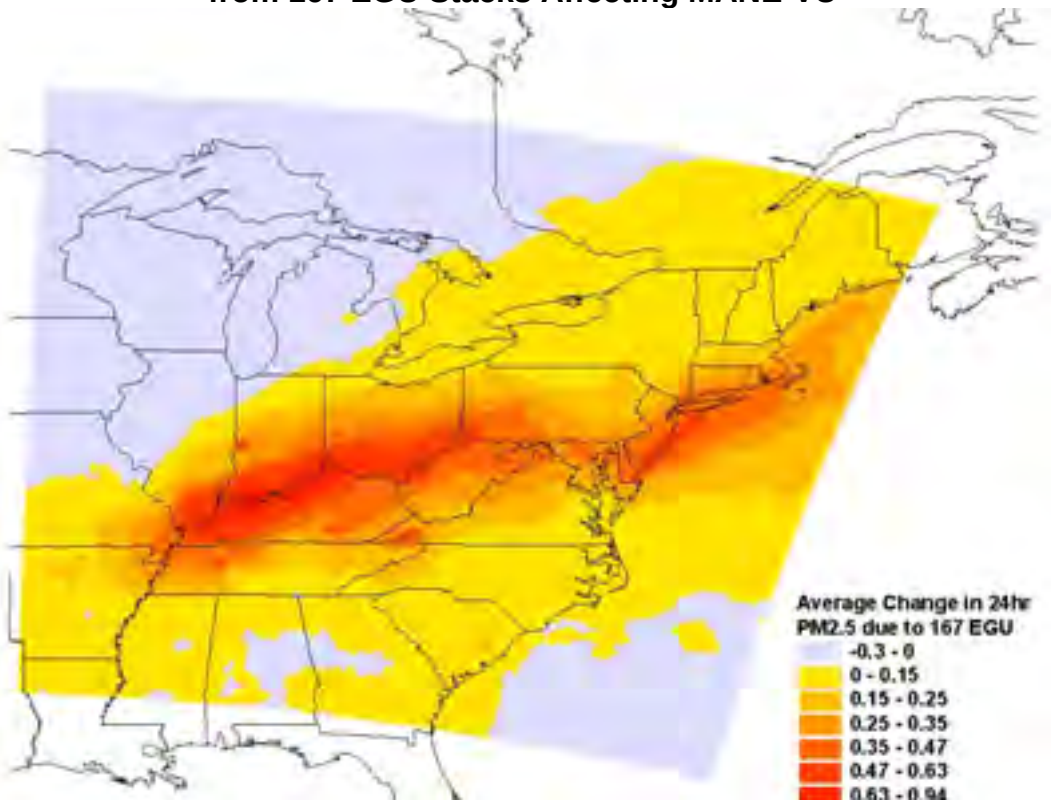


Figure 9-2 shows that significant reductions of $PM_{2.5}$ were predicted for the MANE-VU region as well as for portions of the VISTAS and Midwest RPO regions

as a result of reducing SO2 emissions by 90 percent from 167 EGU stacks affecting MANE-VU.

While these reductions are potentially large, based on consultations with affected states, it was determined to be unreasonable to expect that the full 90 percent emissions reductions would be achieved by 2018. Therefore, further modeling was conducted to assess a more realistic scenario.

MANE-VU's "Best and Final" modeling is documented in the report *2018 Visibility Projections* (NESCAUM, March 2008), Appendix V. This modeling estimated composite visibility benefits of all strategies within and outside MANE-VU rather than the benefits of individual strategies.

9.10 Reducing Non-EGU SO2 Emissions Outside MANE-VU by 28 Percent

In addition to these measures (BART controls within MANE-VU, low sulfur fuel within MANE-VU, and controls on specific EGUs), MANE-VU asked neighboring RPOs to consider further non-EGU emissions reductions comparable to those achieved through MANE-VU's low sulfur fuel strategies, which are expected to achieve a greater than 28 percent reduction in non-EGU SO2 emissions in 2018. After consultation with other states and consideration of comments received, the MANE-VU Class I States decided that MANE-VU's Best and Final modeling would include implementation of these additional emissions reductions.

In order to model the impact of this strategy on visibility at MANE-VU Class I areas, the following reductions were made to emissions in the VISTAS and MRPO regions:

For both Southeast and Midwest States:

- Coal-Fired ICI Boilers: Emissions were reduced by 60 percent.
- Oil-Fired ICI boilers: Emissions were reduced by 75 percent.
- ICI Boilers lacking fuel specification: Emissions were reduced by 50 percent

Additional controls required in the Southeastern States:

- Emissions from Other Area Oil-Combustion sources were reduced by 75 percent. (Used the same SCCs identified in MANE-VU Oil strategies list.)

9.11 Implementation of Gas-Turbine EGU Controls in Canada

As requested by the MANE-VU Class I States, for the Best and Final Modeling, NESCAUM also removed SO2 emissions from 6500MW of six coal-burning EGUs

in Canada that are scheduled to be shut down.[11] It is expected that these units will be replaced with nine natural gas turbine units with Selective Catalytic Reduction (SCR) controls. NESCAUM based estimated emission rates for modeled pollutants on a combination of factors, including recommendations from the State of New Hampshire, a NYSERDA study, and AP-42 ratios among pollutants. Emissions were reduced by more than 144,000 tons per year as a result of this measure.

9.12 Results of Best and Final Modeling

In order to estimate the visibility impacts of the measures discussed above, NESCAUM conducted regional modeling using the CMAQ chemical transport model. Documentation of this modeling is contained in the report *2018 Visibility Projections* (NESCAUM, March 2008), Appendix V. Based on currently available information and up-to-date modeling tools, this modeling provides an estimate of visibility improvement that could be achieved by 2018 through the reasonable measures described above based on currently available information and up-to-date modeling tools.

Figures 9-3 through 9-7 show the uniform rate of progress for each MANE-VU Class I area as well as the estimated combined visibility benefits of the strategies described in Section 9.5 above. All areas are expected to achieve sufficient visibility improvement by 2018 to meet or exceed the required improvements based on the uniform rate of progress. As a contributing state implementing the emissions measures under the "Ask" of the Class I area states, New York will therefore meet its obligation under this SIP and the Regional Haze Program.

[11] NESCAUM's 2018 Visibility Projections report cited a November 2006 paper by the Ontario Power Authority, "Ontario's Integrated power System Plan Discussion Paper 7: Integrating the Elements—A Preliminary Plan."
See http://www.powerauthority.on.ca/ipsp/Storage/32/2734_DP7_IntegratingTheElements.pdf

Figure 9-3 - Projected Visibility Improvement at Acadia National Park Based on 2009 and 2018 Best and Final Projections

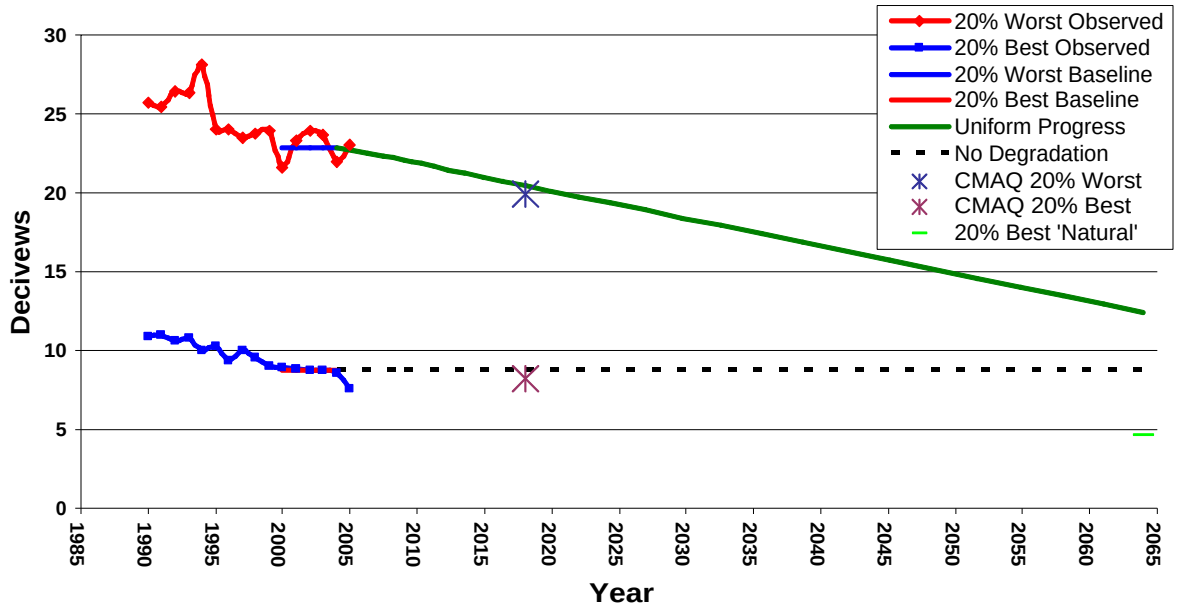


Figure 9-4 - Projected Visibility Improvement at Brigantine National Wildlife Refuge Based on Best and Final Modeling

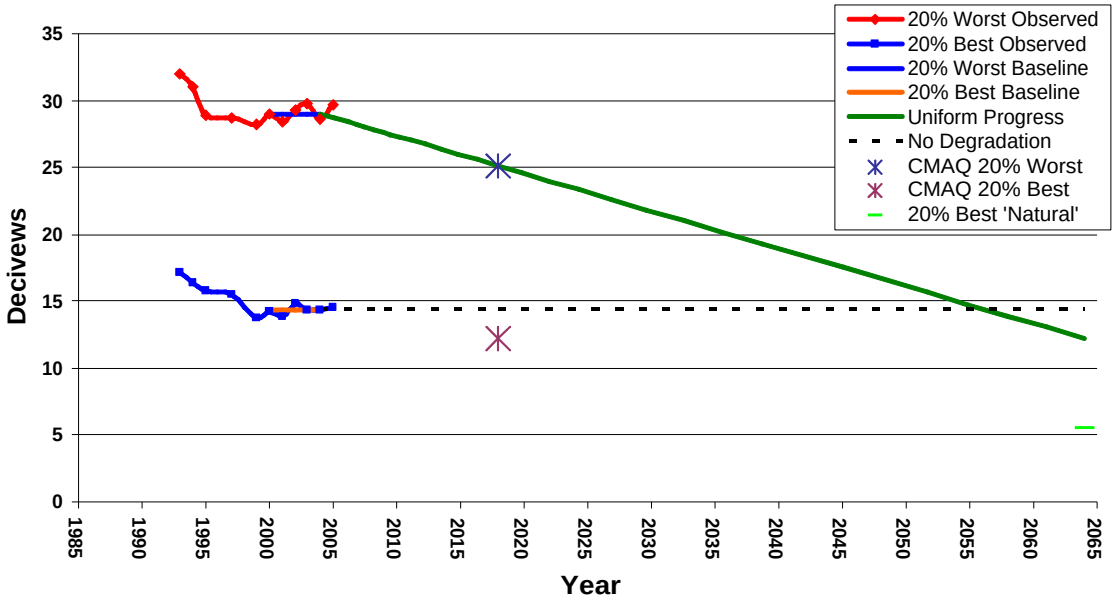
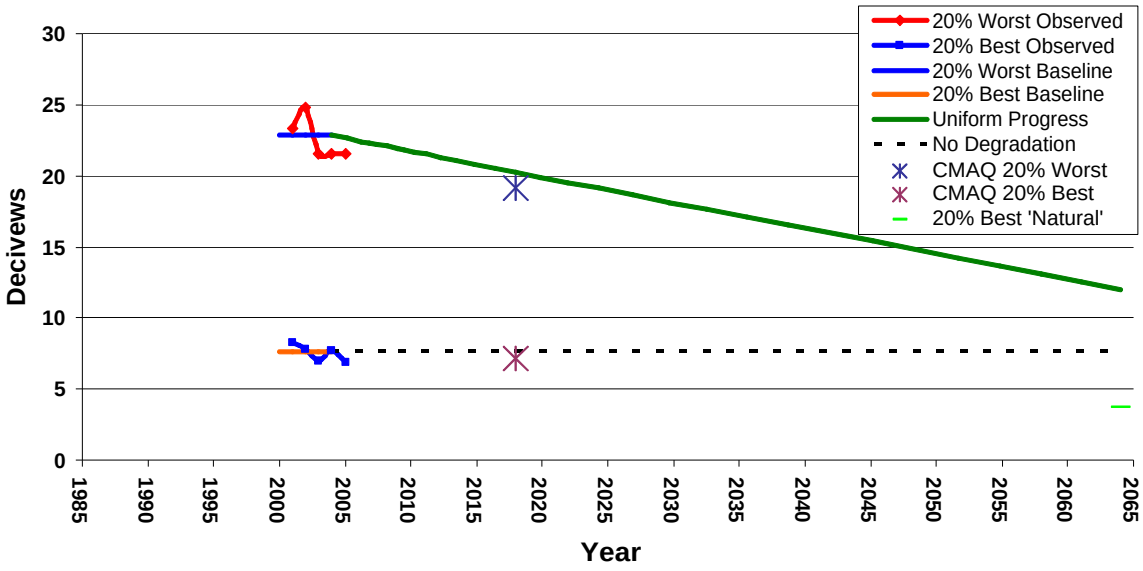


Figure 9-5 - Projected Visibility Improvement at Great Gulf Wilderness Area Based on Best and Final Modeling[12]



[12] The estimate for Great Gulf Wilderness Area also serves to provide an estimate for the Presidential Range/Dry River Wilderness Area

Figure 9-6 - Projected Visibility Improvement at Lye Brook Wilderness Area Based on Best and Final Modeling

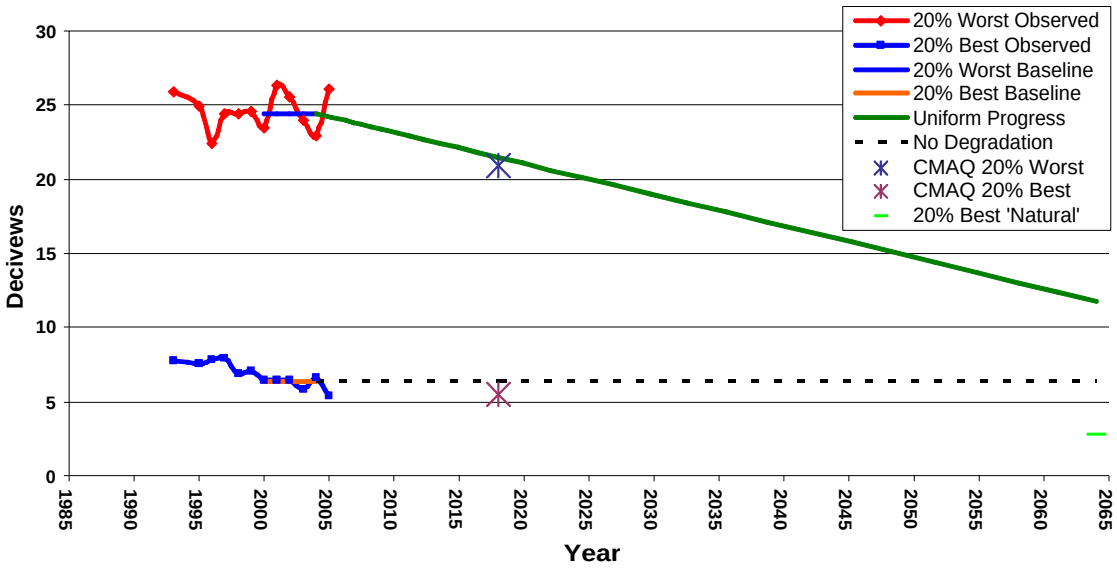
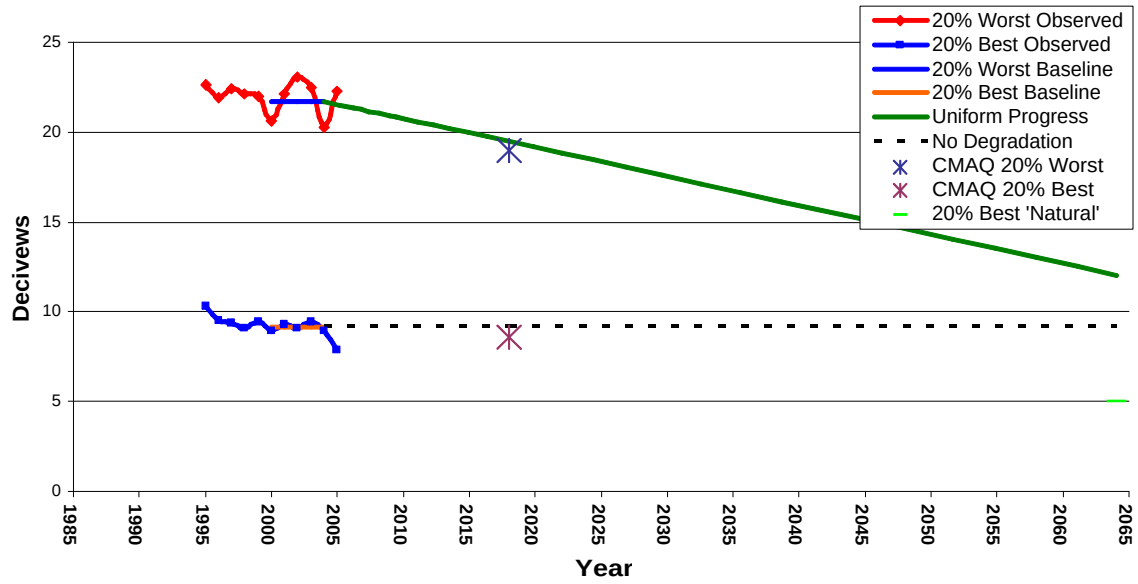


Figure 9-7 - Projected Visibility Improvement at Moosehorn National Wildlife Refuge and Roosevelt/Campobello International Park Based on Best and Final modeling



[13] The estimate for Moosehorn National Wildlife Refuge also serves to provide an estimate for Roosevelt/Campobello International Park.

9.13 Comparison to the Clean Air Act

The control measures that are a part of the “Ask” will result in at least as much visibility improvement that is expected from implementation of other CAA requirements during the planning period. See *Updated Visibility Statistics for the MANE-VU Region*, Appendix D.

9.14 Reporting

Progress will be reported to the EPA every five years in accordance with 40 CFR Section 51.308(g). If reasonable progress requirements are not met, New York will submit a revision of the haze SIP with the necessary corrections.

10.0 Long Term Strategy

40 CFR Section 51.308(d)(3) requires states like New York to submit long-term strategies that address regional haze visibility impairment for each Class I Federal area located within and each Class I Federal area located outside the states which may be affected by emissions from within the states. The long-term strategy must include enforceable emissions limitations, compliance schedules and other measures necessary to achieve reasonable progress goals established by the states where the Class I areas are located. While much of the material in this section describes MANE-VU's development of a long term strategy region-wide, this section also describes how New York will meet the long-term strategy requirement and demonstrates that the programs to be implemented in New York meet reasonable control levels to address progress.

This long term strategy addresses visibility impairment for each of the following Class I areas: Acadia National Park, Brigantine Wilderness, Great Gulf Wilderness, Lye Brook Wilderness, Presidential Range/Dry River Wilderness, Moosehorn National Wildlife Refuge, and Roosevelt/Campobello International Park. As explained in the sections that follow, these are the Class I areas whose visibility has been determined to be affected by emissions from within New York. There are no federal Class I areas in New York.

The long term strategy outlined in this section includes descriptions of how enforceable emissions limitations, compliance schedules, and other measures necessary to achieve the reasonable progress goals established for the above Class I areas will be used to achieve the visibility goals in each of the Class I areas mentioned above. Some have already been adopted by New York, while others are either planned for adoption or will be adopted as determined to be reasonable at a later date after further consideration and review at the five-year reevaluation periods. Controls are discussed in several portions of this document, with most detail in Sections 9.4, 10.3 and 10.4.

10.1 Overview of the Long Term Strategy Development Process

As a participant in MANE-VU, New York State supported an approach that determined which control measures to pursue that was based on technical analyses documented in several reports including the following:

- Contributions to Regional Haze in the Northeast and Mid-Atlantic United States (called the Contribution Assessment), (prepared by NESCAUM 8/1/06),
- Comparison of CAIR and CAIR Plus Proposal using the Integrated Planning Model® (called the CAIR + Report [Final Draft Report]), (prepared by MARAMA 5/30/07),

- Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas (called the Reasonable Progress Report), (prepared by NESCAUM 7/9/07), and
- Five-Factor Analysis of BART-Eligible Sources (called the BART 5 Factor Report), (prepared by NESCAUM 6/1/07).

The regional strategy development process identified reasonable measures that would reduce emissions contributing to visibility impairment at Class I areas affected by emissions from within the MANE-VU region by 2018 or earlier. The technical basis for the long term strategy is discussed in Section 10.2. This section describes the process of identifying potential emission reduction strategies.

10.1.1 Regional Process of Identifying Potential Strategies

MANE-VU reviewed a wide range of potential control measures to reduce emissions from sources contributing to visibility impairment in affected Class I areas. The process by which MANE-VU arrived at a set of proposed regional haze control measures to pursue for the 2018 milestone started in late 2005 in conjunction with efforts to identify measures to reduce ozone pollution. The Ozone Transport Commission (OTC) selected a contracting firm to assist with the analysis of ozone and regional haze control measure options. OTC provided the contractor with a “master list” of some 900 potential control measures, based on experience and previous state implementation plan work. With the help of an internal OTC control measure workgroup, the contractor also identified available regional haze control measures for MANE-VU’s further consideration.

MANE-VU then developed an interim list of control measures, which for regional haze included: beyond-CAIR (CAIR+) sulfate reductions from electricity generating units (EGUs), low-sulfur heating oil (residential and commercial), and controls on ICI boilers (both coal and oil-fired), lime and cement kilns, residential wood combustion, and outdoor burning (including outdoor wood boilers).

The next step in the regional haze control measure selection process was to further refine the interim list. The CAIR+ Report mentioned above documents the analysis of the cost of additional SO2 and NOx controls at EGUs in the Eastern U.S. The Reasonable Progress Report documents the assessment of control measures for EGUs and the other source categories selected for analysis. Further analysis is provided in the NESCAUM document entitled, “Assessment of Control Technology Options for BART-Eligible Sources: Steam Electric Boilers, Industrial Boilers, Cement Plants and Paper and Pulp Facilities.”

The beyond-CAIR EGU strategy continued to stay on the list since EGU sulfate emissions have, by far, the largest impact on visibility in the MANE-VU Class I

areas. Likewise, a low-sulfur oil strategy gained traction after a NESCAUM-initiated conference with refiners and fuel-oil suppliers concluded that such a strategy could realistically be implemented in the 2014 timeframe. Thus the low-sulfur heating oil and the oil-fired ICI boiler sector control measures merged into an overall low-sulfur oil strategy for #2, #4, and #6 residual oils for both the residential and commercial heating and oil-fired ICI boiler source sectors.

During MANE-VU's internal consultation meeting in March 2007, member states reviewed the interim list of control measures to make further refinements. States determined, for example, that there may be too few coal-fired ICI boilers in the MANE-VU states for that to be considered as a "regional" strategy, but could be a sector pursued by individual states. They also determined that lime and cement kilns, of which there are few in the MANE-VU region, would likely be handled via the BART determination process, which will be the case for New York. Residential wood burning and outdoor wood boilers remained on the list for those states where localized visibility impacts may be of concern even though emissions from these sources are primarily organic carbon and direct particulate matter. Finally, outdoor wood burning was determined to also be better left as a sector to be examined further by individual states, due to issues of enforceability and penetration of existing state regulations.

10.2 Technical Basis for Emission Reduction Obligations

40 CFR Section 51.308(d)(3)(iii) requires states/tribes to document the technical basis for the state's/tribe's apportionment of emission reductions necessary to meet reasonable progress goals in each Class I area affected by the state's/tribe's emissions. The Department relied on technical analyses developed by MANE-VU to demonstrate that emission reductions in New York, when coordinated with those of other States and Tribes are sufficient to achieve reasonable progress goals in Class I areas affected by New York. MANE-VU's technical documentation of the emission reductions necessary to meet reasonable progress goals in each Class I area affected by New York is summarized in the following sections of this SIP and in additional documentation referenced in those sections and below:

- Baseline and Natural Background Visibility Conditions—Considerations and Proposed Approach to the Calculation of Baseline and Natural Background Visibility Conditions at MANE-VU Class I Areas (NESCAUM, December 2006), Appendix L

- The Nature of the Fine Particle and Regional Haze Air Quality Problems in the MANE-VU Region: A Conceptual Description (NESCAUM, November 2006), Appendix M

- Contributions to Regional Haze in the Northeast and Mid-Atlantic United States (NESCAUM, August 2006) (called the Contribution Assessment), (Appendix A)

- Comparison of CAIR and CAIR Plus Proposal using the Integrated Planning Model® (called the CAIR+ Report) (ICF, May 2007), (Appendix T)

- Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas (MACTEC, July 2007) (called the Reasonable Progress Report), (Appendix J)

- Five-Factor Analysis of BART-Eligible Sources: Survey of Options for Conducting BART Determinations (July, 2007), (Appendix Q)

- Assessment of Control Technology Options for BART-Eligible Sources: Steam Electric Boilers, Industrial Boilers, Cement Plants and Paper and Pulp Facilities (NESCAUM, March 2005), (Appendix U)

- MANE-VU Modeling for Reasonable Progress Goals: Model Performance Evaluation, Pollution Apportionment, and Control Measure Benefits (NESCAUM, February 2008), (Appendix R)

- 2018 Visibility Projections (NESCAUM, March 2008), (Appendix V). In addition, New York relied on analysis conducted by neighboring RPOs, including the following documents, which are available but are not incorporated into this SIP;

- VISTAS Reasonable Progress Analysis Plan by VISTAS, dated September 18, 2006

http:// www.vistas-sesarm.org/documents/VISTASReasonableProgress_Sep182006.pdf

- Reasonable Progress for Class I Areas in the Northern Midwest-Factor Analysis, by EC/R, dated July 18, 2007

http://www.ladco.org/docs2/MRPO%20Report_071807.pdf

40 CFR Section 51.308(d)(3)(iii) requires states to document the technical basis for the apportionment of emission reductions necessary to meet reasonable progress goals in each Class I area affected by the state's emissions. New York relied on technical analyses and weight-of-evidence assessments developed by MANE-VU to demonstrate that emission reductions, when coordinated with those of other states, are sufficient to achieve reasonable progress goals in Class I areas affected by emissions from New York. To assess the degree to which specific geographic

regions or states are contributing to visibility impairment at MANE-VU Class I areas, a weight-of-evidence approach was used that relies on several independent methods to determine the sources of visibility impairing pollutants. A weight-of-evidence assessment is intended to support analytical results that might otherwise have relied on the use of a single model by itself. The weight-of-evidence analysis included the use of models, including Eulerian (grid-based) source models and Lagrangian (air pollution-based) source dispersion models. Additionally, other data analysis techniques were applied, such as source apportionment models, back trajectory calculations, and the use of monitoring and inventory data. The modeling efforts provided a definitive basis for a weight-of-evidence assessment of state contributions. The weight-of-evidence analysis conducted for this submission can be found in Contributions to Regional Haze in the Northeast and Mid-Atlantic United States, (prepared by NESCAUM 8/1/06), Appendix A.

The demonstration of attainment of reasonable progress goals relies on the analysis of monitored and modeled data in a weight of evidence analysis to determine whether visibility is improved on days when it is usually poor and does not deteriorate on days when it is usually good. Current visibility is estimated from monitored components of PM2.5 and coarse mass. Models are used in a relative sense to estimate how current concentrations respond to emission reduction measures. Data analysis is used to identify source categories and regions. Current concentrations of particulate matter components are adjusted by the relative modeled response to estimate concentrations at the end of the first implementation period in 2018.

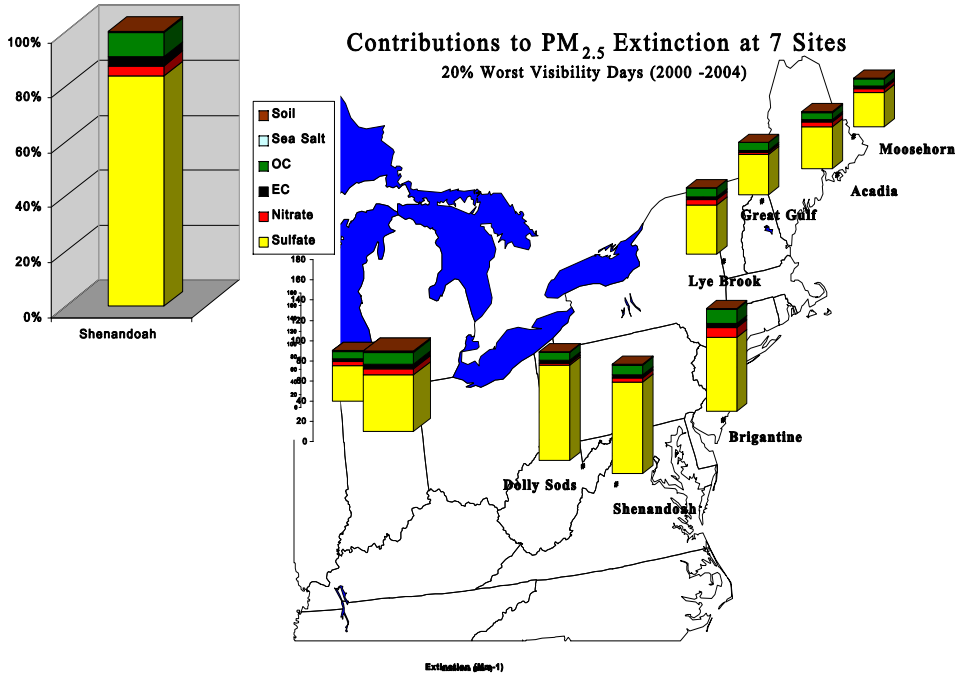
Future visibility is estimated from predicted component concentrations of PM2.5 and coarse particulate matter at the end of the first implementation period. The difference between present visibility and future estimated visibility is compared with the reasonable progress goal to determine if the goal is met. The MANE-VU technical report on current visibility conditions is found in Appendix D, *Updated Visibility Statistics for the MANE-VU Region*. The inventories and supporting data that were prepared included: county-level, mass emissions and modeling inventories of 2002 emissions for the State and local agencies; temporal, speciation, and spatial allocation profiles; wildfires, prescribed burning, and agricultural field burning for the southeastern provinces of Canada; as well as inventories for other RPOs, Canada, and Mexico. The inventory includes emissions for sulfur dioxide (SO2), oxides of nitrogen (NOx), volatile organic compounds (VOC), carbon monoxide (CO), ammonia (NH3), and particulates, primary PM10 and PM2.5. The modeling methodology appears in the *Technical Support Document for 2002 MANE-VU SIP Modeling Inventories, Version 3*, (prepared by Pechan, published by MANE-VU 11/20/06), Appendix H. Details on the development of projected inventories are found in Appendix E, *Development of Emission Projections for 2009, 2012 and 2018 for NonEGU Point, Area, and Nonroad Sources in the MANE-VU Region*. The

following sections discuss the pollutants, source regions, and types of sources considered in developing this long term strategy.

10.2.1 Visibility Impairing Pollutants

40 CFR Section 51.308(d)(3)(iv) requires states to identify all anthropogenic sources of visibility impairment considered by the state in developing its long-term strategy. EPA's Guidance for Setting Reasonable Progress Goals Under the Regional Haze Program (June, 2007) notes that this process begins with the identification of key pollutants and source categories that contribute to visibility impairment at the Class I area(s) affected by emissions from the state. Finalized in August 2006, the MANE-VU Contribution Assessment reflects a conceptual model in which sulfate emerges as the most important single constituent of haze-forming fine particle pollution and the principal cause of visibility impairment across the region. Sulfate alone accounts for anywhere from one-half to two-thirds of total fine particle mass on the 20 percent haziest days at MANE-VU Class I sites. Organic carbon was shown to be the second largest contributor to haze. As a result of the dominant role of sulfate in the formation of regional haze in the Northeast and Mid-Atlantic region, MANE-VU concluded that an effective emissions management approach would rely heavily on broad-based regional SO2 control efforts in the eastern United States. The following figure shows the dominance of sulfate in the extinction calculated from the 2000-2004 baseline data.

Figure 10-1 - Contributions to $PM_{2.5}$ Extinction at Seven Class I Sites



10.2.2 Contributing States and Regions

The MANE-VU Contribution Assessment used various modeling techniques, air quality data analysis, and emissions inventory analysis to identify source categories and states that contribute to visibility impairment in MANE-VU Class I areas. With respect to sulfate, based on estimates from four different techniques, the Contribution Assessment estimated emissions from within MANE-VU in 2002 were responsible for about 25-30 percent of the sulfate at MANE-VU and nearby Class I areas. (See Chapter 8 of the Contribution Assessment.) Emissions from other regions, Canada, and outside the modeling domain were also important.

Table 10-1, below, shows the results of one of the four methods of assessing state-by-state contributions to sulfate impacts (the REMSAD model). This table highlights the importance of emissions from outside the MANE-VU region. Note that percentage contributions differ between methods.

Table 10-1 - Percent of Modeled Sulfate Due to Emissions from Listed States[14]

Contributing	Acadia	Brigantine	Dolly	Great Gulf	Lye	Moosehorn	Shenandoah
Connecticut	0.76	0.53	0.04	0.48	0.55	0.56	0.08
Delaware	0.96	3.20	0.30	0.63	0.93	0.71	0.61
District of	0.01	0.04	0.01	0.01	0.02	0.01	0.04
Maine	6.54	0.16	0.01	2.33	0.31	8.01	0.02
Maryland	2.20	4.98	2.39	1.92	2.66	1.60	4.84
Massachusetts	10.11	2.73	0.18	3.11	2.45	6.78	0.35
New Hampshire	2.25	0.60	0.04	3.95	1.68	1.74	0.08
New Jersey	1.40	4.04	0.27	0.89	1.44	1.03	0.48
New York	4.74	5.57	1.32	5.68	9.00	3.83	2.03
Pennsylvania	6.81	12.84	10.23	8.30	11.72	5.53	12.05
Rhode Island	0.28	0.10	0.01	0.11	0.06	0.19	0.01
Vermont	0.13	0.06	0.00	0.41	0.95	0.09	0.01
MANE-VU	36.17	34.83	14.81	27.83	31.78	30.08	20.59
Midwest RPO	11.98	18.16	30.26	20.10	21.48	10.40	26.84
VISTAS	8.49	21.99	36.75	12.04	13.65	6.69	33.86
Other	43.36	25.02	18.18	40.03	33.09	52.83	18.71

The following two figures are from the Contribution Assessment and show another method used to identify and rank states' contributions to sulfate at MANE-VU and nearby Class I areas using 2002 data. One simple technique for deducing the relative impact of emissions from specific point sources on a specific receptor site involves calculating the ratio of annual emissions (Q) to source-receptor distance (d). This ratio is then multiplied by a factor designed to account for the effects of prevailing winds and to convert units. The use of this technique is explained in the Contribution Assessment. (See pages 4-13 and following of Contribution Assessment document.)

Based on the results of the Q/d technique, the following figures show the resulting rankings across a set of northern and southern Class I areas in or near MANE-VU. The first figure covers the four northern Class I areas in MANE-VU. The second figure covers one Class I area in the southern part of MANE-VU as well as two neighboring Class I areas in the VISTAS region. In both figures, New York is shown to be a moderate contributor to visibility impairment, but much less than several other MANE-VU and non-MANE-VU states. Emissions from Canada are also shown to have a significant effect.

14 Percentages based on 2002 annual average sulfate impact estimated with REMSAD model as described in MANE-VU Contribution Assessment Chapter 4 and summarized on page 8-2 of the Contribution Assessment.

For more details about the methods used to identify contributing states and regions, please see the Contribution Assessment document, Appendix A.

Figure 10-2 - Ranked state percent sulfate contributions to Northeast Class I receptors based on emissions divided by distance (Q/d) results adjusted for prevailing winds

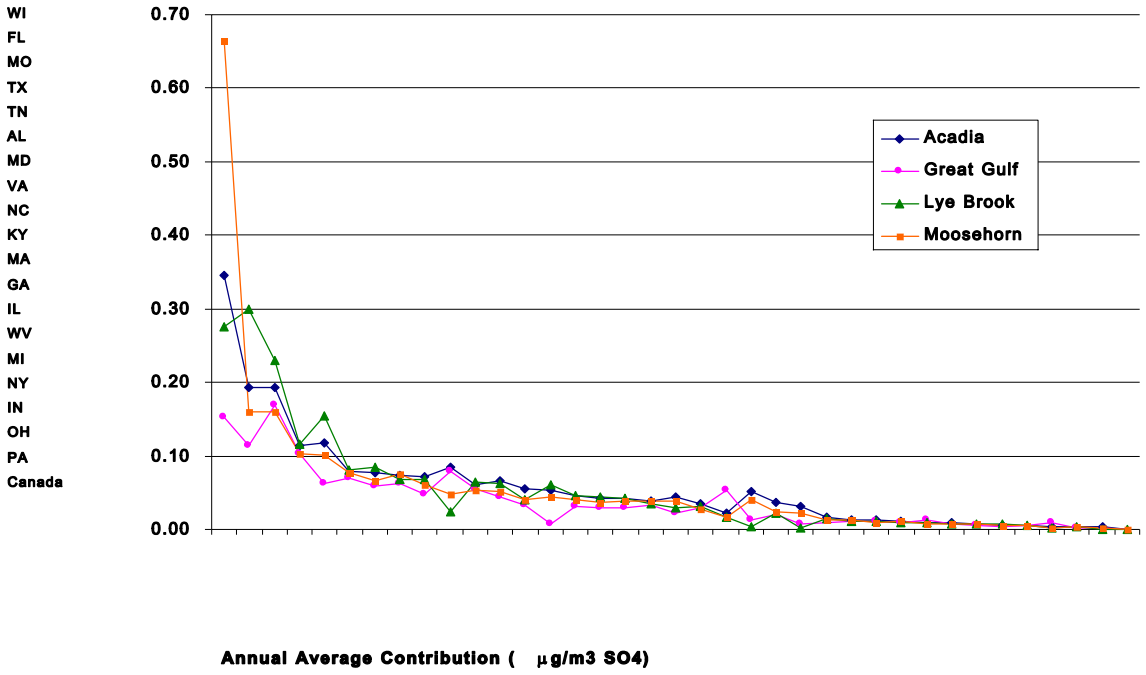
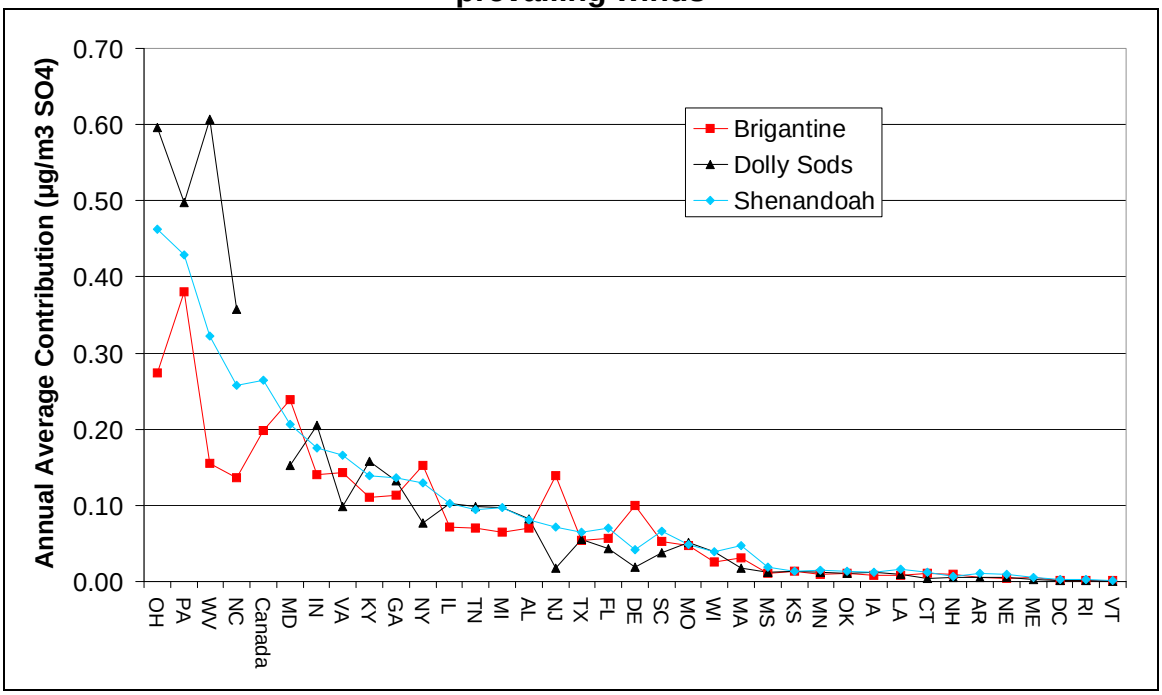


Figure 10-3 - Ranked state percent sulfate contributions to Mid-Atlantic Class I receptors based on emissions divided by distance (Q/d) results adjusted for prevailing winds



The above three figures show that New York's contributions, while important, are not the most significant, with the impacts of Canada and several states outside the MANE-VU region being significantly larger than New York's. MANE-VU considered modeling results documented in the Contribution Assessment to determine which states should be consulted in developing the long term strategy for improving visibility in MANE-VU Class I areas. Because sulfate was the primary pollutant of concern and the REMSAD model results quantified sulfate impacts, three methods of evaluating states' impacts using REMSAD results were considered:

1. States/regions that contributed 0.1 ug/m^3 sulfate or greater on the 20 percent worst visibility days in the base year (2002)

2. States/regions that contributed at least 2 percent of total sulfate observed on 20 percent worst visibility days in 2002

3. The top ten contributing states on the 20 percent worst visibility days in 2002.

Each of the following seven figures shows on the left side the IMPROVE monitored $PM_{2.5}$ mass data by species for 2000-2004 (the baseline years). The yellow, bottom portion of the bar chart is the measured sulfate concentration. The second part of each figure, in the center, shows the REMSAD sulfate modeling results for 2002.

The middle bar chart indicates contributions of states and regions to the total modeled sulfate concentrations. Finally, on the right, are three maps indicating which states met the criteria identified above as the three potential methods for identifying states with the greatest contribution to sulfates in MANE-VU Class I areas in 2002. The top map shows states contributing at least 0.1 ug/m^3 of sulfate. The middle map shows states contributing at least 2 percent of total sulfate. The bottom map highlights the ten states contributing the greatest amount of the sulfate in 2002. In each of these figures, New York is shown to have either contributed 0.1 ug/m3 sulfate or greater on the 20 percent worst visibility days in the base year, contributed at least 2 percent of total sulfate observed on 20 percent worst visibility days in 2002, or to have been one of the top 10 contributors in each of the Class I areas shown, including the Shenandoah and Dolly Sods areas. Due to its proximity to New York, the proportion of sulfate impacts in the Lye Brook area are the highest. Shenandoah and Dolly Sods are Class I areas in the VISTAS region that are impacted by emissions from MANE-VU states. The other five Class I areas are in MANE-VU. The IMPROVE monitor at Great Gulf also represents the Presidential Range/Dry River Wilderness. The IMPROVE monitor at Moosehorn also represents Roosevelt Campobello International Park. For purposes of deciding how broadly to consult, the MANE-VU states decided to use method 2, including states that contributed at least 2 percent of total sulfate observed on the 20 percent worst visibility days in 2002. CT, DC, RI, and VT were not identified as being among the states contributing at least 2 percent of sulfate to any of the above Class I areas. However, as participants in MANE-VU, those states have agreed to pursue adoption of regional control measures in order to contribute to visibility improvement on the worst days and to the prevention of visibility degradation on clear days.

Figure 10-4 - Modeled 2002 Contributions to Sulfate by State at Brigantine

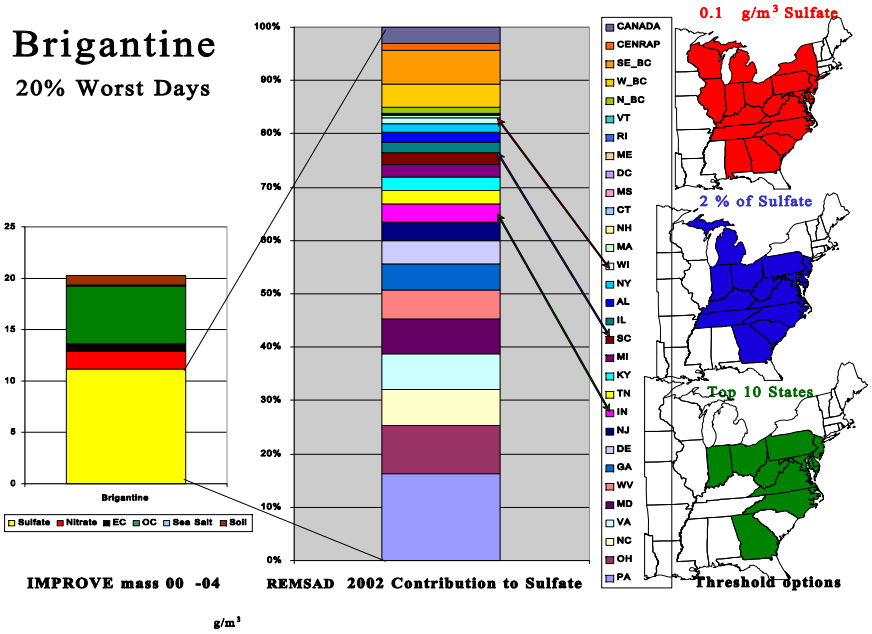


Figure 10-5 - Modeled 2002 Contributions to Sulfate by State at Lye Brook

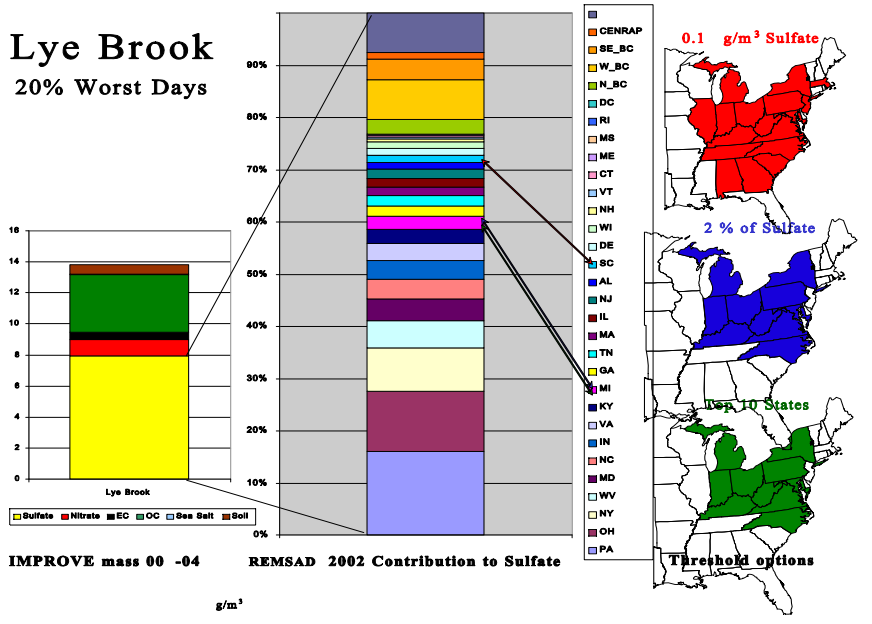


Figure 10-6 - Modeled 2002 Contributions to Sulfate by State at Great Gulf

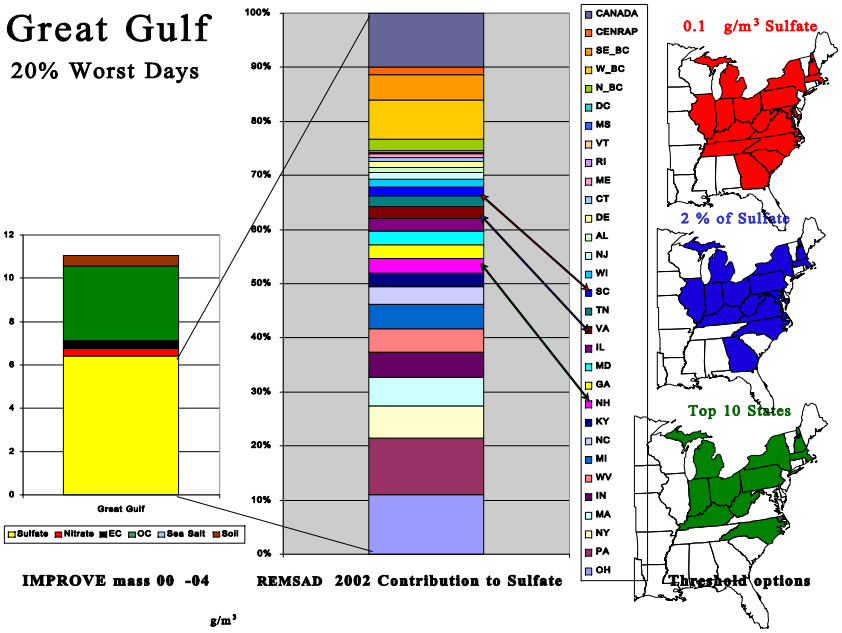


Figure 10-7 - Modeled 2002 Contributions to Sulfate by State at Acadia

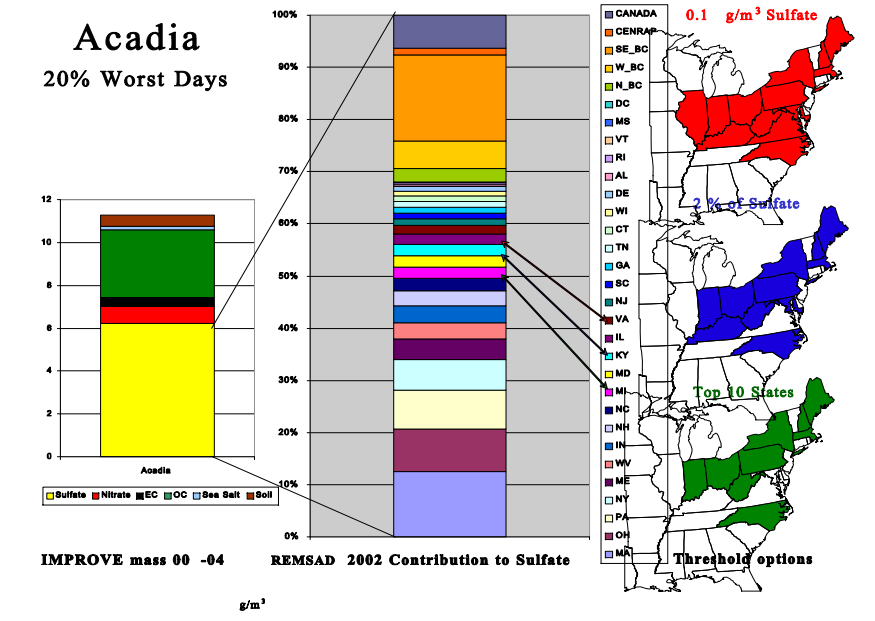


Figure 10-8 - Modeled 2002 Contributions to Sulfate by State at Moosehorn

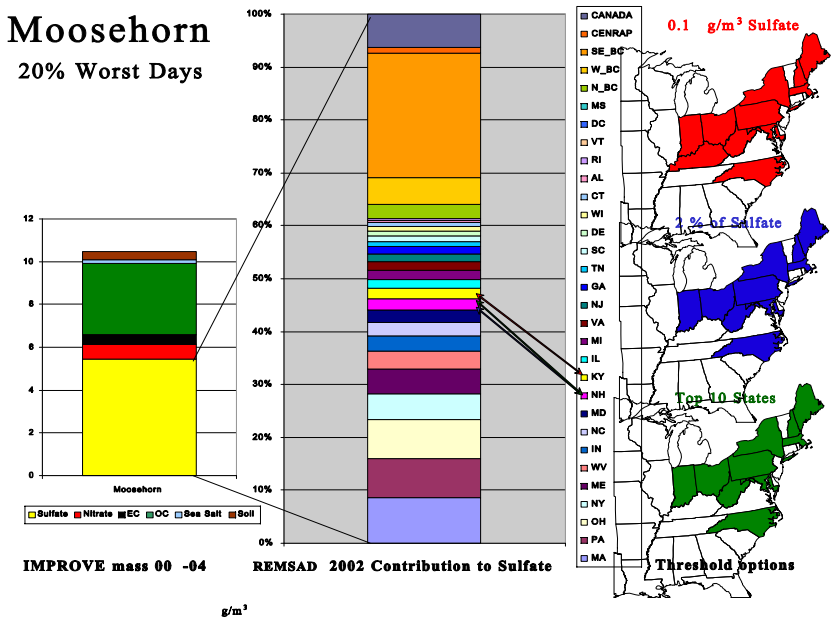


Figure 10-9 - Modeled 2002 Contributions to Sulfate by State at Shenandoah

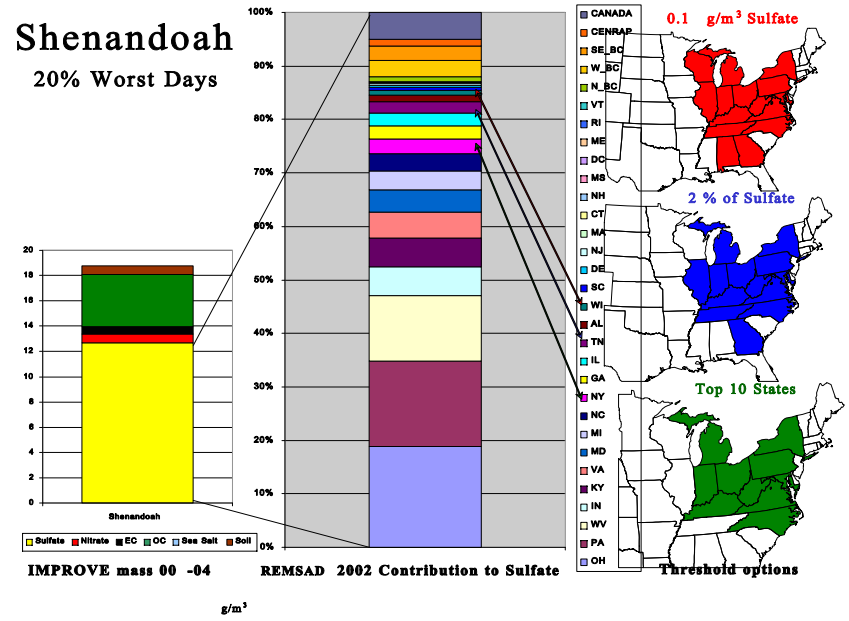
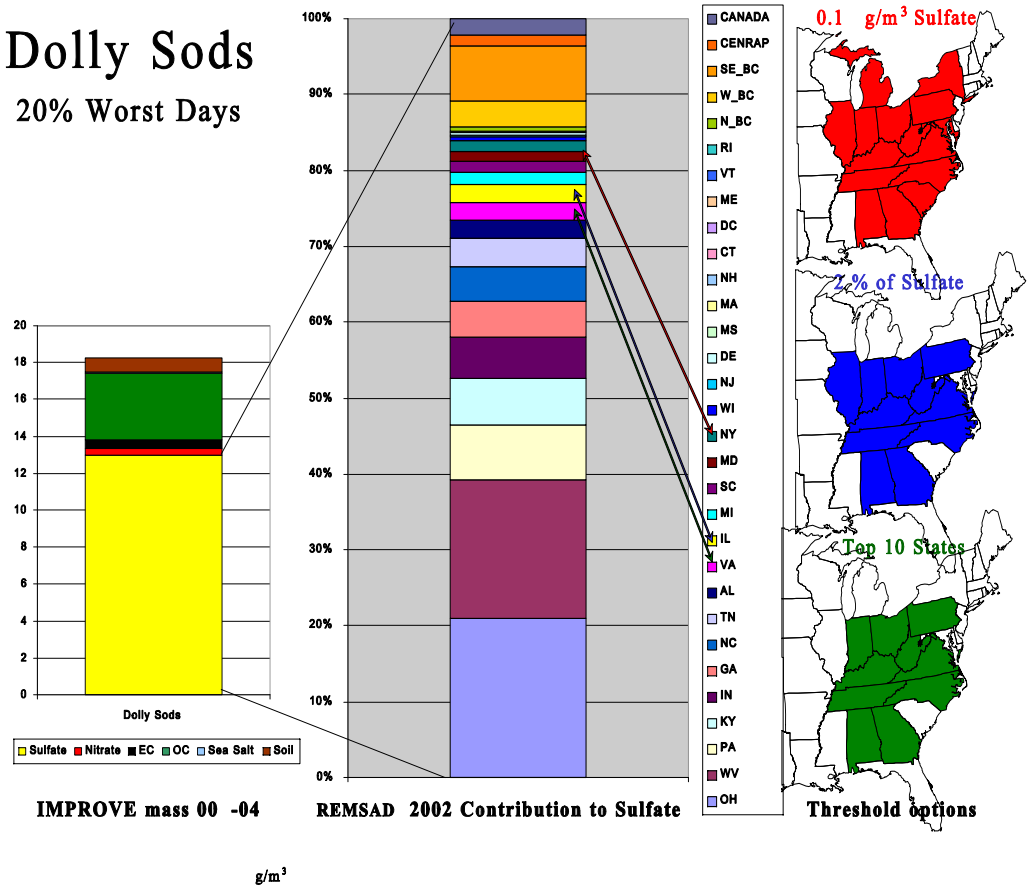


Figure 10-10 - Modeled 2002 Contributions to Sulfate by State at Dolly Sods



10.2.3 Baseline Emissions

40 CFR Section 51.308(d)(3)(iii) requires that New York identify the baseline emissions information on which the long-term strategy is based.

- For the MANE-VU region, New York used the 2002 MANE-VU Emissions Inventory Version 3.0 as its baseline inventory. The inventory is documented in Section 7 of this SIP.

- For other regions, MANE-VU used emissions inventories developed by the RPOs for those regions, including VISTAS Base G2, MRPO's Base K, and CenRAP's emissions inventory.

More specific information about the baseline emissions inventory data used may be found in the inventory section of this SIP, Section 7.0.

10.2.4 Modeling Techniques Used

The following documents describe preliminary and final modeling runs conducted by MANE-VU and used in developing this long term strategy:

- Contributions to Regional Haze in the Northeast and Mid-Atlantic United States (NESCAUM, August 2006)(called the Contribution Assessment), (Appendix A)
- MANE-VU Modeling for Reasonable Progress Goals: Model Performance Evaluation, Pollution Apportionment, and Control Measure Benefits (NESCAUM, February 2008), (Appendix R)
- 2018 Visibility Projections (NESCAUM, March 2008), (Appendix V)

As documented in the MANE-VU Contribution Assessment, two regional-scale air quality models were used to perform air quality simulations for MANE-VU. These are the Community Multi-scale Air Quality modeling system (CMAQ; Byun and Ching, 1999) and the Regional Modeling System for Aerosols and Deposition (REMSAD; SAI, 2002). CMAQ was developed by EPA, while REMSAD was developed by ICF Consulting/Systems Applications International (ICF/SAI) with EPA support. CMAQ provides one-atmosphere results for multiple pollutants while the REMSAD model was used primarily for attribution of sulfate species in the Eastern US via the species-tagging scheme included in Version 7.10 and newer versions of the model.

Three rounds of modeling were conducted:

- CMAQ was run for a complete set of baseline simulations including 2002, 2009 and 2018. Preliminary runs are described in greater detail in Appendix C of the MANE-VU *Contribution Assessment* (Appendix A).
- Runs assessing impacts of potential control measures are described in *MANE-VU Modeling for Reasonable Progress Goals : Model Performance Evaluation, Pollution Apportionment, and Control Measure Benefits* (NESCAUM, February 2008, Appendix R).
- Final modeling to help develop reasonable progress goals is described in the *2018 Visibility Projections* report (NESCAUM, 2008, Appendix V).

The modeling tools utilized for these analyses include MM5, SMOKE, CMAQ and REMSAD, and incorporate tagging features that allow for the tracking of individual source regions or measures.

A significant feature of the REMSAD work used to evaluate regional contributions is that NESCAUM reprocessed the SO_2 emission data from each state to take advantage of REMSAD's tagging capabilities. Thus, all SO_2 emissions included in the model for the eastern half of the country were tagged according to state of origin, and emissions from Canada and the boundary conditions were also tagged. This allowed for a rough

estimation of the total contribution from elevated point sources in each state to simulated sulfate concentrations at eastern receptor sites. Using identical emission and meteorological inputs to those prepared for the Integrated SIP (CMAQ) platform, REMSAD was used to simulate the annual average impact of each state's SO_2 emission sources on the sulfate fraction of $PM_{2.5}$ over the northeastern United States. For more information see Appendix C of the MANE-VU Contribution Assessment, Appendix A.

In addition to the REMSAD run with tagging, NESCAUM and its modeling partners at the University of Maryland and Rutgers University performed a sensitivity run with the CMAQ Particle and Precursor Tagging Methodology (CMAQ-PPTM) system. This run was used to assess the impacts of potential control measures under consideration. This work is described in the *Modeling for Reasonable Progress* report.

The modeling platform is further described in the reports *Modeling for Reasonable Progress* and *2018 Visibility Protections*. MANE-VU used the Inter-RPO modeling domain. The 36-km gridded domain covers the continental US, southern Canada, and northern Mexico. The 12-km gridded inner domain covers the northeastern, central, and southeastern U.S. as well as southeastern Canada.

Meteorological inputs for CMAQ, provided by Dalin Zhang's group at the University of Maryland, were derived from the Fifth-Generation Pennsylvania State University /National Center for Atmospheric Research (NCAR) Mesoscale Model (MM5). A detailed description of the meteorological inputs can be found in the *Modeling for Reasonable Progress* report.

The evaluation of model performance is also described in the report on *Modeling for Reasonable Progress*. The modeling tools were evaluated and found to perform adequately relative to USEPA modeling guidance.

10.2.5 Monitoring and Emissions Data Analysis

Chapters 4 and 5 of the MANE-VU Contribution Assessment document the techniques for analyzing air monitoring data and emissions data used by MANE-VU to assess the contribution of various states, regions, and source categories to visibility impairment at MANE-VU Class I areas. Some examples of these analyses have been included here. (Figures 10-2 and 10-3 in Section 10.2.2, above, show the results of emissions inventory analysis (Q/d) to estimate the percent sulfate contribution from each state on MANE-VU's Class I areas. Figure 10-12, in Section 10.2.6, below, shows results of source apportionment analysis of monitoring data to assess the areas contributing to wood smoke emissions affecting MANE-VU Class I areas.

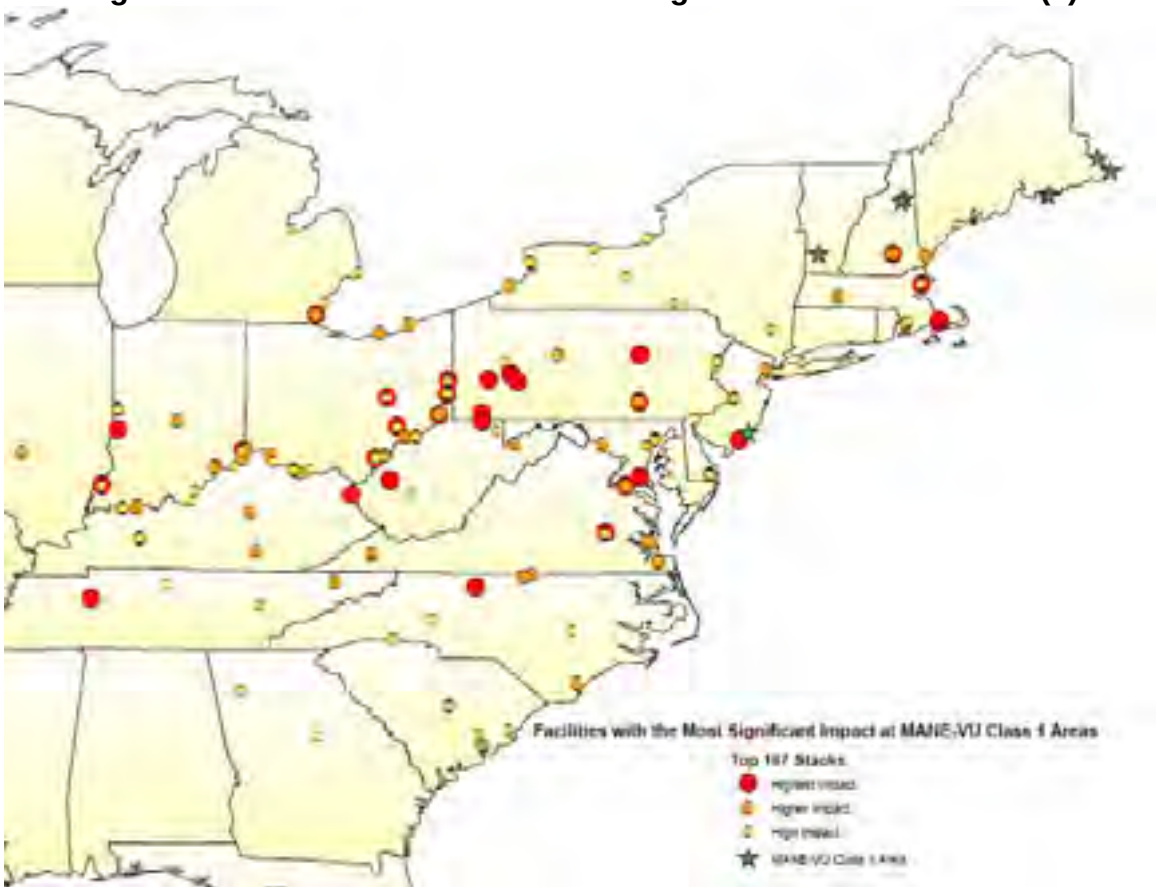
10.2.6 Anthropogenic Sources of Visibility Impairment

40 CFR Section 51.308(d)(3)(iv) requires that New York identify all anthropogenic sources of visibility impairment considered in developing its long-term strategy. Chapter 4 of the MANE-VU Contribution Assessment Document summarizes an analysis of haze-associated pollutant emissions. Chapter 5 of the same document describes the results of numerous source apportionment analyses, which are further explained in Appendix B of the Contribution Assessment (Appendix A). Together, these studies identify the major source categories affecting Class I areas in and near MANE-VU. These are identified below.

10.2.6.1 Sources of SO_2 Emissions

For the reasons described above in Section 10.2.1, the emphasis in developing this SIP revision was placed on sources of SO_2. Emissions inventory analysis shows that point sources dominated the 2002 inventory of SO2 emissions. The largest source category of sulfur dioxide in the region is electric generating units (EGUs). Additional SO_2 source categories analyzed include oil-fired installations at residential, commercial, institutional, or industrial facilities; industrial, commercial, and institutional (ICI) boilers; and cement and lime kilns. Roughly 70 percent of the 2.3 million tons of SO_2 emission in the 2002 MANE-VU emissions inventory Version 3.0 were from EGUs, making them the largest SO_2 source category in terms of visibility impairing emissions. MANE-VU found through modeling analysis documented in the Contribution Assessment, Appendix A, that emissions from specific EGUs were important contributors to visibility impairment in MANE-VU Class I areas in 2002. The figure below shows the locations of 167 EGU stacks that impair visibility at one or more MANE-VU Class I area. Some of the stacks identified as important were outside the states identified as contributing at least 2 percent of the sulfate at MANE-VU Class I areas, these were dropped from the list. The list of these sources is found in the Emissions Inventory section of this document, Section 7.

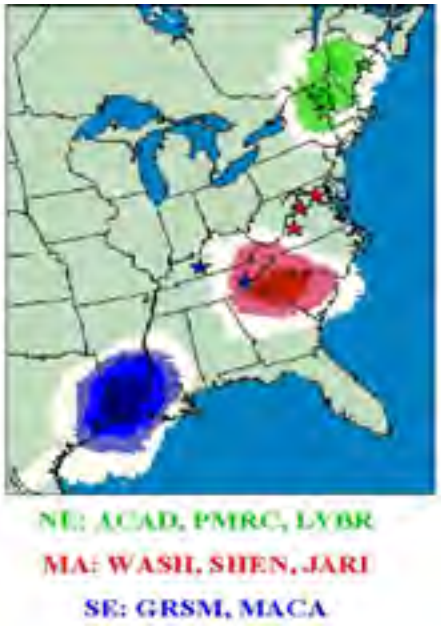
Figure 10-11 - 167 EGU Stacks Affecting MANE-VU Class I Area(s)



10.2.6.2 Sources of Other Pollutants

Source apportionment documented in Appendix B of the MANE-VU Contribution Assessment (Appendix A) also identified biomass combustion as a local source contributing to visibility impairment. According to Appendix B of the MANE-VU Contribution Assessment, woodsmoke also contributes to visibility impairment, with contributions typically higher in rural areas than urban areas, winter peaks in northern areas from residential wood burning, and occasional large summer impacts at all sites from wildfires. Woodsmoke impacting MANE-VU Class I areas is more local in origin than sources of SO_2, except for major transport events. The figure below is from Appendix B of the MANE-VU Contribution Assessment and represents the results of source apportionment and trajectory analyses. It illustrates that the impacts of woodsmoke on MANE-VU Class I areas are more likely due to emissions from within MANE-VU and Canada. The highlighted section of the map shows the woodsmoke source region for several MANE-VU Class I areas represented by the stars within the sections. (Brigantine was not analyzed for this map.)

Figure 10-12 - Woodsmoke Source Regional Aggregations



The MANE-VU *Technical Support Document on Agricultural and Forestry Smoke Management in the MANE-VU Region* (Appendix I) concluded that fire from land management activities was not a major contributor to regional haze in MANE-VU Class I areas, and that the majority of emissions from fires were from residential wood combustion.

10.2.6.3 Identification of Key Source Categories

Based on available information about emissions and potential impacts, the MANE-VU Reasonable Progress Workgroup selected the following source categories for detailed analysis of the four factors the Clean Air Act establishes as the basis for determining how much progress in visibility improvement is reasonable:

- Coal and oil-fired Electric Generating Units, (EGUs);
- Point and area source industrial, commercial and institutional boilers;
- Cement kilns;
- Lime kilns;
- The use of heating oil; and
- Residential wood combustion and open burning.

New York worked with other members of the Ozone Transport Commission and MANE-VU as described in Section 10.1 above to consider a wide variety of potential emission reduction strategies covering a wide range of sources of SO_2 and other pollutants contributing to regional haze.

10.3 Emission Reductions Due to Ongoing Air Pollution Control Programs

40 CFR Section 51.308(d)(3)(v)(A) requires New York to consider emission reductions from ongoing pollution control programs. Significant emissions control programs will be implemented on a regional basis between the baseline period and 2018. In developing its Long Term Strategy, these emission control programs were considered as discussed below. Further discussion regarding programs in New York State can be found in Section 9, Reasonable Progress Goals.

MANE-VU's 2018 "beyond on the way" (BOTW) emissions inventory accounts for emission controls already in place as well as emission controls that are not yet finalized as well as some emission control regulations that will be instituted as a result of this SIP. These are discussed in this section.

The BOTW inventory was developed based on the MANE-VU 2002 Version 3.0 inventory and the MANE-VU 2018 on the books/on the way (OTB/OTW) inventory. Inventories used for other RPOs also reflect anticipated emissions controls that will be in place by 2018. The inventory is termed "beyond on the way" because it includes control measures that were developed for ozone SIPs which were not yet on the books in some states. For some states it also included controls that were under consideration for regional haze SIPs that have not yet been adopted. More information may be found in the following documents:

- Development of Emissions Projections for 2009, 2012, and 2018 for Non-EGU Point, Area, and Non-road Sources in the MANE-VU Region (MACTEC, February 2007) (Appendix E)
- Documentation of 2018 Emissions from Electric Generating Units in the Eastern U.S. for MANE-VU's Regional Haze Modeling (Alpine Geophysics, March 2008) (Appendix W)
- MANE-VU Modeling for Reasonable Progress Goals: Model Performance Evaluation, Pollution Apportionment, and Control Measure Benefits, (NESCAUM, February 2008) (Appendix R)
- 2018 Visibility Projections, (NESCAUM, March 2008) (Appendix V)

10.3.1 EGU Emissions Controls Expected by 2018 Due to Ongoing Air Pollution Control Programs

Clean Air Interstate Rule (CAIR) The IPM® model was used to predict future emissions from EGUs after implementation of CAIR.[15] Modifications to the output of IPM® made to better represent anticipated

[15] Although the IPM® model runs also anticipated the implementation of EPA's Clean Air Mercury Rule (CAMR), that rule has since been vacated by the courts. However, it is anticipated the adjustments to the predicted SO_2 emissions from electric generating units (EGUs) used in the air quality modeling, which were based on SO_2 controls to be installed through New York's (and other states') regulations for mercury and CAIR, will have more of an impact on the air quality modeling analysis conducted for this SIP than the vacatur of the CAMR rule.

controls are described in the report *Documentation of 2018 Emissions from Electric Generation Units in the Eastern United States for MANE-VU's Regional Haze Modeling (Alpine Geophysics, March 2008)* (Appendix W). CAIR will cap emissions of sulfur dioxide (SO2) and nitrogen oxides (NOx) in the eastern United States. New York's CAIR Program became effective October 19, 2007. As discussed in preceding sections, a July 11, 2008 decision from the U.S. Court of Appeals for the District of Columbia Circuit vacated the Clean Air Interstate Rule (CAIR) and remanded the rule back to EPA. This disruption resulted in the need for both Class I states and contributing states to reevaluate the control strategies and other elements of their regional haze SIPs, which caused states to delay submissions further. Complicating this matter was EPA's petition for rehearing and the Court's request for a briefing asking if it should stay the mandate until EPA revises the rule in response to the remand. On December 23, 2008, the U.S. Court of Appeals for the District of Columbia Circuit decided to remand the rule back to EPA without the vacatur of CAIR, but did not impose a particular schedule by which EPA must revise CAIR. The CAIR program, therefore, remains in effect, and the emission reductions are expected to occur in 2009 and 2010. Since CAIR has been remanded to EPA to fix its flaws and it is uncertain exactly how EPA will do this, it is not possible to determine with any amount of certainty the emission levels that will occur by 2018. One can surmise, however, that EPA would develop a program at least as stringent as CAIR. MANU-VU states determined that Phase II level reductions were reasonable and reflect that in their selection of reasonable progress goals. New York commits to attain that level of emission reduction by 2018 to meet its reasonable progress requirement.

10.3.2 Other Point Source Controls Expected by 2018 Due to Ongoing Air Pollution Control Programs

Control factors were applied to the 2018 MANE-VU inventory to represent the following national, regional, or state control measures:

- NO_x SIP Call Phase I (NO_x Budget Trading Program)
- NO_x SIP Call Phase II
- NO_x RACT in 1-hour Ozone SIPs
- NO_x RACT in 8-hour Ozone SIPs
- NO_x OTC 2001 Model Rule for ICI Boilers
- 2-, 4-, 7-, and 10-year MACT Standards
- Combustion Turbine and Reciprocating Internal Combustion Engines (RICE) MACT
- Industrial Boiler/Process Heater MACT[16]
- EPA's Refinery Enforcement Initiative

- Acid Deposition Reduction SO_2 Budget Trading Program

In addition, states provided specific control measure information about specific sources or regulatory programs in their state. MANE-VU used state-specific data to the extent it was available.

For specific states, the measures included in this analysis reduce emissions for the following pollutants and non-EGU point source categories due to strategies developed for purposes of reducing ozone in the Ozone Transport Region (OTR):

- NO_x measures:

    - Asphalt production plants in CT, DC, NJ, and NY;
    - Cement kilns in ME, MD, NY, PA;
    - Glass and fiberglass furnaces in ME, MD, NY, PA;
    - In addition, New York will be implementing controls on industrial, commercial and institutional boilers, distributed generation sources, high electricity demand day (HEDD) operations.

These measures were included in the "Beyond on the Way" inventory for the states identified.

For other regions, MANE-VU used inventories developed by the RPOs for those regions, including VISTAS Base G2, MRPO's Base K, and CenRAP's emissions inventory. (Emissions for CenRAP states in the MANE-VU modeling domain were taken from the VISTAS Base G2 inventory.)

<u>New York Reasonably Available Control Technology (RACT) Reductions</u>

CAA Section 172(c)(1) requires SIPs to "provide for the implementation of all reasonably available control measures as expeditiously as practicable (including such reductions in emissions from existing sources in the area as may be obtained through the adoption, at a minimum, of reasonably available control technology) and shall provide for attainment of the national primary ambient air quality standards." EPA interprets Reasonably Available Control Technology (RACT) to mean "the lowest emissions limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility."

New York State has a RACT program for sources which emit nitrogen oxides and volatile organic compounds—both major constituents of particulate matter—over certain threshold limits. Through the RACT

[16] The inventory was prepared before the MACT for Industrial Boilers and Process Heaters was vacated. Control efficiency was assumed to be at 4 percent for SO_2 and 40 percent for PM.

regulations, New York State controls emissions from combustion sources, surface coating processes, graphic arts printing, and metal cleaning operations, among others.

Although emission reductions of VOC are not required to be addressed in this SIP, the reduction in their emissions are expected to improve visibility in Class I areas as well as others. The other pollutant addressed by RACT requirements, however, is being addressed by this SIP and as such, the application of RACT in New York is of importance to the reduction of visibility impairment.

A number of additional RACT regulations are being instituted to update the current RACT requirements. Additionally, the Department determined that source-specific RACT provisions presently in place also meet RACT requirements for all applicable EPA source categories in operation in New York. Many permits in which these requirements appear contain conditions requiring the reassessment of RACT for the affected sources, resulting in the frequent updating of these requirements. These regulations will serve to reduce PM concentrations through the state in addition to ozone levels since VOCs and NOx act as precursors for both of these pollutants.

10.3.3 New York State and Federal Requirements for Particulate Matter, Sulfur and Nitrogen Oxides

Existing State Particulate Matter Measures

Part 215: Open Burning

6 NYCRR Part 215 has been revised and has been published in the New York State Register. The new version will become effective October 14, 2009. This revised regulation will allow (in any town with a total population less than 20,000) for the burning of downed limbs and branches (including branches with attached leaves or needles) less than six inches in diameter and eight feet in length between May 15th and the following March 15th. The burning of all other household generated wastes is prohibited. The Department feels that the strengthened rule will reduce the impacts of pollutants such as dioxins, particulate matter and carbon monoxide. A strengthened ban will have the additional benefit of reducing forest fires and the impacts from them. Exemptions from this rule will include restricted categories such as camp fires, agricultural burning, prescribed burning, and ceremonial fires.

Existing Federal Particulate Matter Measures

Locomotive Engines and Marine Compression-Ignition Engines Final Rule

Locomotives and marine diesel engines are important contributors to the nation's air pollution, as they emit large amounts of direct PM and NOx. In 2007, these engines accounted for approximately 25 percent of mobile source diesel PM2.5 emissions and 20 percent of mobile source NOx emissions. To dramatically reduce emissions from these engines, EPA is issuing its rule, "Control of Emissions of Air Pollution From Locomotive Engines and Marine Compression-Ignition Engines Less than 30 Liters per Cylinder." This final rule was effective on July 7, 2008, and set new exhaust emission standards on all types of locomotive engines, and on all types of marine diesel engines below 30 liters per cylinder displacement.

This program includes a set of near-term emission standards for newly-built engines, which will begin to be phased in starting 2009, and for existing locomotives, which would take effect as soon as 2008 but no later than 2010 (2013 for Tier 2 locomotives)–as soon as certified remanufacture systems are available. Further long-term standards would be phased in over time, starting in 2014. Provisions are also being included to reduce unnecessary locomotive engine idling. Compared to engines meeting current standards, these stricter requirements will ultimately result in estimated PM reductions of 90 percent and NOx reductions of 80 percent. In addition to PM and NOx reductions, the standards will effectively reduce nonmethane hydrocarbons, carbon monoxide, and air toxics.

New or Revised State Particulate Matter Measures

Part 227: Stationary Combustion Installations

The Department has cited a need to add PM2.5 RACT requirements to 6 NYCRR Part 227, "Stationary Combustion Installations." Sources with potential direct PM2.5 emissions greater than 100 tpy would be required to perform a case-by-case RACT analysis to determine the appropriateness of controls. The methods by which the RACT analysis would be conducted will be similar to those of the NOx RACT requirements of Part 227. The addition of this requirement would affect nearly 10 sources within New York State.

Existing State Sulfur Measures

Part 225: Fuel Consumption and Use

6 NYCRR Part 225, "Fuel Consumption and Use," contains methods by which to reduce sulfur associated with different types of fuel use. Subpart 225-1 places restrictions on the amount of sulfur in oil or coal which is bought or sold for the purpose of use in New

York State. These standards are area and facility-specific; the current standards were made effective in January 1988.

Subpart 225-4 declares that any motor vehicle diesel fuel or fuel additives sold or supplied in New York State must conform with the provisions provided in 40 CFR Part 80, Subpart I (July 1, 2003). These provisions commenced June 1, 2006 for all refiners and importers supplying diesel fuel to the State of New York, July 15, 2006 for locations in the diesel fuel distribution system downstream from refineries and import facilities except retail outlets and wholesale purchaser-consumer facilities, and September 1, 2006 for retail outlets and wholesale purchaser-consumer facilities. Included is a requirement for a maximum sulfur content in motor vehicle diesel fuel of 15 ppm, with some exceptions allowing for 500 ppm.

In addition to these requirements for sulfur content, subpart 225-3 addresses the volatility of gasoline. This regulation mandates a 9.0 psi Reid Vapor Pressure on gasoline sold during the ozone season. Retaining this level will limit the amount of VOCs which vaporize into the air.

Existing Federal Sulfur Measures

Clean Air Act Title IV – Acid Rain Program

Due to the ongoing problem of acid deposition, caused principally by the combustion of fossil fuels, Title IV of the CAA contained the goal of reducing annual emissions of SO_2 by 10 million tons from 1980 emissions levels within the continental U.S. EPA proposed to meet these goals through two phases of SO_2 requirements. In CAA Section 403, EPA established an SO_2 allowance allocation and trading system.

The Phase I SO_2 requirements went into effect on January 1, 1995. Under CAA Section 404, EPA allocated allowances to sources in 21 eastern and midwest states, including New York State. A total of 445 units were held to emissions limitations by the Phase I requirements.

On January 1, 2000, the emissions limitations established in CAA Section 404 were superseded by those established in the Phase II SO_2 requirements of CAA section 405. This section served to place more stringent controls on the Phase I units, and imposed restrictions on smaller plants with oil-, coal- and gas-fired units as well. These requirements impacted over 2,000 units.

Also included in Title IV is a similar goal of reducing annual NOx emissions by 2 million tons from 1980 levels.

Nitrogen Oxides

Existing State NOx Measures

Part 210: Emissions and Labeling Requirements for Personal Watercraft Engines

6 NYCRR Part 210, “Emissions and Labeling Requirements for Personal Watercraft Engines,” establishes an emissions reduction program for personal watercraft engines. Adopted in 2003, this regulation reduces emissions of NOx, PM and hydrocarbons past the levels achieved by federal standards.

This regulation includes lower emission certification levels beginning with model year 2006 and which become increasingly stringent; requires test procedures for new and in-use engines which guarantee compliance with the standards; establishes an environmental label program; and extends emission warranty requirements. Manufacturers must ensure that the emissions of their entire product line meet the corporate average requirement. CARB’s average requirement declines through the 2008 model year.

Part 217: Motor Vehicle Emissions

Included in 6 NYCRR Part 217, “Motor Vehicle Emissions,” effective October 30, 2002, are provisions which curb NOx, PM, hydrocarbon and carbon monoxide emissions from motor vehicles in New York State. The provisions of Part 217 cover inspection and maintenance programs as well as additional requirements for heavy-duty motor vehicles.

Under Subpart 217-1, motor vehicles statewide are required to conform to certain gas cap standards and, for model year 1996 and newer motor vehicles, specific on-board diagnostic system requirements. This subpart contains additional exhaust emissions requirements for applicable motor vehicles registered or primarily operated in the New York Metropolitan Area (which includes New York City, Long Island, and Rockland and Westchester Counties).

Subpart 217-3 contains anti-idling provisions for heavy duty vehicles. These heavy duty vehicles, which have a gross vehicle weight rating greater than 8,500 lbs. and are designed for transporting persons or properties, are not permitted to idle for

more than five minutes while the vehicle remains motionless, unless specifically excepted.

Since June 1, 1999, all heavy duty diesel vehicles (HDDVs) requiring registration in the New York City Metropolitan Area (except for buses, municipally owned vehicles and other vehicles exempted in the subpart) were required by Subpart 217-5 to pass an annual diesel emissions inspection test. Beginning June 1, 2000, buses and municipally owned vehicles were also held to this requirement. This time schedule also applies for which vehicles statewide are subject to roadside or random inspection along public highways and quasi-public locations.

Part 218: Emission Standards for Motor Vehicles and Motor Vehicle Engines

Section 177 of the CAA permits states to adopt new motor vehicle emissions standards that are identical to California's. New York has exercised this option in 6 NYCRR Part 218, "Emission Standards for Motor Vehicles and Motor Vehicle Engines," which incorporates California's emissions standards for light-duty vehicles. These regulations apply to 1993, 1994, 1996 and newer model year vehicles.

The Low Emission Vehicle (LEV) regulations provide flexibility to auto manufacturers by allowing them to certify their vehicle models to one of several different emissions standards. These consist of several different tiers of increasingly stringent LEV emission standards to which a manufacturer may certify a vehicle, including LEV, ultra-low-emission vehicle (ULEV), super-ultra low-emission vehicle (SULEV), and zero-emission vehicle (ZEV). The different standards are intended to provide flexibility to manufacturers in meeting program requirements. However, manufacturers must demonstrate that the overall fleet for each model year meets the specified non methane organic gas (NMOG) standard for that year. These requirements are progressively lower with each model year.

New or Revised New York State NOx Measures

Part 212: General Process Emission Sources

6 NYCRR Part 212.10, which applies to both NOx and VOC emissions, requires major stationary sources to apply Reasonably Available Control Technology (RACT) to all emission points of NOx and VOC emissions. The definition of a major stationary source depends on the location of the source within the State. Sources located in the New York Metropolitan Area and Orange County have a lower major source emission threshold (25 tons per year for both contaminants) than major sources located outside these areas (100 tons per year for NOx and 50 tons per year for VOCs).

The Department is in the process of revising Section 212.10 to control emissions from hot mix asphalt production. This revision will affect only minor sources, as all asphalt production plants in New York State have capped out below the major source emissions threshold. The dryer operation is the main source of emissions in asphalt production plants, as high temperatures amid the presence of nitrogen and oxygen result in NOx formation. These NOx emissions reductions can efficiently be realized through the implementation of low-NOx burners and flue gas recirculation. Because smaller burners are incompatible with these controls, the Department will use annual burner tune-ups as the suggested control strategy.

NOx emissions from large burners can be reduced by 25-40 percent with low-NOx burners, and by an additional 10 percent through addition of flue gas recirculation. The proposed control methods come at reasonable costs. Low-NOx burner costs are in the range of $500-$1,250 per ton of NOx reduced, and combining these with flue gas recirculation leads to costs of $1,000-$2,000 per ton of NOx removed, as calculated by the Department. The annual burner tune-up requirement for smaller burners is expected to decrease NOx emissions by approximately 10 percent.

Subpart 220-1: Portland Cement Plants

The Department will target the reduction of NOx emissions with updates made to 6 NYCRR Part 220, "Portland Cement Plants." NOx is created during fuel combustion for the energy-intensive formation of cement. The state will investigate RACT controls to identify a feasible way to meet these reductions. In updating the rule, the regulations concerning Portland Cement plants will be identified as Subpart 220-1, as new regulations for glass manufacturing plants will be introduced as Subpart 220-2.

There are currently three Portland Cement plants in New York State (three long wet kilns, and one dry kiln). Upon the introduction of NOx RACT in 1995, the Department promulgated revisions to Part 220 that required owners of these facilities to submit a plan that identified RACT and included a schedule for installation of RACT. An all-inclusive regulation could not be established, as the variation in technology demanded a distinct analysis and application of NOx controls that were reasonably available at the time.

The Department may retain the same approach, where each plant owner will be required to perform a RACT analysis that will identify the level of control technology and include a schedule for installation.

Subpart 220-2: Glass Manufacturing

The Department is proposing to implement a new regulation to limit the emissions of NOx formed by the high temperatures required in glass melting furnaces. The current 6 NYCRR Part 220, "Portland Cement Plants," will be altered to include a Subpart 220-2, under which the glass manufacturing plants within the state will be subject to certain restrictions. New York State currently does not contain specific emission limitation requirements, but will propose those NOx limits proposed by the OTC in their 2006 model rule.

There are several alternate control technology options to reduce NOx from glass furnaces. These include combustion modifications (low NOx burners, oxy-fuel firing, oxygen-enriched air staging), process modifications (fuel switching, batch preheat, electric boost), and post-combustion modifications (fuel reburn, selective catalytic reduction, selective non-catalytic reduction). Oxy-firing has proved to be the most effective control measure by reducing NOx emissions up to 85 percent, as well as reducing energy consumption, increasing production rates and improving glass quality.

6 NYCRR Part 212.10, which applies to both NOx and VOC emissions, will require major glass manufacturing facilities to conduct a Reasonably Available Control Technology (RACT) analysis. The definition of a major glass manufacturing facility depends on the location of the source within the State. Sources located in the New York Metropolitan Area have a lower major source emission threshold (25 tons per year) than major sources located elsewhere in New York State (100 tons per year).

Part 227-2: NOx RACT

This regulatory revision will set new more stringent NOx limits on electricity generating units. On High Electricity Demand Days (HEDD) base loaded, load following and peaking units all increase operations to meet demand. HEDDs are generally those days when the potential for ozone formation is highest (hazy, hot and humid weather). The Department is specifically moving to revise the NOx emission limits for all boilers and combustion turbines. These emission limits are expected to result in the reduction of 35 to 40 tons per day of NOx emissions.

Part 227: Stationary Combustion Installations

6 NYCRR Part 227, “Stationary Combustion Installations” is undergoing a number of revisions. These include stricter requirements for NOx-emitting sources, and a new requirement for sources with excessive direct PM emissions.

Subpart 227-2 will be revised to include stricter control requirements for major stationary sources that contain natural gas and/or oil-fired Industrial/Commercial/Institutional (ICI) boilers, and/or coal-fired or combined cycle/cogeneration combustion turbines. The regulation contains presumptive RACT emission limits that vary depending on the size of the boiler and type of fuel burned. Unique boiler configurations may lead to problems meeting the proposed presumptive RACT emission limits; in such events, case-by-case RACT determinations will be made.

Part 231: New Source Review for New and Modified Facilities

Revisions to Part 231 were approved by the State Environmental Board on January 6, 2009. Part 231 has been re-titled “New Source Review for New and Modified Facilities” and includes new Subparts 231-3 through 231-13. The new subparts implement nonattainment New Source Review (NNSR) and attainment New Source Review Prevention of Significant Deterioration (PSD).

The revised Part 231 NNSR requirements are based on New York’s existing NNSR program Subpart 231-2, with revisions to include selected provisions from the December 31, 2002 Federal NSR reform rule and EPA’s December 21, 2007 Reasonable Possibility in Recordkeeping Rule. The newly added PSD requirements are also based largely on the December 31, 2002 Federal NSR reform rule as codified at 40 CFR 52.21.

Revised Part 231 changes the basis of applicability for modifications and emission reduction credits (ERCs) from an "Emission Unit" basis to an "Emission Source" basis, incorporates various federal requirements, provides clarification of existing requirements, and requires comprehensive reporting, monitoring, and recordkeeping that will conform to the requirements of Title V. Revised Part 231 establishes a new method for determining baseline actual emissions. Baseline actual emissions are determined by using any 24 consecutive month period of emissions in the previous five years. All facilities (no separate baseline period for electric utility steam generating units) will be required to determine their baseline actual emissions using this method.

The Department has retained existing Subpart 231-1 "Requirements for emission sources subject to the regulation prior to November 15, 1992" and Subpart 231-2, "Requirements for emission units subject to the regulation on or after November 15, 1992". These regulations are currently cited in many air permits issued throughout the State and retaining them will facilitate implementation and enforcement of the NSR program. Existing Subpart 231-2 was revised only to indicate that the Subpart will not apply after the effective date of revised Part 231. Thus, permit applications received on or after the effective date of revised Part 231 will be processed according to the provisions of Subparts 231-3 through 231-13, as applicable.

As required by 40 CFR 51.307, the review of any new major stationary source or major modification that would be constructed in an area that is designated attainment or unclassified must provide for written notification of all affected Federal Land Managers of any proposed new major stationary source or major modification that may affect visibility in any Federal Class I area, advance notification of FLMs of the intended submission of an application or notification of intent to monitor, and the consideration of any analysis performed by the Federal Land Manager.

Additionally, reviews must be required of any new major stationary source or major modification that may have an impact on any mandatory Class I area if it is identified at least 12 months before submission of a complete permit application, or that proposes to locate in an area classified as nonattainment that may have an impact on visibility in any mandatory Class I Federal area.

Finally, the review of any major stationary source or major modification under the PSD program in New York State must also be conducted so as to assure that the source's emissions will be consistent with making reasonable progress toward the national visibility goal, accounting for the costs of compliance, the time necessary for compliance, the energy and non-air quality

environmental impacts of compliance, and the useful life of the source.

Diesel Emissions Reduction Act of 2006

New York State enacted the Diesel Emissions Reduction Act of 2006, for which rulemaking is currently underway. This initiative will require thousands of state-owned or operated diesel-powered vehicles to be retrofitted with emission control equipment to cut down on the release of exhaust particles. The benefit will be seen with existing engines which are not expected to be replaced with new, cleaner engines for some time. This regulation will provide reductions beginning in 2008, and additional reductions in 2009 and 2010, which will contribute to the attainment of the PM NAAQS.

Existing Federal NOx Measures

Federal Diesel Fuel

EPA's motor vehicle diesel fuel regulations treat diesel engine systems and fuels as a system. The EPA motor vehicle diesel fuel regulation is an integral part of EPA regulations establishing new emission standards that were effective for model year 2007 and apply to heavy-duty highway engines and vehicles greater than 8,500 pounds GVWR.

In addition to setting emission limits for PM, the requirements establish standards for NOx and non-methane hydrocarbons (NMHC) of 0.20 grams per brake horsepower-hr (g/bhp-hr) and 0.14 g/bhp-hr, respectively. The NOx and NMHC standards will be phased in between 2007 and 2010 for diesel engines. The phase-in will be on a percent-of-sales basis from 2007 into 2010. Gasoline engines are also subject to these standards, with a phase-in provision that requires 50 percent compliance in the 2008 model year and 100 percent compliance in the 2009 model year. Flexibility provisions to assist the transition to the new standards are included that will provide an incentive for the early introduction of clean technologies. They will also provide for flexibility in adapting new technologies and existing engine-based technologies.

Because many control devices are damaged by sulfur, it is necessary to reduce the level of sulfur in motor vehicle diesel fuel from 500 ppm to 15 ppm. This rule provides for production of 15 ppm motor vehicle diesel fuel beginning on June 1, 2006. The rule became effective at downstream locations (such as terminals) on July 15, 2006, and at retail locations and wholesale purchaser-consumer facilities on October 15, 2006.

Table 10-2 - Recreational Marine Diesel Emission Standards

Subcategory	HC+NOx (g/kW-hr)	PM (g/kW-	Implementation Date
disp* < 0.9	7.5	0.40	2007
0.9 ≤ disp < 1.2	7.2	0.30	2006
1.2 ≤ disp < 2.5	7.2	0.20	2006
disp ≥ 2.5	7.2	0.20	2009

*engine displacement

Small Spark-Ignition Engines

The first phase of regulations to control emissions from new nonroad spark-ignition engines at or below 19 kW (25 hp) was published in July 1995 (60 FR 34582). Covered under this rule are a wide variety of new engines manufactured during or after 1997 used in, among other things, lawn and garden equipment and small construction equipment. This first phase of standards was to reduce hydrocarbon emissions by 32 percent and carbon monoxide emissions by seven percent in 2020, when complete fleet turnover would be achieved.

A second phase of control requirements was published in March 1999 (64 FR 15208), specifically for Class I and Class II non-handheld spark-ignition engines at or below 19 kW such as lawnmowers and garden tractors. These Phase 2 requirements, which were phased in from 2001 to August 2007, will result in an estimated 51 percent reduction in combined hydrocarbon and NOx emissions by 2010, and a 59 percent reduction of these emissions by 2020.

Additional Phase 2 requirements were published by EPA in April 2000 (65 FR 24268). These standards affected handheld spark-ignition engines at or below 19 kW, principally those used in lawn and garden equipment such as trimmers, leaf blowers and chainsaws. An estimated 70 percent reduction of combined hydrocarbon and NOx emissions are expected by 2010. The standards apply to Class III, IV, and V engines, and were phased in between 2002 and 2007.

MACT

Under Section 112 of the 1990 CAA Amendments, HAPs are required to be controlled by technology determined to be MACT. Otherwise known as NESHAP standards, the Department has been adopting these control requirements as they have been developed by EPA and has therefore been realizing the reductions resulting from the MACT program. Many of these standards affect emissions of PM or its precursors. Notable sources of NOx

reductions include the MACT standards relating to combustion, such as the standards for Stationary Combustion Turbines, Combustion Sources at Kraft, Soda, and Sulfite Pulp & Paper Mills, and Reciprocating Internal Combustion Engines.

10.3.4 Area Sources Controls Expected by 2018 Due to Ongoing Air Pollution Control Programs

For area sources within MANE-VU, New York relied on MANE-VU's Version 3.0 Emissions Inventory for 2002. In general, the 2018 inventory for area sources was developed by MANE-VU applying growth and control factors to the 2002 Version 3.0 inventory. Area source control factors were developed for the following national or regional control measures:

- OTC VOC Model Rules
- Federal On-board Vapor Recovery
- New Jersey Post-2002 Area Source Controls
- Residential Woodstove NSPS

The following additional control measures were included in the 2018 analysis to reduce VOC emissions for the following area source categories for some states (as identified below):

- VOC measures: adhesives and sealants (controls added in all MANE-VU states except VT),
- Emulsified and cutback asphalt paving (controls added in all MANE-VU states except DE, ME, and VT),
- Consumer products (controls added in all MANE-VU states except VT), and
- Portable fuel containers (controls added in all MANE-VU states except VT)

After release of Version 3.0 of the MANE-VU 2002 inventory, Massachusetts revised their inventory of area source heating oil emissions due to two changes: (1) The sulfur percent used to derive the emissions factors was adjusted from 1.0 to 0.3; and (2) use of the latest DOE-EIA 2002 fuel use data instead of the previously used 2001 version. These two changes significantly altered the 2002 SO_2 emissions for area source heating oil combustion. Massachusetts provided revised 2002 PE and EM tables, which MACTEC used in preparing the 2009/2012/2018 projection inventories.

The District of Columbia discovered a gross error in the 2002 residential, non-residential and roadway construction emissions. It requested that the following values be used for the 2002 base year as the basis for the 2009/2012/2018 projections:

Table 10-3 - Corrected Construction Emissions from the District of Columbia

Source Classification Code	Pollutant Code	2002 Annual Emissions(tpy)
2311010000	PM_{10}-PRI	8.2933
Residential Construction	PM_{25}-PRI	1.6587
2311020000	PM_{10}-PRI	486.1951
Indust/Comm/Inst Const	PM_{25}-PRI	97.239
2311030000	PM_{10}-PRI	289.8579
Road Construction	PM_{25}-PRI	57.9716

As noted above, the inventory information used for other regions was obtained from those regions' RPOs.

10.3.5 MANE-VU Consideration of Controls on Non-road Sources Expected by 2018 due to Ongoing Air Pollution Control Programs

MANE-VU used Version 3.0 of the MANE-VU 2002 Emissions Inventory. Non-road source controls incorporated into the modeling include the following:

Nonroad Diesel Rule. This rule sets standards that will reduce emissions by more than 90 percent from nonroad diesel equipment, and reduce sulfur levels by 99 percent from current levels in nonroad diesel fuel starting in 2007. This step will apply to most nonroad diesel fuel in 2010 and to fuel used in locomotives and marine vessels in 2012. (http://www/epa/gov/nonroaddiesel/)

In its June 1994 rule (59 FR 31306), EPA noted that nonroad engines are significant contributors of PM and its precursors, which cause or contribute to air pollution which may have negative health consequences. In this rule, EPA set the first phase of emission standards for nonroad diesel engines rated 37 kW (50 hp) and above.

The final rule published in October 2006, “Control of Emissions of Air Pollution from Nonroad Diesel Engines” (63 FR 56968) extended the previous finding to nonroad diesel engines rated below 37 kW. The rule finalizes a new set of emission standards for all nonroad diesel engines, except for locomotive engines, underground mining equipment engines, and marine engines rated at or above 37 kW. EPA finalized a set of emission standards for PM, carbon monoxide, and combined nonmethane hydrocarbons and NOx, that vary in level and implementation date depending on the rated power of the engine and other factors. These build upon the Tier 1 standards presented in the 1994 rule. The various emission limits and their implementation dates are shown in the table below.

Table 10-4 Nonroad Diesel Emission Standards

Engine Power	Tier	Model Year	NMHC+NOx*	PM*
kW < 8	Tier 1	2000	10.5 (7.8)	1.0 (0.75)
(hp < 11)	Tier 2	2005	7.5 (5.6)	0.80 (0.60)
8 ≤ kW < 19	Tier 1	2000	9.5 (7.1)	0.80 (0.60)
(11 ≤ hp < 25)	Tier 2	2005	7.5 (5.6)	0.80 (0.60)
19 ≤ kW < 37	Tier 1	1999	9.5 (7.1)	0.80 (0.60)
(25 ≤ hp < 50)	Tier 2	2004	7.5 (5.6)	0.60 (0.45)
37 ≤ kW < 75	Tier 2	2004	7.5 (5.6)	0.40 (0.30)
(50 ≤ hp < 100)	Tier 3	2008	4.7 (3.5)	-
75 ≤ kW < 130	Tier 2	2003	6.6 (4.9)	0.30 (0.22)
(100 ≤ hp < 175)	Tier 3	2007	4.0 (3.0)	-
130 ≤ kW < 225	Tier 2	2003	6.6 (4.9)	0.20 (0.15)
(175 ≤ hp < 300)	Tier 3	2006	4.0 (3.0)	-
225 ≤ kW < 450	Tier 2	2001	6.4 (4.8)	0.20 (0.15)
(300 ≤ hp < 600)	Tier 3	2006	4.0 (3.0)	-
450 ≤ kW ≤ 560	Tier 2	2002	6.4 (4.8)	0.20 (0.15)
(600 ≤ hp ≤ 750)	Tier 3	2006	4.0 (3.0)	-
kW > 560	Tier 2	2006	6.4 (4.8)	0.20 (0.15)

*g/kW-hr (g/hp-hr)

As noted above, the inventory information used for other regions was obtained from those regions' RPOs.

10.3.6 Mobile Source Controls Expected by 2018 due to Ongoing Air Pollution Control Programs

Mobile source controls incorporated into the MANE-VU modeling include the following:

Heavy Duty Diesel (2007) Engine Standard

EPA set a PM emissions standard for new heavy-duty engines of 0.01 grams per brake-horsepower-hour (g/bhp-hr), to take full effect for diesel engines in the 2007 model year. This rule also includes standards for NOx and non-methane hydrocarbons (NMHC) of 0.20 g/bhp-hr and 0.14 g/bhp-hr, respectively. These NOx and NMHC standards will be phased in together between 2007 and 2010 for diesel engines. Sulfur in diesel fuel must be lowered to enable modern pollution-control technology to be effective on these trucks and buses. EPA will require a 97 percent reduction in the sulfur content of highway diesel fuel from its current level of 500 parts per

million (low sulfur diesel, or LSD) to 15 parts per million (ultra-low sulfur diesel, or ULSD).

Tier 2 Motor Vehicle Standards

Tier 2 is a fleet averaging program, modeled after the California LEV II standards. Manufacturers can produce vehicles with emissions ranging from relatively dirty to zero, but the mix of vehicles a manufacturer sells each year must have average NOx emissions below a specified value. Tier 2 standards became effective in the 2005 model year and are included in the assumptions used for calculating mobile source emissions inventories used for 2018.

Large Industrial Spark-Ignition Engines Over 19kW and Recreational Vehicle Rules

In 2002 EPA published a federal rule to control emissions of NOx, direct PM, hydrocarbons and carbon monoxide, titled “Control of Emissions from Nonroad Large Spark-Ignition Engines, and Recreational Engines (Marine and Land-Based)” (67 FR 68242). Subject to this rule are those large spark-ignition engines such as those found in forklifts and airport ground-service equipment, and recreational engines found in off-highway motorcycles, all-terrain vehicles, and snowmobiles, as well recreational marine diesel engines. Companies that manufacture or introduce into commerce any of the subject engines or vehicles are required to produce engines and equipment meeting the new standards.

EPA enacted a two-phase system controlling emissions from large spark-ignition engines. The first phase of the standards went into effect in 2004, for which a nearly 75 percent reduction in combined NOx and hydrocarbons, based on emission measurements during steady-state operation, was expected. The second phase of requirements went into effect in 2007. These included optimization of existing technologies, and emission measurements based on a transient test cycle, which is more indicative of actual use. New requirements for evaporative emissions and engine diagnostics were also included.

10.3.7 Summary of Timelines for Rulemaking

The table below summarizes the proposed schedule for the rulemaking required to achieve the goals of this SIP. The first two (Part 225: Fuel Composition and Use, and Part 249: Best Available Retrofit Technology) are consistent with the “Asks” from the MANE-VU states with Class I areas.

Table 10-5 – Rulemaking Schedule Summary

6 NYCRR Part	Rule Name	Proposal Published in State Register	Regulatory Package to Environmental Board*	File Regulation with Secretary of State	Regulation Effective
249	Best Available Retrofit Technology*	10/2009	02/2010	04/2010	05/2010
225	Fuel Composition and Use	07-01-11	10-01-11	11-14-11	12-31-11
231	New Source Review for New and Modified Facilities	09-24-08	01-06-09	01-20-09 Amended filing 02-03-09	02-19-09 03-05-09
215	Open Fires	05-27-09	09-01-09	09-14-09	10-14-09
212.10	General Process Emission Sources (Hot Mix Asphalt (NOx))	1/2010	05/2010	06/2010	07/2010
220-1	Portland Cement Plants	1/2010	05/2010	06/2010	07/2010
220-2	Glass Manufacturing	1/2010	05/2010	06/2010	07/2010
241	Asphalt Paving Production	1/2010	05/2010	06/2010	07/2010
227-2	HEDD, Boiler NOx RACT for PM2.5	1/2010	05/2010	06/2010	07/2010

* Actual dates for Environmental Board Meetings are determined a few months ahead of time

10.3.8 Additional Measures

Several other programs are in place for which emission reductions for PM2.5 and its precursors will be realized. These are measures to which the Department cannot commit since it does not have direct control. However, they are presented here as additional weight-of-evidence measures.

Canadian Emission Reductions

Some portion of the particulate matter present in the air in the northern United States originates in Canada. The sources of this contamination are the industrial and commercial operations, fossil fuel and woodburning and especially the emissions of particulate matter and its precursors from coal-fired power plants. A number of initiatives have been put in place in Canada that will reduce emissions and have a positive effect in the air quality in the northeast United States.

The first of these are the Canada-Wide Standards for Mercury Emissions from Coal-Fired Electric Power Generation Plants. Under these provisions, a reduction of approximately 52 percent to 58 percent in mercury emissions is expected nationally by 2010. The Ontario Power

Authority (OPA) has been directed to replace Ontario's coal-fired generation facilities by cleaner sources "in the earliest practical time frame that ensures adequate generating capacity and electricity system reliability in Ontario." The reduction in mercury emissions is expected to have the co-benefit of the reduction of the emission of other pollutants as well, including particulate and its precursors (SO_2 and NOx), organics, metals and greenhouse gases. The replacement of coal-fired units in Ontario, which are most likely to affect New York's air quality, will have a significant effect on ambient particulate concentrations and haze.

The second initiative in Canada that will affect New York's air quality is the promulgation of air quality standards for PM2.5 and ozone at a level of 30ug/m3 on a 24-hour basis and 65 ppb on an 8-hour basis, respectively. The intention is to meet these standards by 2010, the result of which will have a positive effect on New York's air quality as well. Quebec's five-year report on their reduction efforts to date discusses the measures taken from 2001 to 2005. The control measures instituted by Canada are aimed at reducing industrial emissions. Specifically, regulations like Quebec's "Regulation respecting the quality of the atmosphere"[17] contain control measures for new and existing sources of VOC's similar to those in New York and other states, and set ambient air quality standards. VOC controls address surface coating processes, automotive painting operations, printing, dry cleaning, formaldehyde from panelboard mills, pulp and paper operations, styrene from composite material manufacturing (fiberglass and resins), and transportation. Particulate emissions measures include the control of fugitive emissions from mining and sandblasting, granaries, mills, distilleries, breweries, powder milk plants, fertilizer mixing plants, concrete plants, vitreous enamel operations, earthenware and ceramic products plant, polyvinyl chloride production or processing plant, wood processing plants, and aluminum manufacturing. Programs also control particulate and NOx emissions from combustion operations (boilers, turbines, and internal combustion), as well as fuel sulfur content (2.0 percent by weight for "heavy oil," 1.0 percent by weight for "intermediate oil," 0.5 percent by weight for "light oil," and 2.0 percent in weight for coal). Many other categories are covered as well woodburning, smelting, charcoal kilns, incinerators, refineries, storage tanks, metallic processing plants, as well as other industrial processes.

Additional measures are planned in the next five years to achieve their goals by 2010, including reducing emissions from residential wood heating, establishing and inspection and maintenance program for light vehicles, and implementing "other measures in the transportation, energy and climate change sectors."

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17 http://www2.publicationsduquebec.gouv.qc.ca/dynamicSearch/telecharge.php?type=3&file=/Q_2/Q2R20_A.htm

The above measures are efforts by the Canadian or Provincial governments to improve air quality. They were not included in the present attainment demonstration and will not be enforceable by New York or the federal government. However, give the proximity to New York State, air quality improvements in Canada will certainly impact New York and the northeastern United States.

New York State's "15 by 15" Initiative

New York State has initiated a clean energy plan with the goal of reducing New York's energy demand by 15 percent by 2015. The plan, known as the Energy Efficiency Portfolio Standard (or the "15 by 15 Initiative,") focuses on energy efficiency, conservation, and investment in renewable energy sources as the keys to achieving economic and environmental goals. The specific goals and highlights of the plan include:

- Reduce electricity use by 15 percent from forecasted levels by the year 2015 through new energy efficiency programs in industry and government;
- Eliminate incentives in the marketplace that discourages utilities from conserving energy by requiring annual adjustments to rates to make utilities whole for lost revenues caused by energy efficiency programs; and
- Establish new appliance efficiency standards and set more rigorous energy building codes.

The benefits of this plan for New York and for the environment include a reduction in the electricity that must be purchased, the creation of new jobs, and a reduction in emissions as a result of the need to produce less power and the substitution of clean power sources for those already in operation. The emission reductions for the "15 by 15 Initiative" are also estimated to result in an annual carbon dioxide reduction of about 12.8 million tons, which is the equivalent of removing 2.5 million cars from the road. The Department is not committing to the inclusion of any of these measures as part of the SIP at this time. The Department will evaluate each measure resulting from this initiative individually to determine if it is appropriate to be included in the SIP. The Department will need to consider among other things whether the measure is quantifiable, enforceable, and include emissions reductions that are additional to other adopted SIP measures.

NYSERDA Programs

The New York State Energy Research and Development Authority (NYSERDA) was established in 1975 and is primarily funded by state rate payers through the System Benefits Charge (SBC). The SBC has recently been extended through June 30, 2011. NYSERDA has introduced a number of programs and services to promote energy efficiency amongst the industrial, commercial, municipal, and residential sectors throughout the state, for which they provide technical and financial assistance.

One initiative that has seen success is the New York Energy $mart Program. NYSERDA has allocated funding towards energy efficiency programs, low-income energy affordability programs, and research and development projects with focuses on renewable resources, distributed generation, and combined heat and power installations. In the last five years, the New York Energy $mart Program has created a wealth of economic and environmental benefits:

- Approximately $198 million in annual energy savings
- 1,400 Gwh saved per year
- 860 MW in reduced demand
- Fuel savings of 3.3 Tbtu
- Annual carbon dioxide reduction equivalent to 200,000 fewer cars
- Significant annual greenhouse gas emission reductions:

    - Nitrogen Oxides - 1,280 tons
    - Sulfur Dioxides - 2,320 tons
    - Carbon Dioxide - 1,000,000 tons

In addition to Energy $mart, there are many other programs which result in reductions of emissions of PM and its precursors. For example, the Peak-Load Reduction Program offers incentives to offset costs to companies that implement either short-term demand response measures, or long-term permanent demand reduction, for days in which electric demand is very high. The Enhanced Commercial/Industrial Performance Program contains three tiers of incentives for the installation of energy-efficient equipment resulting in reduced electrical demand and cost. A wide range of businesses, schools, universities, state and local governments, and other institutions are eligible for these incentives. And, NYSERDA's Alternative-Fuel Vehicle Program aims to encourage fleets to purchase vehicles powered by natural gas, propane, biofuels, and electricity, and to encourage the use of emission reduction technologies and anti-idling technologies for diesel vehicles.

10.3.9 Source Retirement and Replacement Schedules

40 CFR Section 51.308(d)(3)(v)(D) requires states to consider source retirement and replacement schedules in developing reasonable progress goals. Source retirement and replacement were considered in developing the 2018 emissions inventory described in *Development of Emissions Projections for 2009, 2012, and 2018 for Non-EGU Point, Area, and Nonroad Sources in the MANE-VU Region* (MACTEC, February 2007) (Appendix E). Retirement and replacement will be managed in accordance with existing SIP requirements pertaining to PSD and New Source Review. New York State has negotiated consent decrees with certain electric utility companies that require retirement of specific air pollution sources. Table 10-1 at the end of this section lists expected shutdowns in the MANE-VU areas.

10.4 Additional Reasonable Strategies

40 CFR Section 51.308(d)(1)(i)(a) requires states to consider the following four factors to determine which additional emission control measures are needed to make reasonable progress in improving visibility: 1) costs of compliance, 2) time necessary for compliance, 3) energy and non-air quality environmental impacts of compliance, and 4) remaining useful life of any existing source subject to such requirements. The plan must include reasonable measures and identify the visibility improvement that will result from those measures.

10.4.1 MANE-VU Statement of June 20, 2007

The reasonable progress goals adopted by the MANE-VU Class I States represent implementation of the regional course of action set forth by MANE-VU on June 20, 2007 and entitled, “Statement of the Mid-Atlantic/Northeast Visibility union (MANE-VU) Concerning a Course of Action within MANE-VU toward Assuring Reasonable Progress.” These actions, consisting of control and other measures intended to reduce the emissions of visibility impairing pollutants and their precursors, are referred to in the SIP as the “Ask.” As such, these reasonable progress goals are intended to reflect the pursuit by MANE-VU States of a course of action including pursuing the adoption and implementation of the following “emission management” strategies, as appropriate and necessary:

- Timely implementation of BART requirements;
- A low sulfur fuel oil strategy in the inner zone states (New Jersey, New York, Delaware, and Pennsylvania, or portions thereof) to reduce the sulfur content of:
    - Distillate oil to 0.05 percent sulfur by weight (500 ppm) by no later than 2012,

- #4 residual oil to 0.25 percent sulfur by weight by no later than 2012,
- #6 residual oil to 0.3 – 0.5 percent sulfur by weight by no later than 2012,
- Further reduce the sulfur content of distillate oil to 15 ppm by 2016;

- A low sulfur fuel oil strategy in the outer zone states (the remainder of the MANE-VU region) to reduce the sulfur content of:

    - Distillate oil to 0.05 percent sulfur by weight (500 ppm) by no later than 2014,
    - #4 residual oil to 0.25 percent-0.50 percent sulfur by weight by no later than 2018,
    - #6 residual oil to no greater than 0.5 percent sulfur by weight by no later than 2018,

- Further reduce the sulfur content of distillate oil to 15 ppm by 2018 depending on supply and availability;

- A 90 percent or greater reduction in sulfur dioxide (SO_2) emissions from each of the electric generating unit (EGU) stacks identified by MANE-VU (Appendix P) *List of Top 167 Sources*, dated June 20, 2007) as reasonably anticipated to cause or contribute to impairment of visibility in each mandatory Class I Federal area in the MANE-VU region. If it is infeasible to achieve that level of reduction from a unit, alternative measures will be pursued in such State; and

- Continued evaluation of other control measures including energy efficiency, alternative clean fuels, and other measures to reduce SO_2 and nitrogen oxide (NO_x) emissions from all coal-burning facilities by 2018 and new source performance standards for wood combustion.

As stated above, this long-term strategy to reduce and prevent regional haze will allow states up to 10 years to pursue adoption and implementation of reasonable and cost-effective NO_x and SO_2 control measures as appropriate and necessary. The schedules by which it is expected that these measures will be adopted in New York State are presented in Section 9.4.

10.4.2 Analysis of the Four Statutory Factors

MANE-VU agreed on the above additional reasonable strategies after consideration of an analysis of the four factors that the Clean Air Act requires be considered in determining whether controls are reasonable.

New York relied on analysis developed for MANE-VU in applying the four factors to a series of emission control measures. This analysis is

described in detail in the *Statement of the Mid-Atlantic/Northeast Visibility Union (MANE-VU) Concerning a Course of Action Within MANE-VU Toward Assuring Reasonable Progress*, (Appendix K) also known as the Reasonable Progress Report. The Reasonable Progress Report summarizes MANE-VU's assessment of pollutants and associated source categories affecting visibility in Class I areas in and near MANE-VU, lists possible control measures for those pollutants and source categories, and develops the requisite four factor analysis. Table 10-6 presents a summary of the four factor analysis for the source categories analyzed in the Reasonable Progress Report[18].

[18] Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas by MACTEC

Table 10-6 - Summary of Results from the Four Factor Analysis

Source Category	Primary Regional Haze Pollutant	Control Measure(s)	Average Cost in 2006 dollars (per ton of pollutant reduction)	Compliance Timeframe	Energy and Non-Air Quality Environmental Impacts	Remaining Useful Life
Electric Generating Units	SO_2	Switch to a low sulfur coal (generally <1% sulfur), switch to natural gas (virtually 0% sulfur), coal cleaning, Flue Gas Desulfurization (FGD)-Wet, -Spray Dry, or -Dry.	IPM®* v.2.1.9 predicts $775-$1,690. $170-$5,700 based on available literature	2-3 years following SIP submittal	Fuel supply issues, potential permitting issues, reduction in electricity production capacity, wastewater issues	50 years or more
Industrial, Commercial, Institutional Boilers	SO_2	Switch to a low sulfur coal (generally <1% sulfur), switch to natural gas (virtually 0% sulfur), switch to a lower sulfur oil, coal cleaning, combustion control, Flue Gas Desulfurization (FGD)- Wet, -Spray Dry, or -Dry.	$130-$11,000 based on available literature. Depends on size.	2-3 years following SIP submittal	Fuel supply issues, potential permitting issues, control device energy requirements, wastewater issues	10-30 years
Cement and Lime Kilns	SO_2	Fuel switching, Dry Flue Gas Desulfurization-Spray Dryer Absorption (FGD), Wet Flue Gas Desulfurization (FGD), Advanced Flue Gas Desulfurization (FGD).	$1,900-$73,000 based on available literature. Depends on size.	2-3 years following SIP submittal	Control device energy requirements, wastewater issues	10-30 years
Heating Oil	SO_2	Lower the sulfur content in the fuel. Depends on the state.	$550-$750 based on available literature. There is a high uncertainty associated with this cost estimate.	Currently feasible. Capacity issues may influence timeframe for implementation of new fuel standards	Increases in furnace/boiler efficiency, Decreased furnace/boiler maintenance requirements	18-25 years
Residential Wood Combustion	PM	State implementation of NSPS, Ban on resale of uncertified devices, installer training certification or inspection program, pellet stoves, EPA Phase II certified RWC devices, retrofit requirement, accelerated changeover requirement, accelerated changeover inducement.	$0-$10,000 based on available literature	Several years - dependent on mechanism for emission reduction	Reduce greenhouse gas emissions, increase efficiency of combustion device	10-15 years

Guided by this analysis, MANE-VU arrived at a suite of suggested control measures that the MANE-VU states agreed to pursue as a region. The corollary was that the MANE-VU Class I states (Maine, New Hampshire, Vermont, and New Jersey) also asked states outside of MANE-VU that also contribute to visibility impairment to pursue similar strategies for reducing sulfate emissions from source sectors, or equivalent sulfate reductions if not from the source sectors that MANE-VU has identified for its own sulfate reductions.

10.4.3 Best Available Retrofit Technology

BART controls are among the "reasonable" strategies included in this SIP. BART control measures in New York are discussed in detail in Section 8 of this SIP. The schedule by which it is expected that a state BART rule will be adopted in New York State is presented in Section 8.4. To assess the impacts of MANE-VU states' implementation of the BART provisions of the Regional Haze Rule for non-EGUs, NESCAUM included estimated reductions anticipated for BART-eligible facilities in the MANE-VU region in the final 2018 CMAQ modeling analysis.

Two of the facilities that have been identified are located in New York, as referenced in Table 10-7. Both of these facilities have preliminarily been identified as candidates for BART control. However, New York is in the process of promulgating a state BART rule. After this has been completed, these facilities are expected to be required to prepare a BART analysis unless it is determined that they do not fit into the category of sources to which BART applies (i.e., they were constructed outside of the 15-year window applicability between 1962 and 1977, will be shut down, will cap out, emissions of visibility-impairing pollutants do not exceed 250 tons per year, or do not cause or contribute to visibility improvement in Class I areas).

Additional visibility benefits are likely to result from installation of controls at other non-CAIR0 BART-eligible facilities located in adjacent RPOs. These benefits were not accounted for in the MANE-VU modeling, since information about final BART determinations was not available.

Table 10-7 - Estimated Emissions from Non-EGU BART-Eligible Facilities Located in New York Used in Final Modeling

State	Facility Name	Unit Name	SCC Code	Plant ID (from the MANE-VU Inventory)	Point ID (from the MANE-VU Inventory)	Facility Type	2002 Emissions (tons)	2018 Emissions (tons)
NY	KODAK PARK DIVISION	U00015	10200203	8261400205	U00015	Chemical Manufacturer	23798	14216
NY	LAFARGE BUILDING MATERIALS INC	41000	30500706	4012400001	041000	Portland Cement	14800	4440

10.4.4 Low-Sulfur Oil Strategy

The assumption underlying the low-sulfur fuel oil strategy is that refiners can, by 2018, produce home heating and fuel oils that contain 50 percent less sulfur for the heavier grades (#4 and #6 residual), and a minimum of 75 percent and maximum of 99.25 percent less sulfur in #2 fuel oil (also known as home heating oil, distillate, or diesel fuel) at an acceptably small increase in price to the end user. As much as 75 percent of the total sulfur reductions achieved by this strategy come from using the low-sulfur #2 distillate for space heating in the residential and commercial sectors. While costs for these emissions reductions are somewhat uncertain, they appear reasonable in comparison to costs of controlling other sectors as documented in the MANE-VU Reasonable Progress Report, estimated at $550 to $750 per ton. The MANE-VU states agreed that a low-sulfur oil strategy is reasonable to pursue by 2018 as appropriate and necessary. New York agrees with this assessment.

New York's specific measures by which this strategy will be implemented are described in detail in Section 9.4.1.

10.4.5 EGU Strategy

MANE-VU identified emissions from 167 stacks at EGU facilities as having visibility impacts in MANE-VU Class I areas that make controlling emissions from those stacks crucial to improving visibility at MANE-VU Class I areas.

MANE-VU's agreed regional approach for this source sector is to pursue a 90 percent control level on SO2 emissions from these 167 stacks by 2018 as appropriate and necessary. MANE-VU has concluded that pursuing this level of sulfur reduction is both reasonable and cost-effective. Even though current wet scrubber technology can achieve sulfur reductions greater than 95 percent, historically a 90 percent sulfur reduction level includes lower average reductions from dry scrubbing technology. The cost for SO2 emissions reductions will vary by unit, and the MANE-VU Reasonable Progress report summarizes the various control methods and costs available, ranging from $170 to $5,700 per ton, with site-specific factors such as size and type of unit, fuels, etc. influencing the cost.

Nine facilities in New York contain 19 of the sources and are shown in Table 9-4 of this document. Section 9.4.1 describes the specific measures that New York commits to pursue to reduce emissions in accordance with the overall MAVE-VU strategy.

10.4.6 Changes to Emissions by 2018

The emission inventory for New York projects changes to point, area and mobile source inventories by the end of the first implementation period resulting from population growth; industrial, energy and natural resources

development; land management; and air pollution control. A summary of these changes is given in Table 10-10 for emissions of sulfur dioxide. More detail is provided in:

- Development of Emissions Projections for 2009, 2012, and 2018 for NonEGU Point, Area, and Non-road Sources in the MANE-VU Region (MACTEC, February 2007) (Appendix E), and
- Documentation of 2018 Emissions from Electric Generation Units in the Eastern United States for MANE-VU's Regional Haze Modeling (Alpine Geophysics, March 2008) (Appendix W).

Table 10-8 - Emissions from Point, Area and Mobile Sources in MANE-VU (SO_2 tpy)

	Baseline 2002	2018 (with additional measures for RPG)
Area	286,921	129,656
Non-EGU	264,377	91,438
EGU Point	1,643,257	368,717
On-Road	40,091	8,757
Non-Road	57,257	8,643

Table 10-9 - Emissions from Point, Area and Mobile Sources in New York (SO_2 tpy)

	Baseline 2002	2018 (with additional measures for RPG)
Area	130,409	141,408
Non-EGU	58,197	46.038
EGU Point	236,719	72,898
On-Road	10,229	1,794
Non-Road	13,288	1,686

Source:
ftp://ftp.marama.org/2018%20Best%20and%20Final%20Modeling%20Files/Summaries/10.4.5 Emissions Tables_032408.xls

10.5 Additional Measures Considered

10.5.1 Measures to Mitigate the Impacts of Construction Activities

40 CFR Section 51.308(d)(3)(v)(B) requires New York to consider measures to mitigate the impacts of construction activities. A description of MANE-VU's consideration of measures to mitigate the impacts of construction can be found in the MANE-VU Construction TSD entitled, *Technical Support Document on Measures to Mitigate the Visibility Impacts of Construction Activities in the MANE-VU Region* in Appendix G.

Under the ozone NAAQS, states in nonattainment of the ozone standard are required to consider construction emissions as part of the general conformity rule (only VOC and NOx emissions are reviewed). Mitigation under general conformity should be considered as a supplement to any mitigation activities performed under the regional haze rule.

10.5.2 Agricultural and Forestry Smoke Management

40 CFR Section 51.308(d)(3)(v)(E) requires states to consider smoke management techniques for the purposes of agricultural and forestry management in developing reasonable progress goals. A description of MANE-VU's analysis of smoke management in the context of regional haze SIPs can be found in the MANE-VU Smoke Management TSD entitled, *Technical Support Document on Agricultural and Forestry Smoke Management in the MANE-VU Region* in Appendix I.

In New York, prescribed fires have not been shown to significantly contribute to visibility impairment in mandatory Class I Federal areas. Prescribed burns are those that are less than 10 acres in size. The regulation of prescribed burns is dealt with under 6 NYCRR Part 194. However, New York has adopted a smoke management program (SMP) outlining elective prescribed guidelines for prescribed burns that consider the possible impacts in Class I areas. These measures are described below.

New York State has a process for authorizing or granting approval to allow certain fires. The Division of Forest Protection and Fire Management at the Department manages prescribed fires. A total of 23 prescribed fires treating 273 acres were conducted in New York State by the Department on Department-owned land in Regions 1, 3, 7, and 8 by the Albany Pine Bush Preserve Commission and the Long Island Nature Conservancy in 2005. During 2005, there were 208 wildfires which burned 669 acres. In 2006, there were 30 prescribed fires which treated 330 acres at the same locations listed above, and there were 231 wildfires which totaled 2,323 acres burned. The prescribed fires are conducted for wildlife and habitat management, and rare and endangered species management purposes. The prescribed burns in the Long Island Pine Barrens area also provide for hazardous fuels reduction, which minimizes wildfire risk.

New York State has encouraged wildland owners/managers to consider alternatives to burning, which include mowing techniques, and herbicide use for cost effective removal.

New York State has documented the steps taken prior to the burn and actions taken during and after the burn to reduce air pollutant emissions. Steps are taken to ensure that air quality impacts are minimized during burning, and the prescribed burn plans for an area of 10 acres or more must go through a State Environmental Quality Review and Department

review process (USDA Forest Service lands and Department of Defense lands are exempt from the review process for all prescribed burns).

The smoke management components of burn plans are as follows:

- Actions to minimize fire emissions which include measures that will be taken to reduce residual smoke, such as rapid and complete mop-ups and mop-ups of certain fuels;

- Evaluate smoke dispersion conditions prior to authorizing fires. Burn plans should evaluate potential smoke impacts at sensitive receptors and time fires to minimize exposure of sensitive populations and avoid visibility impacts in mandatory Class I Federal areas. The plan should identify the distance and direction from the burn site to local sensitive receptor areas and to regional/interstate areas where appropriate. Fire prescriptions submitted prior to the day of the fire must specify minimum requirements for the atmospheric capacity for smoke dispersal such as minimum surface and upper level wind speeds, desired wind direction, minimum mixing height, and dispersion index.

- The plan should identify actions that will be taken to notify populations and authorities (e.g., local air quality managers) at sensitive receptors, including those in adjacent jurisdictions, prior to the fire. New York State has a public notification process and exposure reduction process in place to reduce the impacts of burning. The plan should also identify contingency actions that will be taken during a fire to reduce the exposure of people at sensitive receptors if smoke intrusions occur. Appropriate short-term (less than 24-hour) contingency actions may, among other things, include:

    - Notifying the affected public (especially sensitive populations) of elevated pollutant concentrations,
    - Suggesting actions to be taken by sensitive persons to minimize their exposure (e.g., remain indoors, avoid vigorous activity, avoid exposure to tobacco smoke and other respiratory irritants),
    - Providing clean-air facilities for sensitive persons,
    - Halting ignitions of any new open burning that could impact the same area,
    - Analyzing the fire situation and identifying alternative management responses upon becoming aware that a fire is out of air quality prescription with regard to the air quality criteria,
    - Consulting State air quality managers regarding appropriate short-term fire management response to abate verified impacts,
    - Implementing management responses that will mitigate the adverse impacts to public health,
    - Reporting the steps taken to mitigate adverse impacts to the public and appropriate State agencies after they have been completed.

In addition, New York State has a process to evaluate potential smoke impacts at sensitive receptors and schedule fires to minimize exposure of sensitive populations and avoid visibility impacts in Class I areas. There are several ways to reduce emissions from a single fire. The approaches fall into four categories and their applicability varies by fuel type:

- Minimize the area burned
- Reduce the fuel loading in the area to be burned
- Reduce the amount of fuel to be consumed by the fire
- Minimize emissions per ton of fuel consumed

New York State has a monitoring process in place to determine how fires affect visibility in Class I areas. New York's SMPs identify how the effects of the fire on air quality at sensitive receptors, and visibility in mandatory Federal Class I areas will be monitored. The extent of the monitoring plan should match the size of the fire. For small fires, visual monitoring of the direction of the smoke plume and monitoring nuisance complaints by the public may be sufficient. Other monitoring techniques include posting personnel on vulnerable roadways to look for visibility impairment and initiate safety measures for motorists, posting personnel at other sensitive receptors to look for smoke intrusions, using aircraft to track the progress of smoke plumes, and continued tracking of meteorological conditions during the fire. For large fires expected to last more than one day, locating real-time PM monitors at sensitive receptors may be warranted to facilitate timely response to smoke impacts.

New York State has established a policy to issue health advisories when necessary. Air Quality Health Advisories help provide increased notice for at-risk individuals to reduce exposure to ozone and PM2.5 by taking the recommended preventative measures. The Department and the New York State Department of Health will issue Air Quality Health Advisories when Department meteorologists predict levels of pollution, either ozone or fine particulate matter (PM2.5), are expected to exceed an Air Quality Index (AQI) value for 100. The AQI was created by the EPA as an easy way to correlate levels of different pollutants to one scale, with a higher AQI value leading to a greater health concern. Air Quality Health Advisories are issued with an effective date and time for locations in one of more of eight air quality regions.

Pursuant to the EPA's interim guidance (cited above), New York State has adopted a program that they believe will prevent NAAQS violations and addresses visibility impairment due to fires. This program established basic parameters: wind speed, direction, location, and distance to sensitive receptors.

Public education and awareness programs have been implemented to explain the use and importance of fire for ecosystem management, the implications to public health and safety, and the goals of the SMP. Wildland and air quality managers should work with the press to announce pre-fire health advisories, and post-fire results including such things as the

management objectives met; smoke intrusions observed, and/or successful minimization of air quality impacts.

New York State has a program in which owners/managers must get prior authorization and a permit prior to implementing fire plans. There must also be an approved burn plan in place, approved by the Natural Resource Supervisor in the Department region affected.

6 NYCRR Part 215 has been revised and has been published in the New York State Register. The new version will become effective October 14, 2009. More than 850 towns in New York have fewer than 20,000 people, and burning household rubbish is common practice in most of those towns. The revised regulation will ban the burning of all household rubbish. However, the revision will allow (in any town with a total population less than 20,000) for the burning of downed limbs and branches (including branches with attached leaves or needles) less than six inches in diameter and eight feet in length between May 15th and the following March 15th.

10.6 Estimated Impacts of New York's Long Term Strategy on Visibility

40 CFR Section 51.308(d)(3)(v)(G) requires states to address the net effect on visibility resulting from changes projected in point, area and mobile source emissions by 2018.

The emission inventory for New York State, discussed in Section 7, projects changes to point, area and mobile source inventories by the end of the first implementation period resulting from population growth; industrial, energy and natural resources development; land management; and air pollution control. The net effect of these emission reductions on visibility in Class I areas was discussed in the weight-of-evidence demonstration provided in *Contributions to Regional Haze in the Northeast and Mid-Atlantic United States*, Appendix A, and in the Reasonable Progress Goal discussion in Section 9.0. These reductions will allow the visibility in Class I areas to meet the reasonable progress goals through the initial time period to 2018, as well as out to 2064.

NESCAUM has conducted modeling for MANE-VU to document the impacts of the long term strategy on visibility at affected Class I areas. (See *2018 Visibility Projections,* NESCAUM, March 2008,) Appendix V. The Class I states affected by emissions from within New York have or will have established reasonable progress goals for each of their Class I areas for 2018. The control measures included in this SIP represent the reasonable contribution of New York toward achieving those reasonable progress goals by 2018.

The starting point for indicating progress achieved by measures included in this SIP and other MANE-VU-member SIPs is the 2000-2004 baseline visibility at affected Class I areas. To calculate the baseline visibility for

affected Class I areas, using 2000-2004 IMPROVE monitoring data, the deciview value for the 20 percent best days in each year were averaged together, producing a single average deciview value for the best days. Similarly, the deciview values for the 20 percent worst days in each year were averaged together, producing a single average deciview value for the worst days.

Initial modeling to assess the impact of potential control measures is documented in *MANE-VU Modeling for Reasonable Progress Goals: Model Performance Evaluation, Pollution Apportionment, and Control Measure Benefits*, (NESCAUM, February 2008, Appendix R). Results of the reasonable progress modeling showed that sulfate aerosol – the dominant contributor to visibility impairment in the Northeast's Class I areas on the 20 percent worst visibility days – has significant contributions from states throughout the eastern U.S. that are projected to continue in future years from all three of the eastern regional planning organizations (RPOs). An assessment of potential control measures identified a number of promising strategies that would yield significant visibility benefits beyond the uniform rate of progress and, in fact, significantly beyond the projected visibility conditions that would result from "on the books/on the way" air quality protection programs. These additional measures include the adoption of low sulfur heating oil, implementation of Best Available Retrofit Technology (BART) requirements, and additional electric generating unit (EGU) controls on select sources.

Final modeling was conducted after consultation with states in and outside of MANE-VU. Final modeling is documented in *2018 Visibility Projections* (NESCAUM, March 2008, Appendix V). Emissions inventory adjustments were made for this modeling in order to better represent the likely outcome of efforts to pursue the BART, low sulfur fuel, and EGU control measures included in the MANE-VU June 20, 2007 statements and described above in Section 10.4.1, above.

Figures 10-13a through 10-13e illustrate the predicted visibility improvement by 2018 resulting from the implementation of the MANE-VU regional long term strategy by New York State as well as others. The results for each area indicate that visibility improvement will occur over the period of the initial SIP (i.e., out to 2018). This improvement is compared to the Uniform Rate of Progress for affected Class I areas. All MANE-VU sites are projected to meet or exceed the uniform rate of progress goal for 2018. In addition, no site anticipates increases in best day visibility relative to the baseline.

Figure 10-13a - Projected Visibility Improvement at Acadia National Park Based On 2009 and 2018 Best and Final Projections

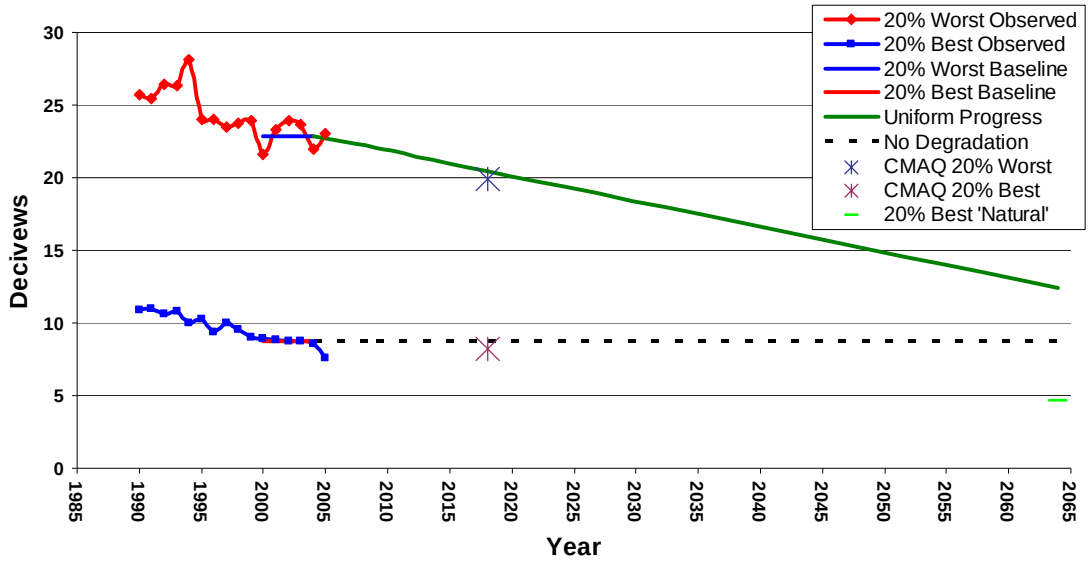


Figure 10-13b - Projected Visibility Improvement at Brigantine National Wildlife Refuge Based On Best and Final Modeling

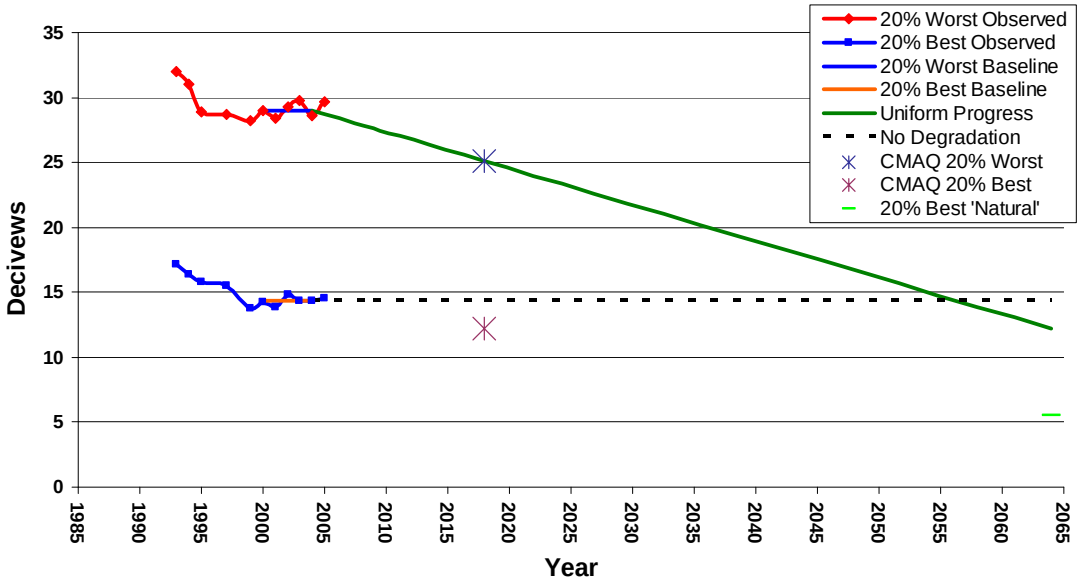


Figure 10-13c - Projected Visibility Improvement at Great Gulf Wilderness Area Based on Best and Final Modeling[19]

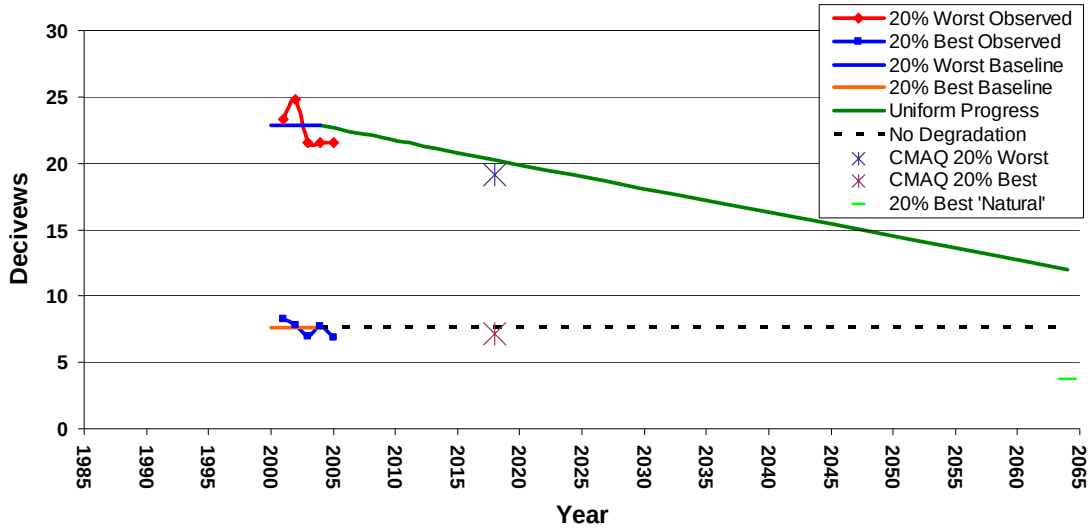
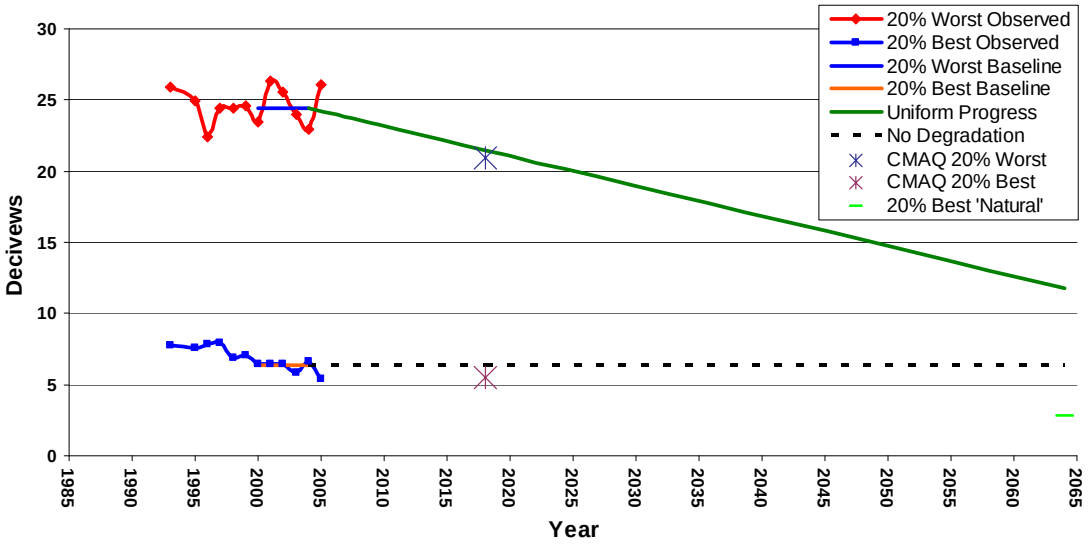
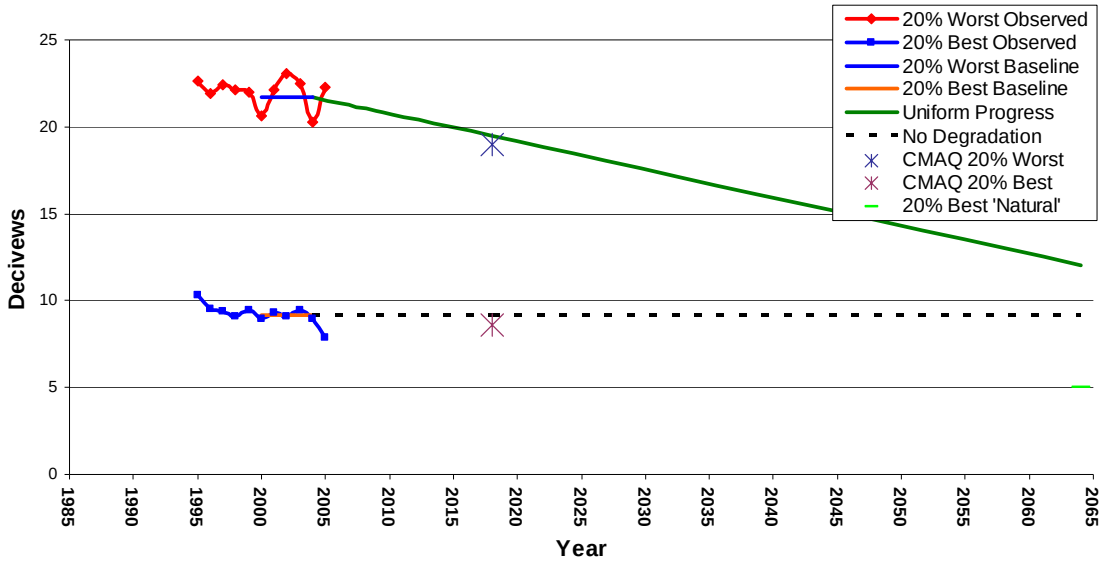


Figure 10-13d - Projected Visibility Improvement at Lye Brook Wilderness Area Based on Best and Final Modeling



[19] The estimate for Great Gulf Wilderness Area also serves to provide an estimate for the Presidential Range/Dry River Wilderness Area

Figure 10-13e - Projected Visibility Improvement at Moosehorn National Wildlife Refuge Based on Best and Final Modeling [20]



10.7 New York's Share of Emission Reductions

40 CFR Section 51.308(d)(3)(ii) requires states to demonstrate that their implementation plans include all measures necessary to obtain their fair share of emission reductions needed to meet reasonable progress goals.

The emission reduction measures proposed in New York's Regional Haze SIP are anticipated to improve visibility at MANE-VU's Class I areas with the implementation in New York of the controls described in this document. These measures meet the requirement of Reasonable Progress Goals under the haze program for these Class I areas, and New York commits to instituting these emission reductions through the regulatory programs described in this SIP and the other elements of Class I area states' "Ask." New York will, therefore, meet its "fair share" of emission reductions needed to meet the applicable reasonable progress goals, satisfying its responsibilities under the Regional Haze Program and the Act.

The modeling analysis referenced in Section 10.6, above, demonstrated that New York's long-term strategy, when coordinated with other State/Tribes' strategies, is sufficient to meet reasonable progress goals. Additionally, applicable measures reflected in the modeling analysis have been incorporated into New York's long-term strategy. All other measures agreed to will be implemented within 10 years as appropriate and necessary as consistent with the MANE-VU June 20, 2007 statement.

[20] The estimate for Moosehorn National Wildlife Refuge also serves to provide an estimate for Roosevelt/Campobello International Park.

10.8 Enforceability of Emission Limitations and Control Measures

40 CFR Section 51.308(d)(3)(v)(F) requires states, including New York, to ensure that emission limitations and control measures used to meet reasonable progress goals are enforceable. New York's operating permit program requires major source Title V permits to include all applicable requirements. CAA Section 110(a)(2)(C) requires States to include a program providing for enforcement of all SIP measures and the regulation of construction of new or modified stationary sources to meet PSD and nonattainment new source review (NNSR) requirements. New York's SIP currently includes NNSR requirements. In addition, there is a federal implementation plan in effect for PSD requirements, which EPA currently implements in New York State.

Environmental Conservation Law (ECL) Section 19-0305 and Article 71 Sections 71-2103 and 71-2105 authorizes the commissioner of the Department to enforce the codes, rules and regulations of the Department established in accordance with Article 19. The SIP is a compilation of rules and regulations that have been duly promulgated by the Department in accordance with its statutory authority and consistent with the State Administrative Procedures Act. Therefore, the Department has the authority to enforce all SIP measures.

10.9 Consultation on the Long Term Strategy

40 CFR Section 51.308(d)(3)(i) requires states to consult with other states to develop coordinated emission strategies. This requirement applies both where emissions from the state are reasonably anticipated to contribute to visibility impairment in Class I areas outside the state and when emissions from other states are reasonably anticipated to contribute to visibility impairment in Class I areas within the state.

New York has consulted with other states and the FLMs by participation in the MANE-VU and inter-RPO processes that developed technical information necessary for development of coordinated strategies. New York also coordinated with MANE-VU and other RPOs to develop a weight-of-evidence analysis, described below, that was used to develop New York's long-term strategy. Strategy development considered the impacts of New York's emissions on Class I areas outside the state, since New York State does not contain any Class I areas.

A list of the consultation events, including telephone conferences and meetings, appears in *Summary of Consultation Meetings and Conferences,* Appendix F of this document.

On May 10, 2006, MANE-VU adopted the Inter-RPO State/Tribal and FLM Consultation Framework. That document set forth the following principles:

1. All State (including New York), Tribal, RPO, and Federal participants are committed to continuing dialogue and information sharing in order to create understanding of the respective concerns and needs of the parties.

2. Continuous documentation of all communications is necessary to develop a record for inclusion in SIP submittals to EPA.

3. States alone have the authority to undertake specific measures under their SIP. This inter-RPO framework is designed solely to facilitate needed communication, coordination and cooperation among jurisdictions but does not establish binding obligation on the part of participating agencies aside from consultation.

4. There are two areas which require State-to-State and/or State-to-Tribal consultations ("formal" consultations): (i) development of the reasonable progress goal for a Class I area, and (ii) development of long-term strategies. While it is anticipated that the formal consultation will cover the technical components that make up each of these policy decision areas, there may be a need for the RPOs, in coordination with their State and Tribal members, to have informal consultations on these technical considerations.

5. During both the formal and informal inter-RPO consultations, it is anticipated that the States and Tribes will work collectively to facilitate the consultation process through their respective RPOs, when feasible.

6. Technical analyses will be transparent, when possible, and will reflect the most up-to-date information and best scientific methods for the decision needed within the resources available.

7. The State with the Class I area retains the responsibility to establish reasonable progress goals. The RPOs will make reasonable efforts to facilitate the development of a consensus between the State with a Class I area and other States affecting that area. In instances where the State with the Class I area can not agree with such other States that the goal provides for reasonable progress, actions taken to resolve the disagreement must be included in the State's regional haze implementation plan (or plan revisions) submitted to the EPA Administrator as required under 40 CFR Section 51.308(d)(1)(iv).

8. All States such as New York, whose emissions are reasonably anticipated to contribute to visibility impairment in a Class I area, must provide the Federal Land Manager ("FLM") agency for that Class I area with an opportunity for consultation, in person, on their regional haze implementation plans. The States/Tribes will pursue the development of a memorandum of understanding to expedite

the submission and consideration of the FLM's comments on the reasonable progress goals and related implementation plans. As required under 40 CFR Section 51.308(i)(3), the plan or plan revision must include a description of how the State addressed any FLM comments.

9. New York will consult with the affected FLMs to protect the air resources of Class I areas in accordance with the FLM coordination requirements specified in 40 CFR Section 51.308(i) and other consultation procedures developed by consensus.

10. The consultation process is designed to share information, define and document issues, develop a range of options, solicit feedback on options, develop consensus advice if possible, and facilitate informed decisions by the Class I States.

11. The collaborators, including States, Tribes and affected FLMs, will promptly respond to other RPO's/States'/Tribes' requests for comments.

The document also describes a process primarily applicable to formal consultation with states in other RPOs concerning regional haze SIP elements. Although other RPOs did not formally adopt the same process, in general, the process was followed and provided significant opportunities for consultation with other states concerning the long term strategy as well as reasonable progress goals.

MANE-VU consultation meetings and conference calls included those held on the following dates:

- MANE-VU Intra-Regional Consultation, March 1, 2007

  At this meeting, MANE-VU members reviewed the requirements for regional haze plans, preliminary modeling results, the work being done to prepare the MANE-VU report on reasonable progress factors, and control strategy options under review.

- MANE-VU Intra-State Consultation, June 7, 2007

  At this meeting the MANE-VU Class I states adopted a statement of principles, and all MANE-VU members discussed draft statements concerning reasonable controls within and outside of MANE-VU. Federal Land Managers also attended the meeting, which was open to stakeholders.

- MANE-VU Conference Call, June 20, 2007

  On this call, the MANE-VU states concluded discussions of statements concerning reasonable controls within and

outside MANE-VU and agreed on the statements called the MANE-VU "Ask," including a statement concerning controls within MANE-VU, a statement concerning controls outside MANE-VU, and a statement requesting a course of action by the U.S. EPA. Federal Land Managers also participated in the call. Upon approval, all statements as well as the statement of principles adopted on June 7 were posted and publicly available on the MANE-VU web site.

- MANE-VU Class I States' Consultation Open Technical Call, July 19, 2007

  On this call, the MANE-VU "Ask" was presented to states in other RPOs RPO staff, and Federal Land Managers, and an opportunity was provided to request further information. This call was intended to provide information to facilitate informed discussion at follow-up meetings.

- MANE-VU Consultation Meeting with MRPO, August 6, 2007

  This meeting was held at LADCO offices in Chicago, Illinois and was attended by representatives of both MANE-VU and MRPO states as well as staff. The meeting provided an opportunity to formally present the MANE-VU "Ask" to MRPO states and to consult with them regarding the reasonableness of the requested controls. Federal Land Manager agencies also attended the meeting.

- MANE-VU Consultation Meeting with VISTAS, August 20, 2007

  This meeting was held at State of Georgia offices in Atlanta and was attended by representatives of both MANE-VU and VISTAS states as well as staff. The meeting provided an opportunity to formally present the MANE-VU "Ask" to VISTAS states and to consult with them regarding the reasonableness of the requested controls. Federal Land Manager agencies also attended the meeting.

- MANE-VU – Midwest RPO Consultation Conference Call, September 13, 2007

  This call was a follow-up to the meeting held on August 6 in Chicago and provided an opportunity to further clarify what was being asked of the MRPO states. The flexibility in the Ask was explained. Both MRPO and MANE-VU staff agreed to work together to facilitate discussion of further controls on ICI boilers and EGUs.

- MANE-VU Air Directors' Consultation Conference Call, September 26, 2007

  This call allowed MANE-VU members to clarify their understanding of the "Ask" and to provide direction to modeling staff as to how to interpret the "Ask" for purposes of estimating visibility impacts of the requested controls.

- MANE-VU Air Directors' Conference Call, March 31, 2008

  On this call, NESCAUM presented the results of the final 2018 modeling and described the methods used to represent the impacts of the measures agreed to by the Class I States. Federal Land Manager agencies also attended this call.

New York State's coordination with FLMs on long-term strategy development is described in Section 4 of this SIP.

10.10 Emission Limitations and Schedules of Compliance

40 CFR Section 51.308(d)(3)(v)(C) requires states to identify additional measures to meet reasonable progress goals when ongoing programs alone are not sufficient to meet the goals. Facilities located in New York State that are subject to state and federal applicable air regulations either have, or will have, limitations placed on their operations and emissions pursuant to New York's air program, as well as schedules by which compliance will be achieved. Likewise, when the additional emission reduction measures to which New York has committed (See Section 9.0) have been taken, the regulations will include the necessary provisions to ensure they are effectively implemented and included in applicable permits.

11.0 Comprehensive Periodic Implementation Plan Revisions

40 CFR Section 51.308(f) requires states to revise their regional haze implementation plan and submit a plan revision to the EPA 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, New York commits to revising and submitting this regional haze implementation plan by July 31, 2018 and every ten years thereafter as required.

In addition, 40 CFR Section 51.308(g) requires periodic reports on progress being made toward the reasonable progress goals established for each mandatory Class I area. These reports will be based on reasonable progress evaluations from states with Class I areas to which New York sources are contributory.

In accordance with the requirements listed in Section 51.308(g) of the federal rule for regional haze, New York commits to submitting this report to the EPA every five years following the initial submittal of this SIP. This report will be in the form of a SIP revision.

All requirements listed in Section 40 CFR 51.308(g) that apply to states that do not contain a Class I area shall be addressed in the SIP revision for reasonable progress. The requirements listed in Section 51.308(g) include the following:

- A description of the implementation status;
- Summary of emission reductions achieved thus far;
- Class I state assessments of changes in visibility conditions at each Class I area affected by sources in New York (current vs. baseline) based on five year averages of annual values for 20 percent best and worst days;
- An analysis of emission changes over the five-year period;
- Analysis of any significant anthropogenic emissions changes that have impeded progress within New York State;
- An assessment of the sufficiency of this implementation plan to meet RPGs;

New York commits to continue consulting with the FLMs on the implementation of Section 51.308 and this SIP, including development and review of SIP revisions and five-year progress reports, and on the implementation of other programs affecting the impairment of visibility in Class I areas. Finally, New York commits to meet the required periodic updates of the emission inventory as required under 51.308(d)(4)(v).

12.0 Determination of the Adequacy of the Existing Plan

Depending on the findings of the five-year progress report, New York State is required to take one of the actions listed in 40 CFR Section 51.308(h) as presented below that apply to non-Class I states. The findings of the five-year progress report, which will be based on consultation with Class I states to which New York sources are contributory as well as the FLMs and the EPA, will determine which action is appropriate and necessary.

List of Possible Actions – 40 CFR Section 51.308(h)

1. If, after consultation with affected Class I states, FLMs and EPA, New York determines that its existing SIP requires no further substantive revision at this time in order to achieve its share of the emission reductions needed to reach the established goals for visibility improvement and emissions reductions, the Administrator will be provided a negative declaration from New York that further revision of the existing SIP is not needed at this time.

2. If a Class I state determines that the existing SIP is or may be inadequate to ensure reasonable progress due to emissions from sources in New York, New York will collaborate with the other state(s) through the regional planning process for the purpose of developing additional strategies to address New York's SIP deficiencies if this is required.

Class I states are additionally required to revise their SIPs:

1. If a Class I state determines that its existing SIP is or may be inadequate to ensure reasonable progress due to emissions from sources within the Class I state, such deficiencies must be addressed within one year, or

2. If a Class I state determines that its current SIP is or may be inadequate to ensure reasonable progress due to emissions from sources in another country, it must notify the Administrator and provide with all pertinent, available information.