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.[1] 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	24.5	20.9	3.6	11.7
Brigantine Wilderness	29.0	25.1	3.9	12.2

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

[1]"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

Class I Area	Baseline Visibility (deciviews) (20% Best Days)	Reasonable Progress Goals, 20% best days (deciviews) (expected by 2018)	Deciview improve ment 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.[2] 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 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

[2]"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.

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.[3]

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:

a. Timely implementation of BART requirements;

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 (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;

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

d. 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.

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[3]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.

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"[4] 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.

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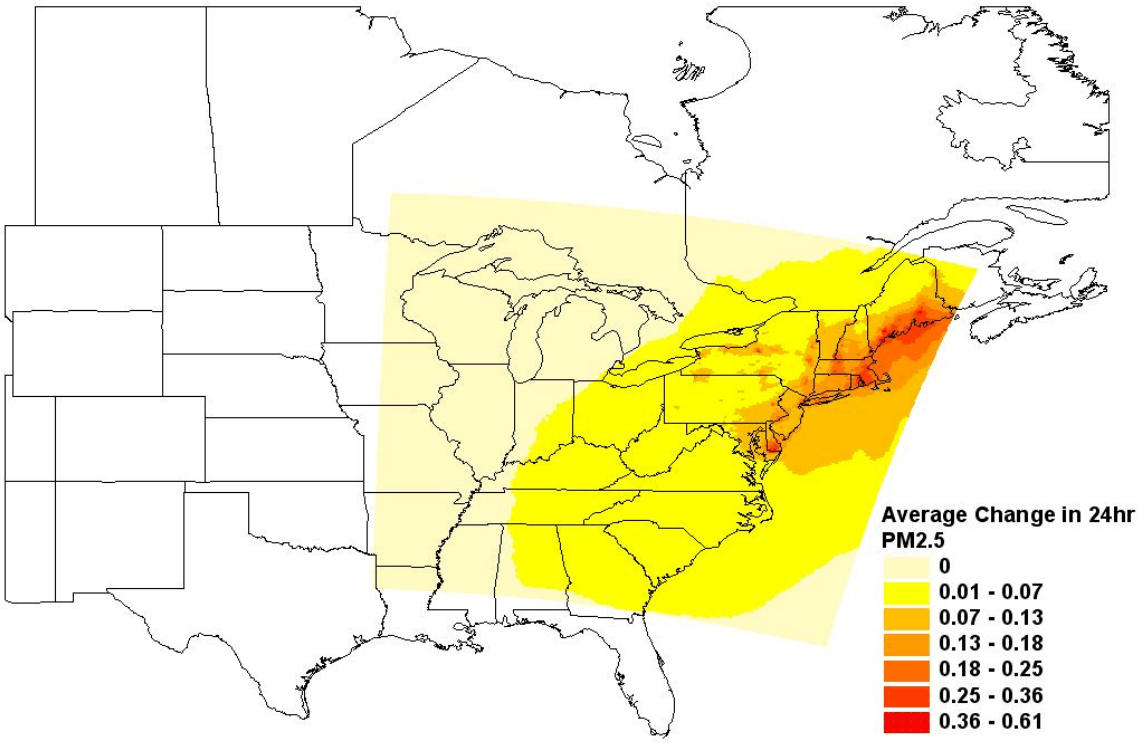
[4] The inner zone includes New Jersey, Delaware, New York City, and potentially portions of eastern Pennsylvania.

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

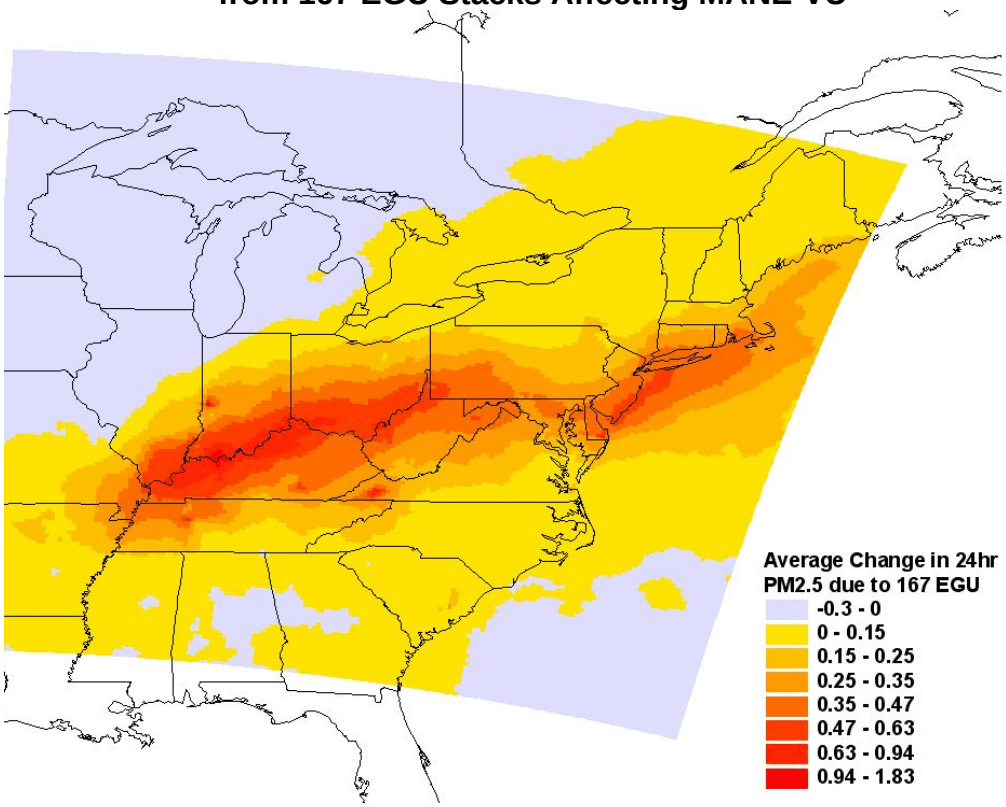


Figure 9-2 shows that significant reductions of $PM_{2.5}$ were predicted for the MANE-VU region as well as for portions of the VISTAS and Midwest RPO regions as a result of reducing SO2 emissions by 90 percent from 167 EGU stacks affecting MANE-VU.

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.[5] It is expected that these units will

[5] 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

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.

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

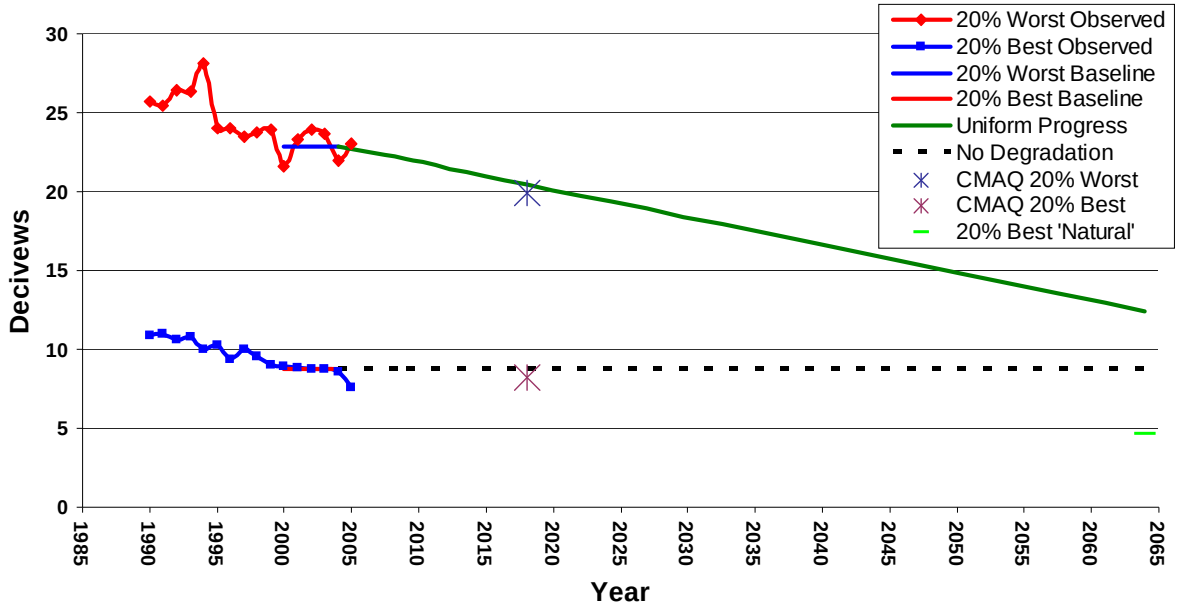


Figure 9-4 - Projected Visibility Improvement at Brigantine National Wildlife Refuge Based on Best and Final Modeling

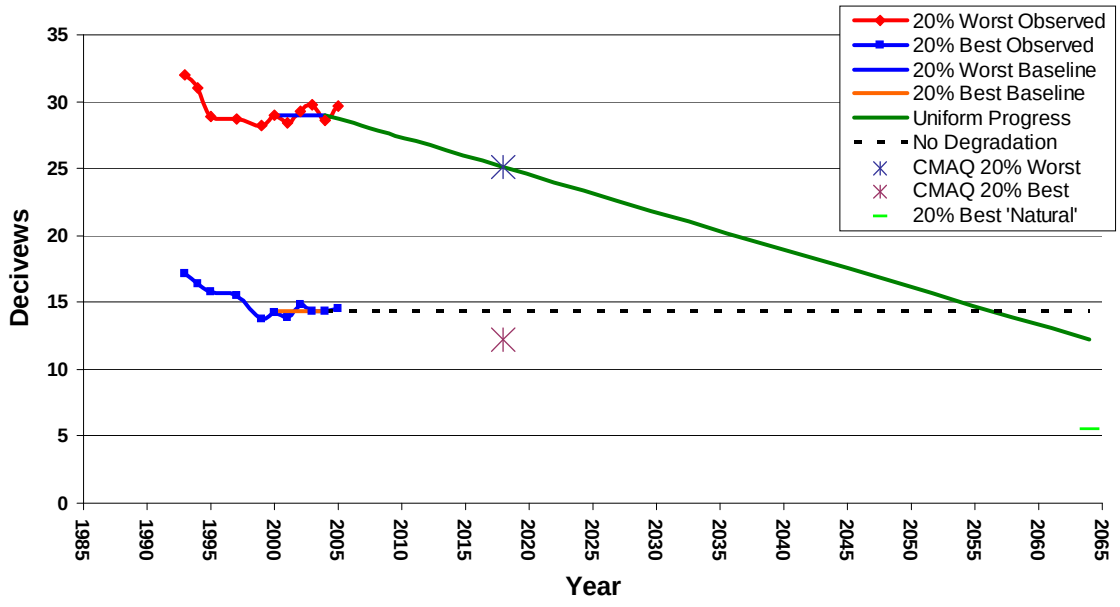


Figure 9-5 - Projected Visibility Improvement at Great Gulf Wilderness Area

Based on Best and Final Modeling[6]

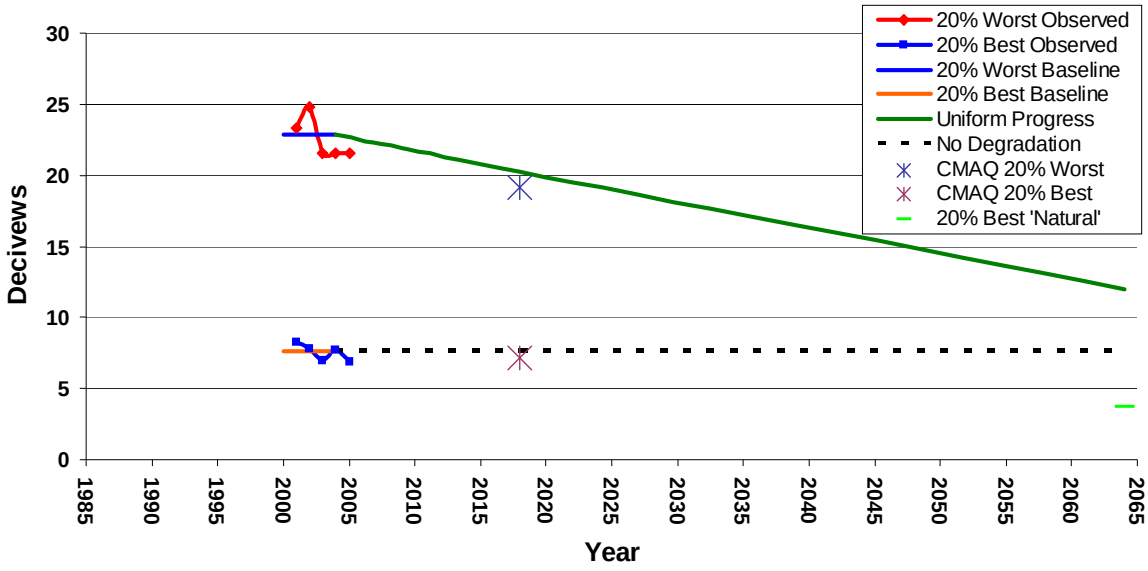
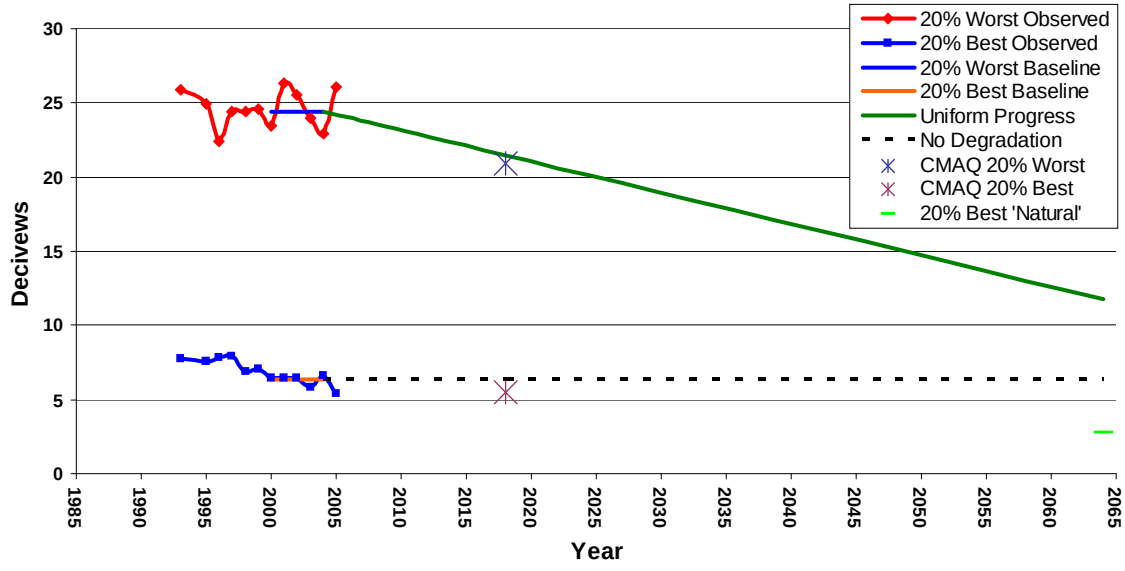
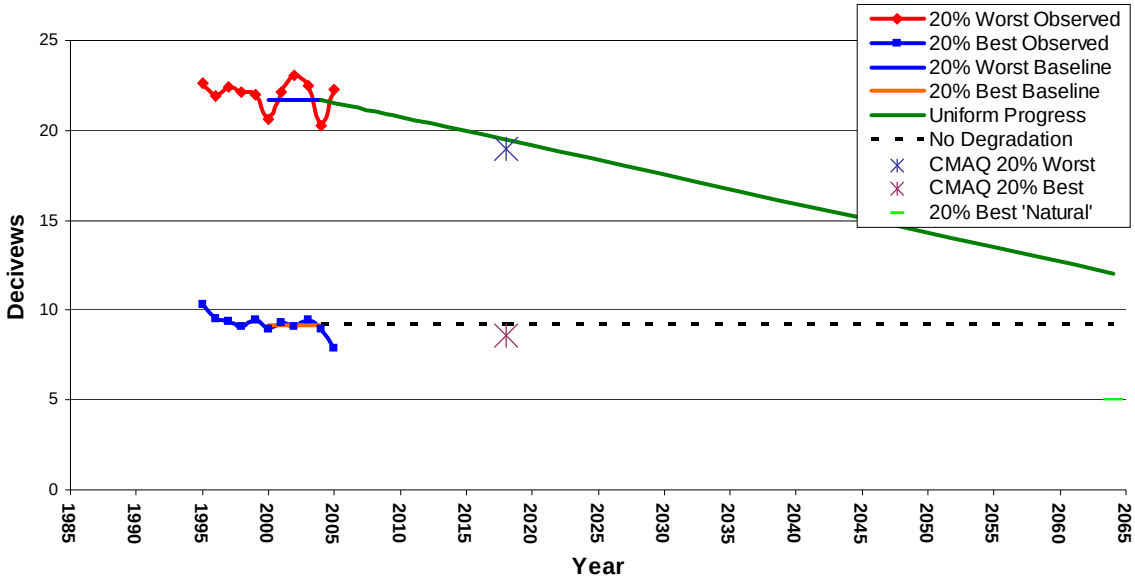


Figure 9-6 - Projected Visibility Improvement at Lye Brook Wilderness Area Based on Best and Final Modeling



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

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



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.

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

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.

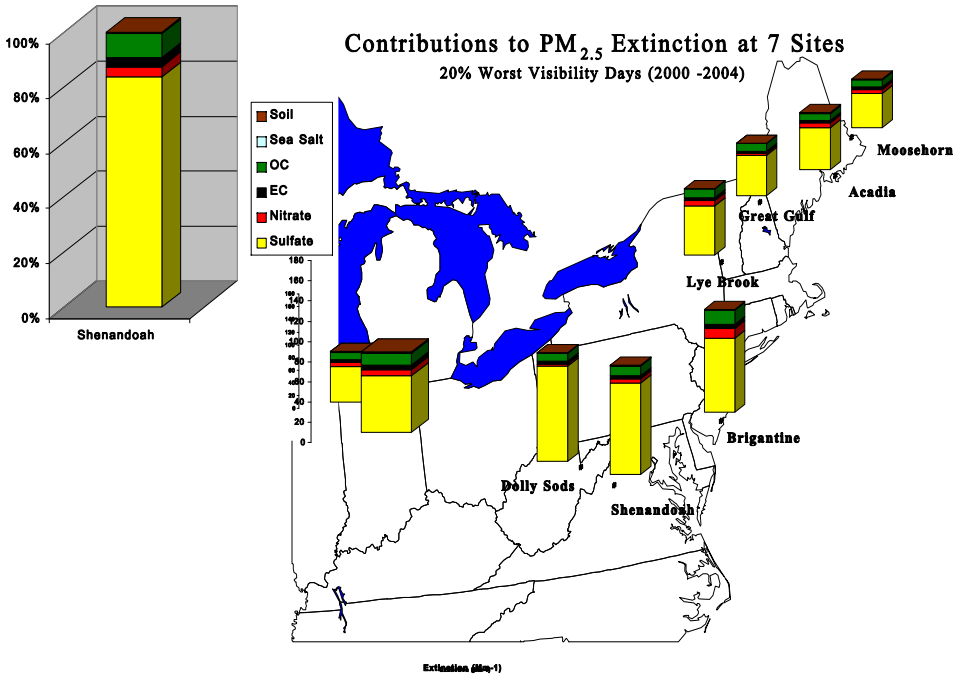
The demonstration of attainment of reasonable progress goals relies on the analysis of monitored and modeled data in a weight of evidence analysis to determine whether visibility is improved on days when it is usually poor and does not deteriorate on days when it is usually good. Current visibility is 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[1]

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

1 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.

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.

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

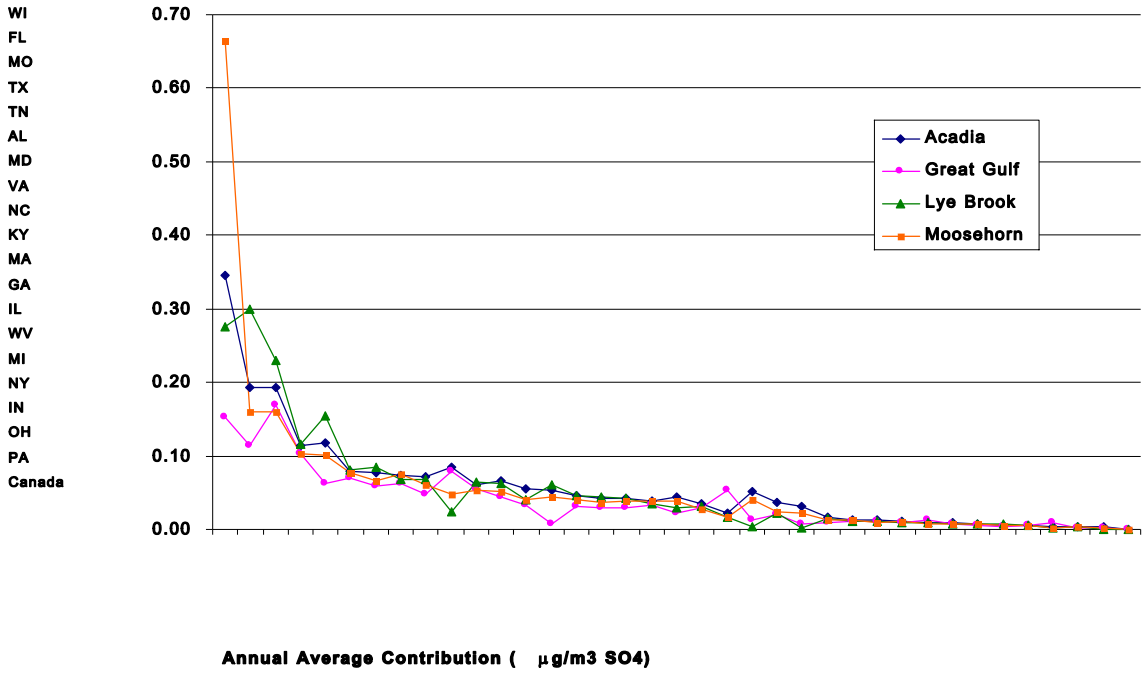
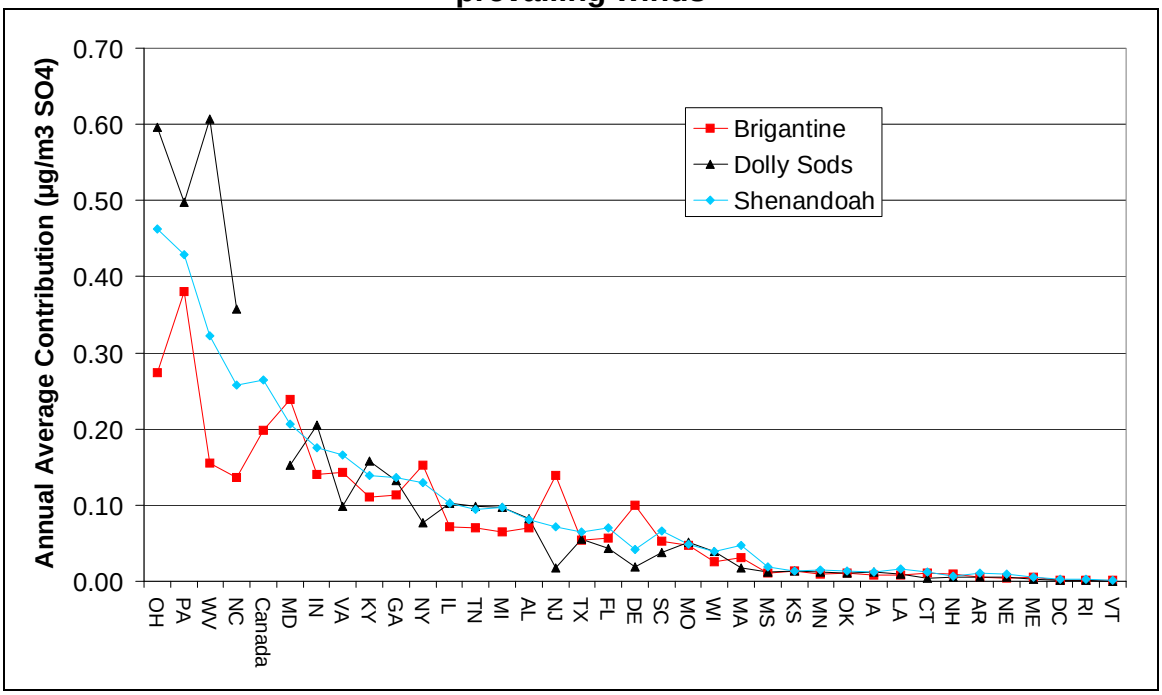


Figure 10-3 - Ranked state percent sulfate contributions to Mid-Atlantic Class I receptors based on emissions divided by distance (Q/d) results adjusted for prevailing winds



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

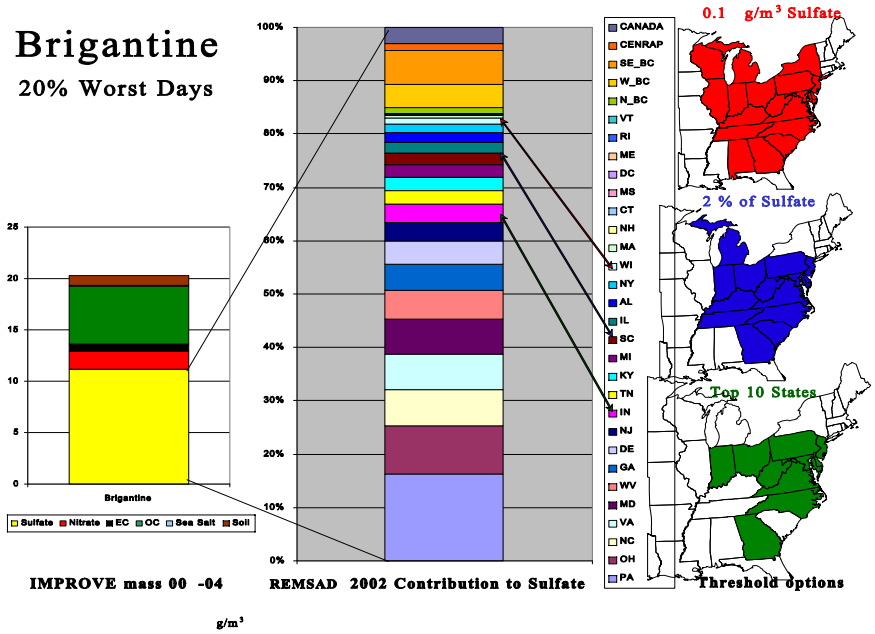


Figure 10-5 - Modeled 2002 Contributions to Sulfate by State at Lye Brook

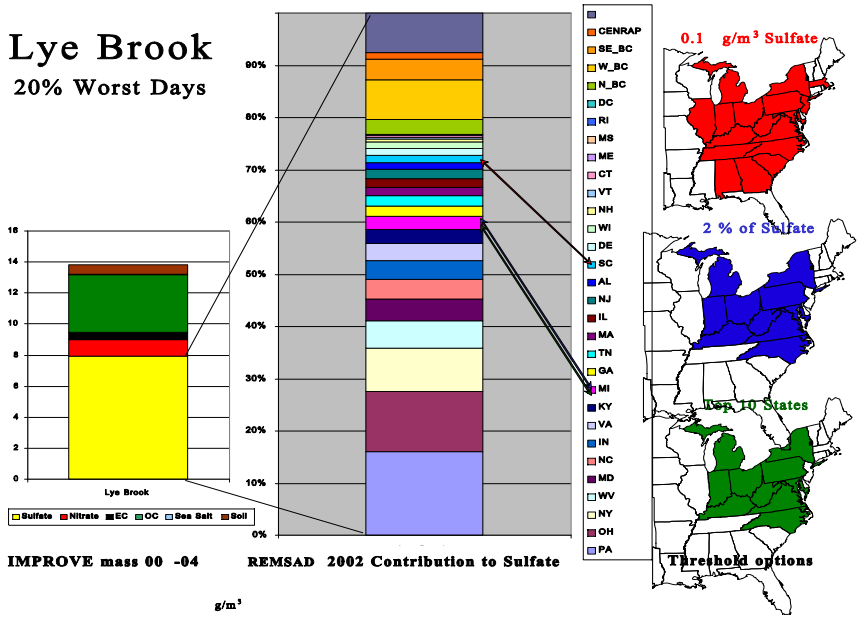


Figure 10-6 - Modeled 2002 Contributions to Sulfate by State at Great Gulf

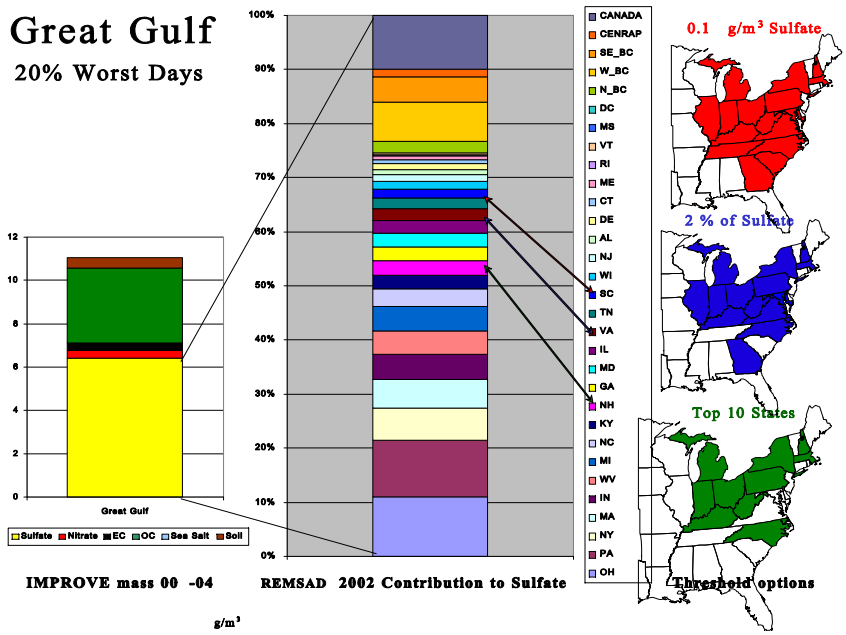


Figure 10-7 - Modeled 2002 Contributions to Sulfate by State at Acadia

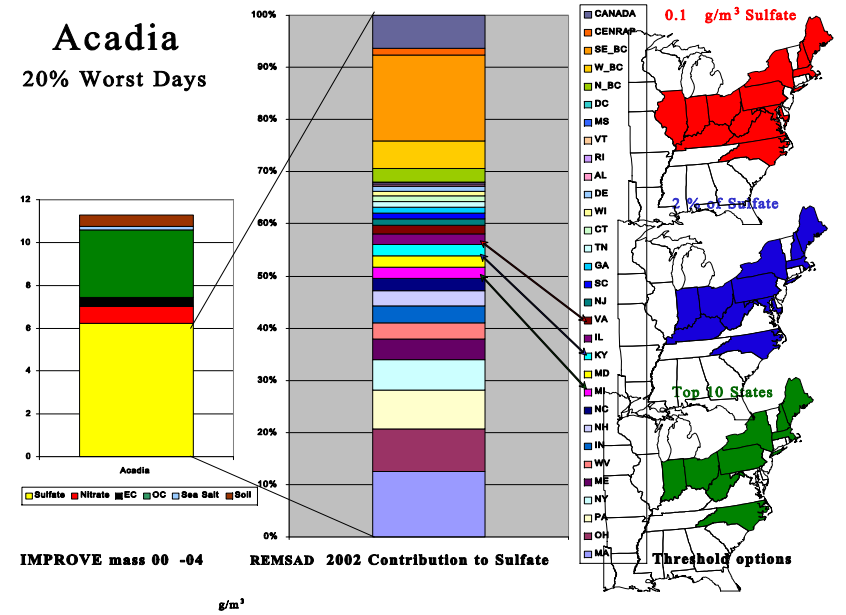


Figure 10-8 - Modeled 2002 Contributions to Sulfate by State at Moosehorn

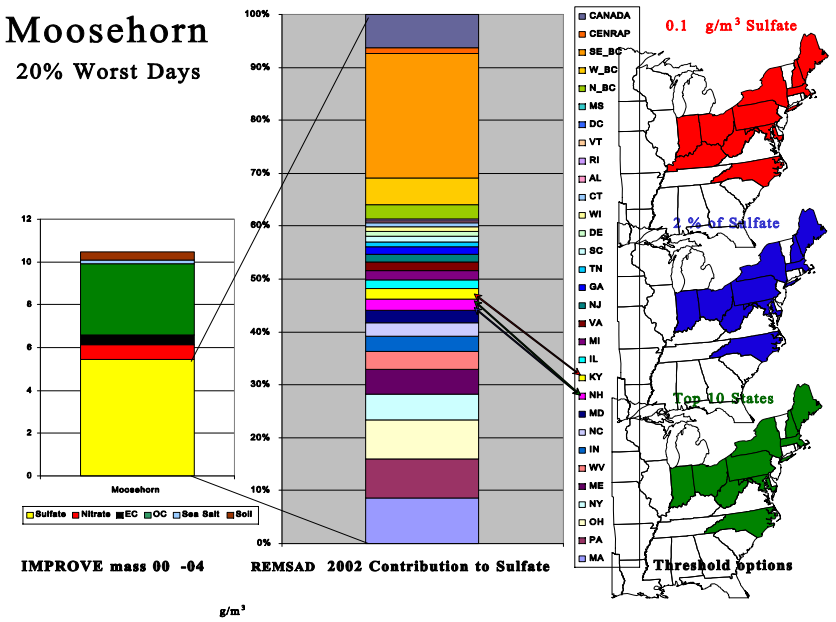


Figure 10-9 - Modeled 2002 Contributions to Sulfate by State at Shenandoah

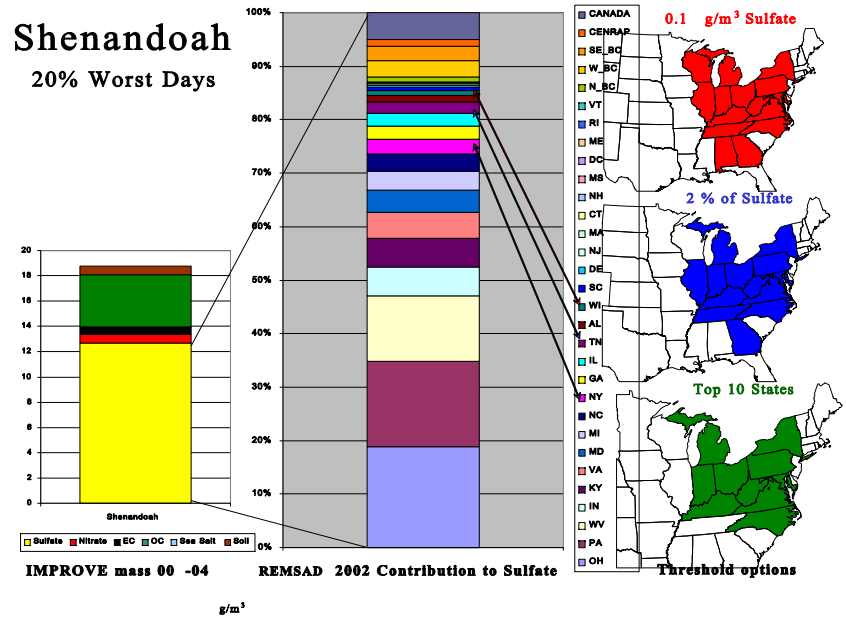
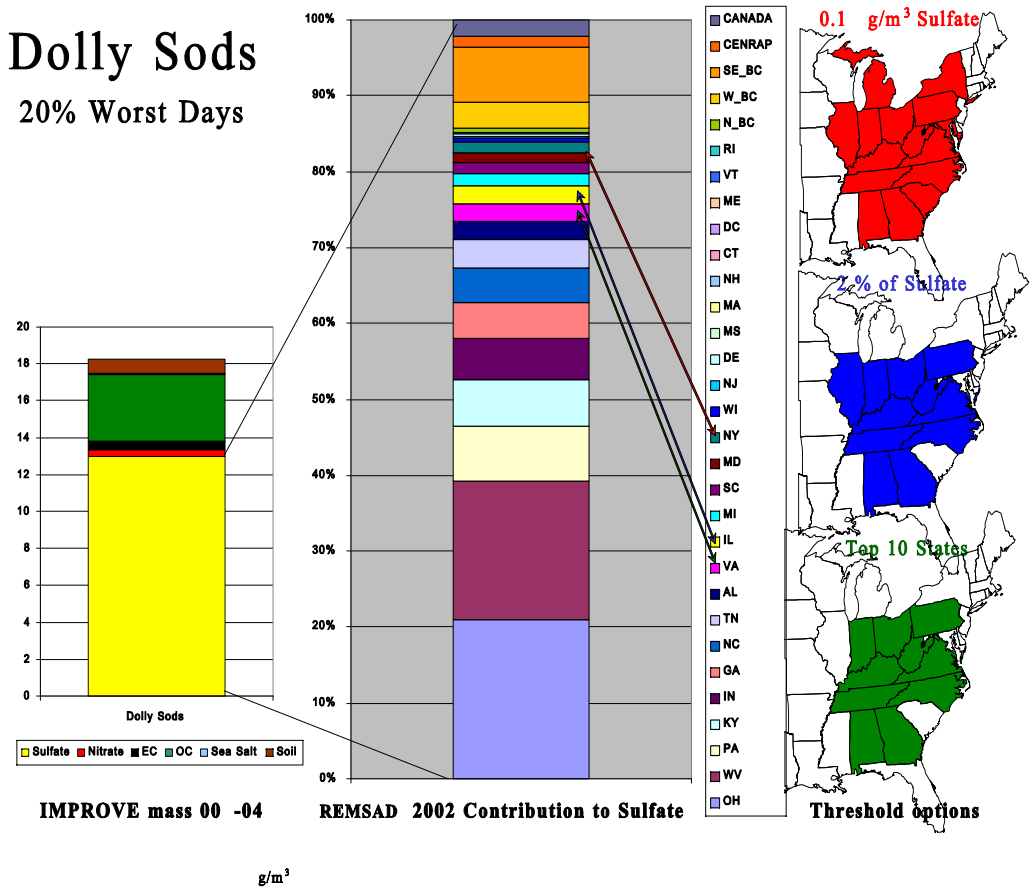


Figure 10-10 - Modeled 2002 Contributions to Sulfate by State at Dolly Sods



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.

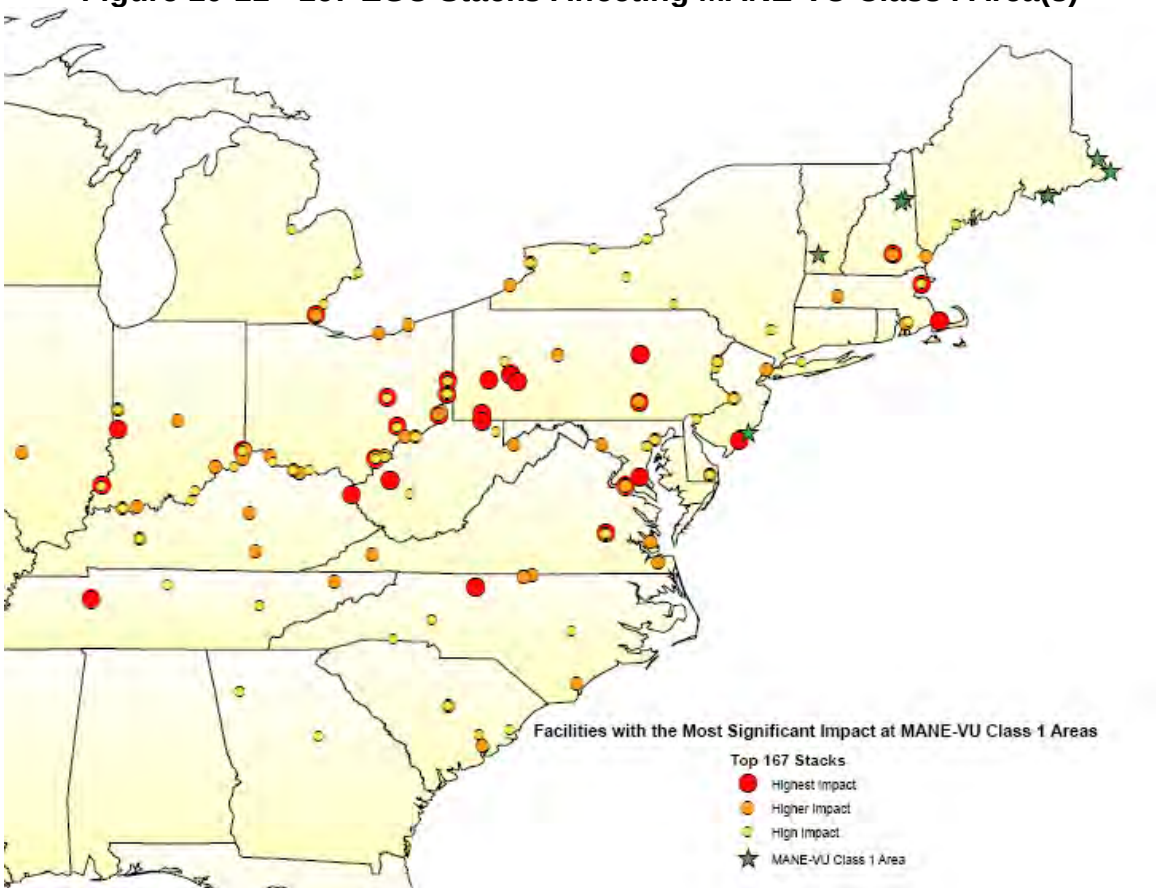
10.2.6 Anthropogenic Sources of Visibility Impairment

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.

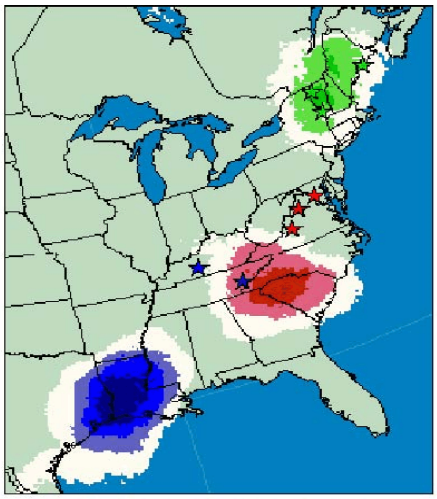
Figure 10-11 - 167 EGU Stacks Affecting MANE-VU Class I Area(s)



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



NE: ACAD, PMRC, LYBR

MA: WASH, SHEN, JARI

SE: GRSM, MACA

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.[2] Modifications

2 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.

to the output of IPM® made to better represent anticipated 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[3]

3 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.

- 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 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"[4] 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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4 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[5].

5 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

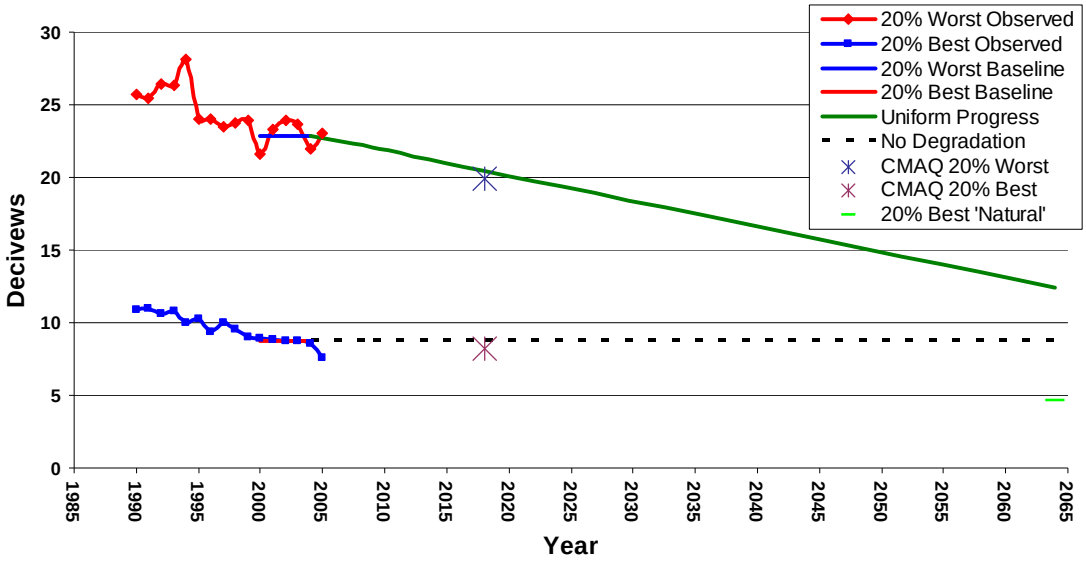


Figure 10-13b - Projected Visibility Improvement at Brigantine National Wildlife Refuge Based On Best and Final Modeling

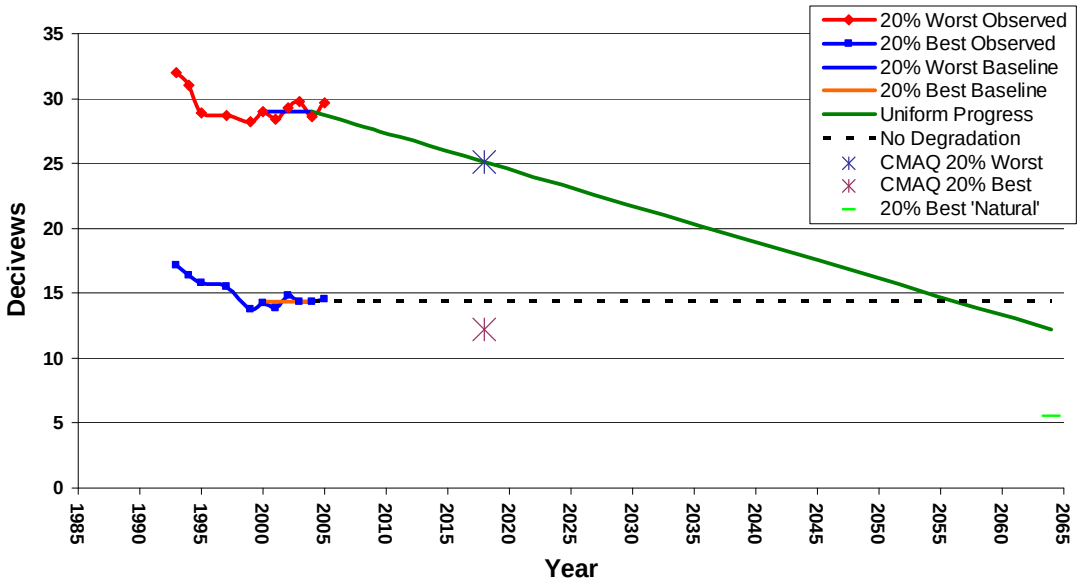


Figure 10-13c - Projected Visibility Improvement at Great Gulf Wilderness Area Based on Best and Final Modeling[6]

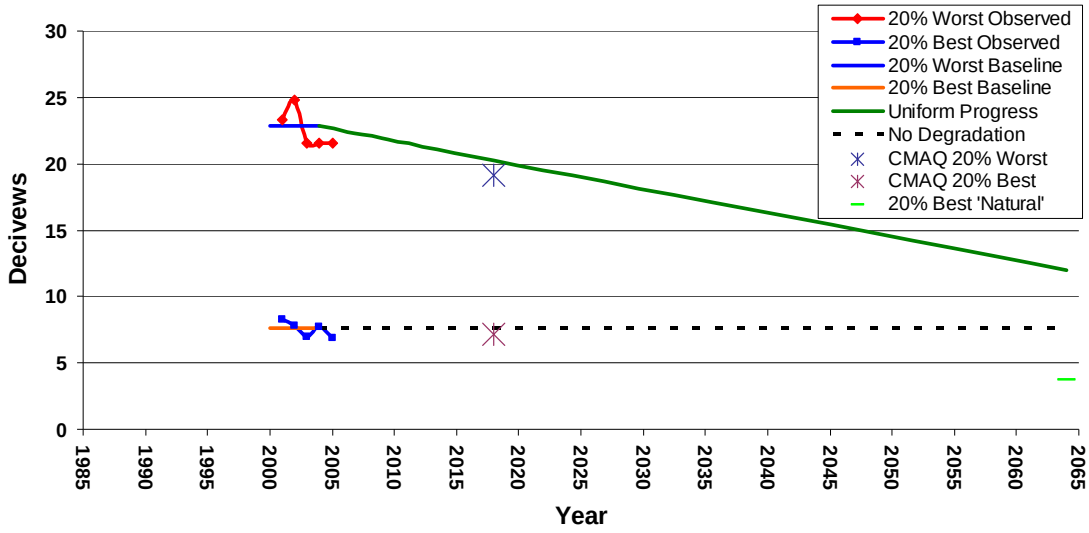
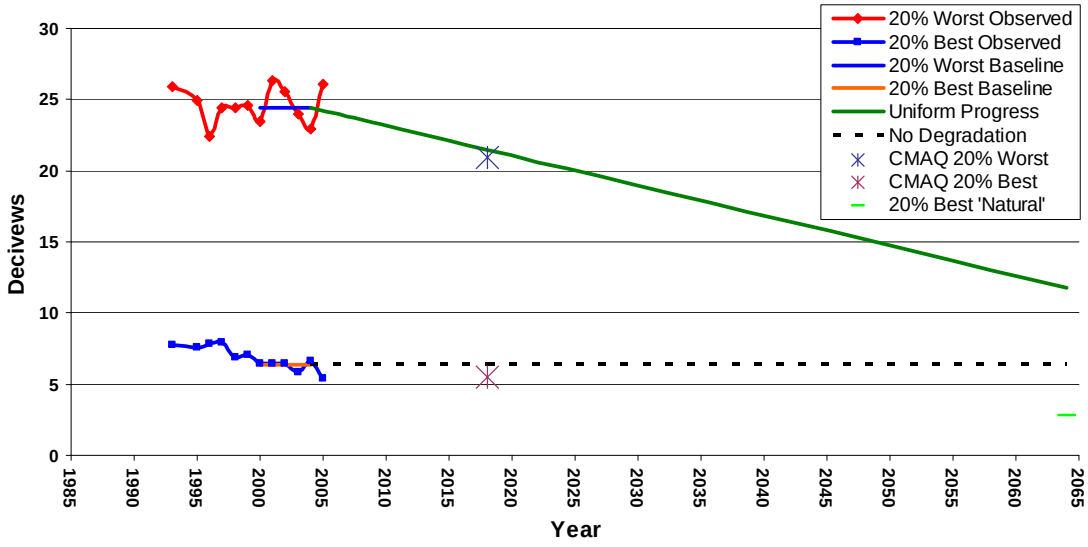
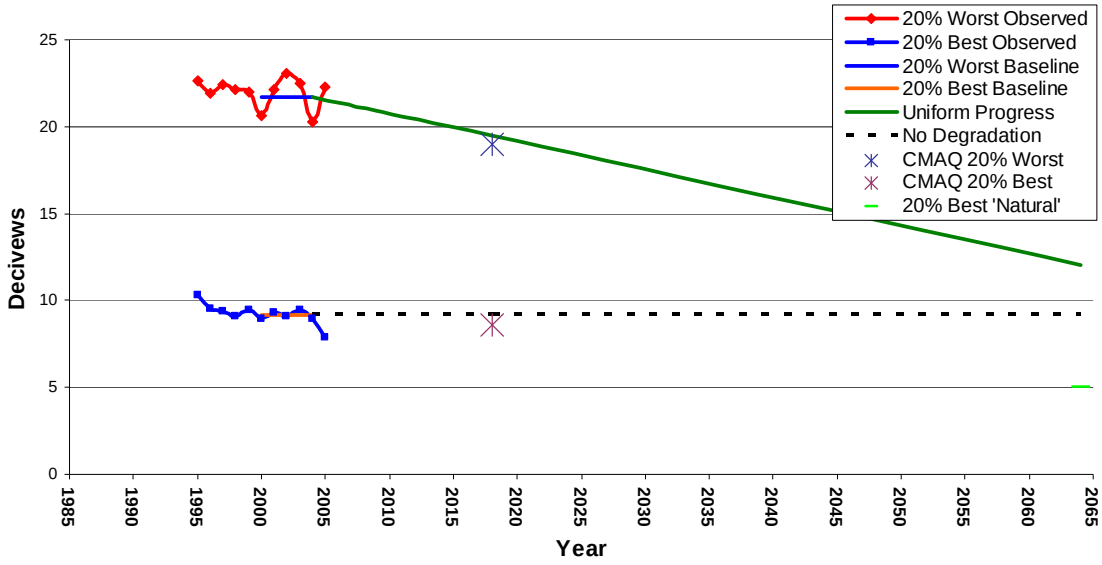


Figure 10-13d - Projected Visibility Improvement at Lye Brook Wilderness Area Based on Best and Final Modeling



6 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 [7]



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.

7 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.

<u>List of Possible Actions – 40 CFR Section 51.308(h)</u>

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.