State of New Jersey
Department of Environmental Protection

5-Year Progress Report for the State Implementation Plan (SIP) For Regional Haze

Final

June, 2016

Preface

Pursuant to the requirements of 42 U.S.C. § 7491 (Sections 169 and 169A of the Clean Air Act) and the Federal Regional Haze Rules at 40 CFR § 51.308, New Jersey has prepared this 5-year progress report on the historical trends in visibility levels at New Jersey's Federal Class I area, the Brigantine Wilderness Area of the Edwin B. Forsythe National Wildlife Refuge (the Brigantine Wilderness Area). This document discusses the most recent trends in emissions of visibility-impairing air pollution within its borders and from out-of-state sources that transport emissions to New Jersey's Federal Clean Air Act defined Class I area. It also presents the latest status of New Jersey's and other states' implementation of the MANE-VU "Ask" to reduce visibility impairing pollutants at select sources.

Acknowledgments

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

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Acronyms and Abbreviations

$\mu g/m^3$	Micrograms per cubic meter
ACO	Administrative Consent Order
APA	Administrative Procedures Act
APCA	Air Pollution Control Act
BART	Best Available Retrofit Technology
BRIG1	IMPROVE Monitor at the Brigantine Wilderness Area
BTU	British Thermal Unit
CAA	Clean Air Act
CAIR	Clean Air Interstate Rule
CD	Consent Decree
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CT	Connecticut
DC	District of Columbia
DE	Delaware
dv	Deciview
EC	Elemental Carbon
EGU	Electric Generating Unit
ESP	Electrostatic Precipitator
FGD	Flue Gas Desulfurization
FLAG	Federal Land Managers Air Quality Related Values Workgroup
FLM	Federal Land Manager
GA	Georgia
H_2S	Hydrogen Sulfide
hr.	Hour
ICI	Industrial/Commercial/Institutional
IGCC	Integrated Gasification Combined Cycle
IL	Illinois
I/M	Inspection and Maintenance
IMPROVE	Interagency Monitoring of Protected Visual Environments
IN	Indiana
KM	Kilometer
KY	Kentucky
lb.	Pound
LNB	Low NO_x Burners
MA	Massachusetts
MANE-VU	Mid-Atlantic/Northeast Visibility Union
MARAMA	Mid-Atlantic Regional Air Management Association
MD	Maryland
ME	Maine
MI	Michigan
MMBTU	Million British Thermal Unit
MW	Megawatt

NAAQS	National Ambient Air Quality Standards
NC	North Carolina
NEI	National Emissions Inventory
NESCAUM	Northeast States for Coordinated Air Use Management
NH	New Hampshire
NH_3	Ammonia
NJ	New Jersey
N.J.A.C.	New Jersey Administrative Code
NJDEP	New Jersey Department of Environmental Protection
NJDOT	New Jersey Department of Transportation
NO_x	Nitrogen Oxides
NO_y	Total Reactive Nitrogen
NSPS	New Source Performance Standards
NY	New York
OFA	Over Fire Air
OH	Ohio
PA	Pennsylvania
PM	Particulate Matter
$PM_{2.5}$	Fine Particulate Matter (particles with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers)
PM_{10}	Particles with an aerodynamic diameter less than or equal to a nominal 10 micrometers
ppm	Parts Per Million
ppmvd	Parts Per Million, Volumetric Dry
PSD	Prevention of Significant Deterioration
PSEG	Public Service Enterprise Group
PTE	Potential to Emit
RACT	Reasonably Available Control Technology
RI	Rhode Island
RPG	Reasonable Progress Goal
RPO	Regional Planning Organization
SC	South Carolina
SCR	Selective Catalytic Reduction
SDA	Spray Dryer Absorber
SIP	State Implementation Plan
SNCR	Selective Non-Catalytic Reduction
SO_2	Sulfur Dioxide
SOA	Secondary Organic Aerosol
TDF	Tire Derived Fuel
TN	Tennessee
tpy	Tons per Year
U.S.	United States
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
U.S.C.	United States Code

USFS	United States Forestry Service
USFWS	United States Fish and Wildlife Service
USNPS	United States National Park Service
VA	Virginia
VMEU	Vineland Municipal Electric Utility
VOC	Volatile Organic Compounds
VT	Vermont
WI	Wisconsin
wt.	Weight
WV	West Virginia

Executive Summary

New Jersey is home to a Federal "Class I" area, the Brigantine Wilderness Area in the Edwin B. Forsythe National Wildlife Refuge. The Clean Air Act designates Class I areas for visibility improvement, including regional haze. In 2009, New Jersey submitted its Regional Haze State Implementation Plan (SIP) revision setting the 2018 progress goal for the Brigantine Wilderness Area to the U.S. Environmental Protection Agency (USEPA). Federal regulations (Regional Haze Rule (40 CFR 51.308)) require all states to evaluate their progress in implementing the measures included in their Regional Haze SIP every five years. This report serves to document that New Jersey has made significant progress in reducing emissions within the State, and demonstrates that New Jersey has significantly improved visibility levels and is on track to meet its 2018 visibility goal at the Brigantine Wilderness Area.

In this SIP, New Jersey set the 2018 visibility goal as 25.1 deciviews. New Jersey's current 5-year average visibility level is 23.8 deciviews, and is already below the 2018 uniform rate of progress goal of 25.1 deciviews. On the "best" days of visibility in the Brigantine Wilderness Area from 2002 to the present, no degradation was observed and none are expected in the future as projected emission inventories show declining emissions of visibility impairing pollutants in future years.

New Jersey worked with other Mid-Atlantic/Northeast Visibility Union (MANE-VU) states to develop reasonable measures[i] to achieve the 2018 visibility target for the Brigantine Wilderness Area. New Jersey, as part of MANE-VU, asked that the MANE-VU and other states to agree and commit to implement these reasonable measures.

New Jersey implemented all the identified reasonable measures. However, some upwind states, including Pennsylvania, did not fully implement them. Commitments made by MANE-VU states and New Jersey's actions to improve visibility in the first planning period in 2018 are shown in Table ES1.

Table ES1

MANE-VU "ASK"	NEW JERSEY ACTIONS
Timely implementation of Best Available Retrofit Technology (BART) requirements	Implemented BART at all applicable New Jersey Sources
90% or greater reduction in sulfur dioxide (SO_2) emissions from each of the 167 stacks identified by MANE-VU	Reduced sulfur dioxide and nitrogen oxide emissions from New Jersey's electric power plants by 94-99 percent (4 of the 167 stacks are located in New Jersey)
Reducing the sulfur content in fuel oil	Adopted a low sulfur fuel oil rule for distillate and residual fuel oil in 2009 (N.J.A.C. 7:27-9)
Continuing evaluation of other measures,	Continued efforts to identify measures to reduce

[i] Reasonable measures are control measures established in 40 CFR Part 51.306 (d) for establishing reasonable progress goals (RPG) for regional haze. The regulation requires a review of relevant factors for new control measures, including the cost of compliance, the time necessary for compliance, the energy and non-air quality environmental impacts of compliance, and the remaining useful life of existing sources.

including energy efficiency, alternative clean fuels and other measures to reduce SO_2 and NO_x from all coal-burning facilities by 2018, and new source performance standards for wood combustion	regional haze, including energy efficiency, alternative clean fuels, and measures to reduce emissions from wood and coal combustion

Twenty two states were determined to contribute to visibility impairment at the Brigantine Wilderness Area. Implementation of the reasonable measures listed in Table ES1 at these 22 states are needed to help achieve the 2018 visibility target set for the Brigantine Wilderness area. Table ES2 shows a summary of the implementation status of the reasonable measures at these 22 states. See table 1.4 for more details on the status of the reasonable measures.

Emission reductions have occurred in all visibility impairing pollutants in New Jersey since 2002, and this downward trend is expected to continue to 2018. A decrease in emissions of visibility impairing pollutants between 2011 and 2018 is also expected to occur. These decreases range from twenty-three percent (23%) for fine particulate matter ($PM_{2.5}$) to eighty-two percent (82%) for sulfur dioxide (SO_2) due to the addition of scrubbers on all of New Jersey's coal-fired power plants and implementation of a low sulfur in fuel oil regulation.

New Jersey is concerned, however, that oil and gas emissions in the neighboring state of Pennsylvania, as well as in other eastern States, have risen dramatically since 2002 due to the increased activity of horizontal drilling for new oil and gas reserves (i.e.; fracking). Increases in this sector may offset emission decreases in other sectors and the USEPA should track emission increases in this sector for other States.[ii]

Based on the analyses conducted for this report, New Jersey's Regional Haze SIP is adequate for continued reasonable progress towards meeting the first progress goal by 2018 in Brigantine and all mandatory Class I Federal areas impacted by emissions from New Jersey. The State is working with MANE-VU partners to develop strategies for future success. A new SIP will be developed in 2018, and new goals will be established for 2028.

Table ES2

	States	Best Available Retrofit Technology (BART)	167 Stacks	Low Sulfur Fuel Oil	Other Measures
MANE-VU	Connecticut	✓	N/A	✓	✓
	District of Columbia	✓	N/A	X	✓
	Delaware	✓	✓	✓	✓
	Maine	✓	✓	✓	✓
	Maryland	✓	✓	X	✓

[ii] There have been no drilling activities for natural gas in New Jersey and, therefore, no emissions from this sector occur.

	Massachusetts	✓	✓	✓	✓
	New Hampshire	✓	✓	X	✓
	New York	Federal Implementation Plan in place for 2 sources. All others done.	✓	✓	✓
	Pennsylvania	X	✓	X	✓
	Rhode Island	N/A	N/A	✓	✓
	Vermont	N/A	N/A	✓	✓
Non MANE-VU	Georgia	X	✓	X	✓
	Illinois	✓	✓	X	✓
	Indiana	X	✓	X	✓
	Kentucky	X	✓	✓	✓
	Michigan	X	✓	X	✓
	North Carolina	X	✓	X	✓
	Ohio	X	✓	X	✓
	South Carolina	X	✓	X	✓
	Tennessee	X	✓	Unknown	✓
	Virginia	X	✓	Unknown	✓
	West Virginia	X	✓	✓	✓

✓ - Completed the Ask.

X - Failed to meet the Ask.

N/A - No Sources

Section 1: Background and Overview of New Jersey's Regional Haze Program

1.1 Introduction

New Jersey is home to the Brigantine Wilderness Area, a designated federally-protected visibility area or Class I area, located in the Edwin B. Forsythe National Wildlife Refuge. Class I areas are specifically listed in the Federal 1977 Clean Air Act for visibility improvement and include many national parks, wilderness areas and memorial parks in the United States of America.

Federal rules[3] set a national goal to restore visibility to its natural conditions in Class I areas by 2064. States are required to develop and implement State Implementation Plans (SIPs) to reduce the pollution that causes visibility impairment at Class I areas, and help meet this goal. The SIPs establish reasonable progress goals for visibility improvement in 10-year increments and include long-term strategies to reduce air pollutant emissions from sources contributing to visibility impairment. Many of the components contributing to visibility impairment are the same pollutants of concern that form ozone and fine particulate matter in the outside air, namely: sulfate, nitrate, organic mass and elemental carbon.[4]

New Jersey is a part of the Mid-Atlantic/Northeast Visibility Union (MANE-VU), a regional organization for visibility improvement planning and coordination that includes Mid-Atlantic and Northeastern states, tribes, and Federal agencies. The MANE-VU Contribution Assessment[5] report produced a conceptual model of regional haze in which sulfate emerged as the most important single constituent of haze-forming fine particle pollution and the principal cause of visibility impairment across the northeastern region of the United States. Solid and liquid sulfate particles are caused by gaseous sulfur dioxide (SO_2) emissions from burning coal, gasoline and oil chemically reacting with ammonium in the outside air. Point sources dominated the inventory of SO_2 emissions. Therefore, MANE-VU's 2018 strategy included measures to reduce emissions of SO_2 both within the region and in other states that were determined to contribute to regional haze within the MANE-VU Class I areas, including New Jersey's Brigantine Wilderness Area. The largest source category responsible for SO_2 emissions within these areas was determined to be power plants or electric generating units (EGUs). MANE-VU determined that adding emission controls to large, older SO_2 sources would help reduce haze in the MANE-VU region. The MANE-VU strategies for the 2002 to 2018 planning period include:

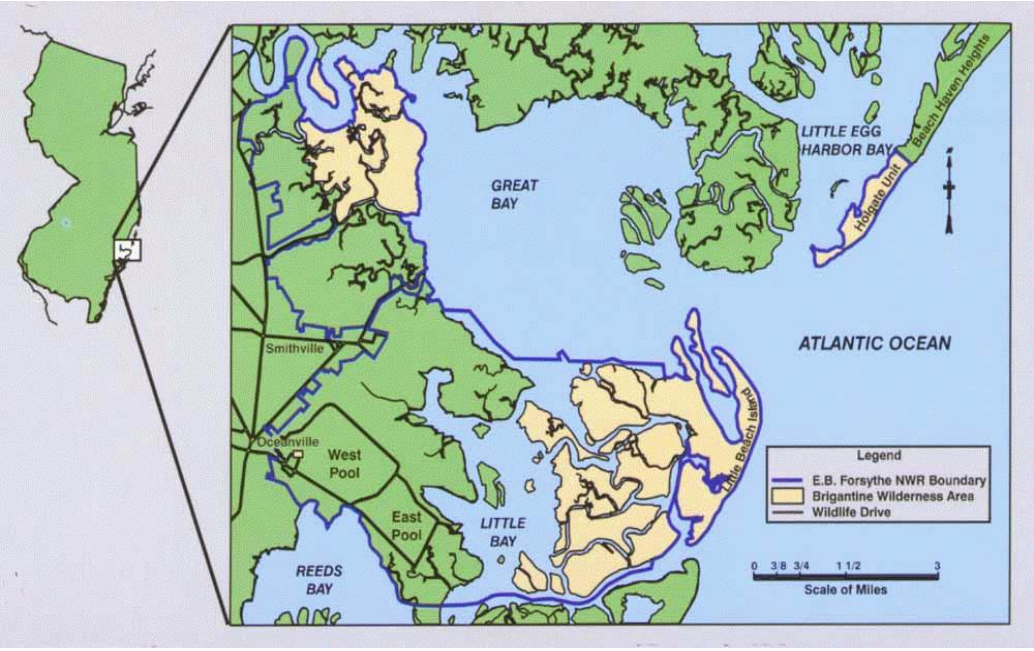
- Timely implementation of Best Available Retrofit Technology (BART);
- Reduce the sulfur content of fuel oil;
- Reduce sulfur dioxide emissions from certain electric power plants;
- Seek to reduce emissions outside MANE-VU that impair visibility in our region; and

[3] 42 U.S.C. § 7491
[4] New Jersey State Implementation Plan for Regional Haze. Final July 2009.
[5] Contributions to Regional Haze in the Northeast and Mid-Atlantic United states. NESCAUM, 2006.

- Continue to evaluate other measures to reduce regional haze, such as energy efficiency, alternative clean fuels, and measures to reduce emissions from wood and coal combustion.

The Brigantine Wilderness Area is managed by the Fish and Wildlife Service of the United States Department of the Interior, referred to as the Federal Land Manager (FLM) throughout this document. Figure 1.1 shows a map of the Brigantine Wilderness Area. New Jersey's efforts to meet the visibility goal at the Brigantine Wilderness Area and addressing its impact at downwind Class I areas were included in New Jersey's 2009 Regional Haze SIP revision.

Figure 1.1: Map of Brigantine Wilderness Area



1.2 New Jersey 2009 Regional Haze State Implementation Plan (SIP) Revision

In 2009, New Jersey submitted its Regional Haze SIP revision, setting the 2018 progress goals for Brigantine Wilderness Area, and addressing New Jersey's contribution to visibility impairment in Acadia National Park and the Moosehorn Wilderness Area in Maine, the Great Gulf Wilderness Area and Presidential Range/Dry River Wilderness Area in New Hampshire, the Lyebrook Wilderness Area in Vermont, and at the Brigantine Wilderness Area in New Jersey. New Jersey's SIP was approved by the USEPA.[6]

New Jersey's 2009 Regional Haze plan defined the emission reduction measures needed to achieve agreed upon commitments in the MANE-VU strategy. Furthermore, New Jersey's Regional Haze plan ensured that emissions from the State would not interfere with the reasonable progress goals for neighboring states' Class I areas. New Jersey's SIP revision

[6] 77 Fed. Reg. 19; January 3, 2012

demonstrated that the MANE-VU commitments would improve visibility to meet the established 2018 visibility goals and make progress towards meeting the final goal of achieving natural background conditions by 2064.

1.2.1 Visibility Goals for Brigantine Wilderness Area

All Class I areas in the nation, including the Brigantine Wilderness Area, must achieve natural background conditions[7] as their visibility goal by the year 2064 according to the Federal Clean Air Act. The 2064 natural background visibility goal in the Brigantine Wilderness Area is 12.2 deciviews.[8] To determine compliance with this goal, the 20% worst days (the days when visibility levels are their poorest due to natural influences such as sea salt, humidity, forest fires, or natural events) are analyzed. The Federal Regional Haze Rules also require states to ensure no degradation of visibility occurs on the 20% best visibility days when visibility is least impaired. To ensure incremental progress is made towards these goals, states establish 10 years goals in their SIPs and report on their progress in visibility improvement every 5 years. Progress is determined by comparing current visibility levels to baseline conditions, and a comparison of trends of emissions in visibility impairing pollutants.

The baseline conditions[9] used in the 2009 Regional Haze plan is the average visibility (in deciviews) for the years 2000 through 2004.[10] For the Brigantine Wilderness Area, the average baseline visibility on the 20% best visibility days (2000-2004) was 14.3 deciviews, and 29.0 deciviews on the 20% worst visibility days during the same period.

To meet the 2018 Reasonable Progress Goal for the Brigantine Wilderness area, a 3.9 deciview improvement is needed to bring the average visibility levels on the 20% worst visibility days to 25.1 deciviews. Table 1.1 shows the Reasonable Progress Goals for the Brigantine Wilderness Area.

Table 1.1: Reasonable Progress Goals for the Brigantine Wilderness Area (all values expressed in deciviews)

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

[7] Natural background conditions are the conditions that would exist in the absence of all human-caused pollution.
[8] A deciview is a unitless standard of visibility levels. It is calculated using a scientific formula containing measured levels of the pollutants that affect visibility, so that the higher the level of pollutants measured in the air corresponds to a higher deciview level to be calculated.
[9] Baseline conditions represent the visibility conditions for each Class I area which existed at the time the Regional Haze Program was established in the year 2002.
[10] USEPA. Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5, and Regional Haze. Pg. 76 EPA-454/B-07-002. April 2007.

In accordance with the consultation requirement of the Regional Haze Rule at 40 CFR. §51, New Jersey consulted with MANE-VU and other contributing states to determine the reasonable measures for achieving 2018 reasonable progress goals at the Brigantine Wildlife Area.

1.2.2 Reasonable Measures for Brigantine Wilderness Area

In the 2009 Regional Haze plan, New Jersey requested that MANE-VU and other states who contribute to the visibility impairment at Brigantine implement the reasonable measures in Table 1.2 and 1.3, respectively. States were asked to implement the measures as expeditiously as practicable, but no later than December 31, 2017, to ensure the visibility benefits will be achieved by the 2018 milestone year. The reasonable measures targeted large sources of SO_2 emissions, including EGUs, the sulfur content in distillate fuel oil, and BART.[11]

Table 1.2: Reasonable Measures for MANE-VU States

Best Available Retrofit Technology (BART)	Timely implementation of BART requirements		
Electric Generating Units (EGU)	A 90% or greater reduction in sulfur dioxide (SO_2) emissions* from each of the 167 stacks identified by MANE-VU		
	Strategy	Phase 1**	Phase 2**
Low Sulfur Fuel Oil - Inner Zone (NJ, NY, PA)	Distillate	500 ppm by 2012	15 ppm by 2016
	#4 fuel oil	0.25% sulfur	0.25% sulfur
	#6 fuel oil	0.3-0.5 % sulfur	0.3-0.5 % sulfur
Low Sulfur Fuel Oil - Outer zone (CT, DC, DE, MA, ME, MD, NH, RI, VT,)	Distillate	500 ppm by 2016	15 ppm by 2018
	#4 fuel oil		0.25% sulfur
	#6 fuel oil		0.3-0.5 % sulfur
Additional Controls ***	Continued evaluation of other measures, including Energy Efficiency, Alternative Clean Fuels and other measures to reduce sulfur dioxide (SO_2) and oxides of nitrogen (NO_x) from all coal-burning facilities by 2018, and new source performance standards for wood combustion		

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

[11] See Section 5, "Status of New Jersey's Best Available Retrofit Technology (BART) Measure in the Regional Haze SIP."

** Phase 1 and Phase 2 refer to two strategies considered by the MANE-VU states and differ by the proposed level and timing of the implementation of a lower sulfur fuel oil strategy.
*** These additional controls were not included in the modeling to establish the 2018 target visibility levels for MANE-VU Class I areas. The controls included in the 2018 modeling were the BART controls, controls on 167 specific EGUs, and a lower sulfur fuel strategy.

Table 1.3: Reasonable Measures for non-MANE-VU States

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

* If it is infeasible for a state to achieve this level of reduction from a unit, the state must identify alternative measures for equivalent emission reductions.
** Not included in the modeling.

The status of the implementation of the reasonable measures at the 22 states that New Jersey asked to implement these measures is shown in Table 1.4.

Table 1.4

MANE-VU States	Timely implementation of BART requirements	90% or greater reduction in SO_2 emissions from each of the 167 stacks identified by MANE-VU	28% Reduction SO_2 emission reduction from non-EGUs	Continuing evaluation of other measures
Connecticut	Done	N/A	Done	Yes
District of Columbia	Done	N/A	Failed to meet because rule is proposed but not finalized.	Yes
Delaware	Done	Done	Done	Yes
Maine	Done	Done	Done	Yes
Maryland	Done	Done	Failed to meet because there is no rule in place.	Yes
Massachusetts	Done	Done	Done	Yes
New Hampshire	Done	Done	Failed to meet because there is no rule in place.	Yes
New York	Federal Implementation Plan (FIP) in place for 2 sources. All others done.	Done	Done	Yes
Pennsylvania	No	Done	Failed to meet because the sulfur content of distillate oil is only going to 500 ppm by 2016 and there is no rule or statute in place for residual oil.	Yes
Rhode Island	N/A	N/A	Done	Yes
Vermont	N/A	N/A	Done	Yes

Non-MANE-VU States	Timely implementation of BART requirements	90% or greater reduction in SO_2 emissions from each of the 167 stacks identified by MANE-VU	28% Reduction SO_2 emission reduction from non-EGUs	Continuing evaluation of other measures
Georgia	Failed to meet because of reliance on Clean Air Interstate Rule (CAIR). FIP in place.	Done	No	Yes
Illinois	Done	Done	Did not address the MANE-VU "Ask" in SIP	Yes
Indiana	Failed to meet because of reliance on CAIR. FIP in place.	Done	Did not address the MANE-VU "Ask" in SIP	Yes
Kentucky	Failed to meet because of reliance on CAIR. FIP in place.	Done	Done	Yes
Michigan	Failed to meet because of reliance on CAIR. FIP in place.	Done	Did not address the MANE-VU "Ask" in SIP	Yes
North Carolina	Failed to meet because of reliance on CAIR. FIP in place.	Done	Did not address the MANE-VU "Ask" in SIP	Yes
Ohio	Failed to meet because of reliance on CAIR. FIP in place.	Done	Did not address the MANE-VU "Ask" in SIP	Yes
South Carolina	Failed to meet because of reliance on CAIR. FIP in place.	Done	Did not address the MANE-VU "Ask" in SIP	Yes
Tennessee	Failed to meet because of reliance on CAIR. FIP in place.	Done	Unknown	Yes
Virginia	Failed to meet because of reliance on CAIR. FIP in place.	Done	Unknown	Yes
West Virginia	Failed to meet because of reliance on CAIR. FIP in place.	Done	Done	Yes

N/A – No Sources

Section 2: New Jersey's Progress in Improving Visibility Levels at the Brigantine Wilderness Area and Other MANE-VU Class I Areas

The intent of this 5-year progress report is to show that sufficient progress has been made in New Jersey to meet the requirements of USEPA's Regional Haze Rule and that the Brigantine Wilderness Area is on target to make visibility improvements sufficient to meet the first regional haze goal in 2018. New Jersey made this progress due to the implementation of the reasonable measures requested by the MANE-VU "Ask."

2.1. Visibility Progress at the Brigantine Wilderness Area

In accordance with Federal rules,[12] New Jersey has determined that, due to emission reductions inside and outside of New Jersey as a result of implementing reasonable measures, visibility trends in the Brigantine Wilderness Area show that the reasonable progress goals for the first 10-year period is on track to be achieved by 2018. If all states implement the MANE-VU "Asks" by 2018, New Jersey finds that no additional control measures are needed at this time, and hereby certifies that the existing New Jersey Regional Haze SIP is adequate if all contributing states continue to implement the reasonable measures in Tables 1.2 and 1.3.

In May 2010, the Northeast States for Coordinated Air Use Management (NESCAUM) prepared the report *Tracking Visibility Progress, 2004-2008*, [13] which summarized progress at MANE-VU Class I areas during the five year period ending in 2008. That report concluded that the dominant contributor to visibility impairment in the northeast's Class I areas is sulfate.

A year later, the 2011 report prepared by Colorado State University entitled "IMPROVE Report V: *Spatial and Seasonal Patterns and Temporal Variability of Haze and its Constituents in the United States,"*[14] reported on five-year average reconstructed light extinction (the regional haze tracking metric) at certain IMPROVE Class I sites for the baseline period of 2000-2004, as well as, for the next five-year period, 2005-2009.[15] The IMPROVE Report V defined the baseline period as 2000 through 2004 and the first trend period as being 2005 through 2009. These five-year averages include total light extinction, as well as, the extinction contributed by separate pollutant species for the haziest 20% of days and for the clearest 20% of days for each of these five-year periods.

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[12] 40 CFR 51.308(h)

[13] *Tracking Visibility Progress* is posted on NESCAUM's website at http://www.nescaum.org/topics/regional-haze/regional-haze-documents.

[14] Jenny L. Hand, et al., *Spatial and Seasonal Patterns and Temporal Variability of Haze and its Constituents in the United States: Report V*, June 2011, posted on the improve website at http://vista.cira.colostate.edu/improve/publications/Reports/2011/2011.htm.

[15] Jenny L. Hand, et al., *Spatial and Seasonal Patterns and Temporal Variability of Haze and its Constituents in the United States: Report V*, June 2011, posted on the improve website at http://vista.cira.colostate.edu/improve/publications/Reports/2011/2011.htm.

Visibility at all MANE-VU Class I Area IMPROVE sites improved for the 2005-2009 period compared to the 2000-2004 baseline period. These improvements occurred for both the haziest 20% worst days (which are required to get gradually cleaner over time), as well as for the cleanest 20% best days (which are required to get no worse over time). Improvements in total light extinction on both the haziest worst and the cleanest best days resulted from reductions in light extinction from all four of the major visibility-impairing pollutant species: sulfates, nitrates, particulate organic matter, and elemental carbon. (Note: Please also see the response to Comment 1 in Appendix B of this report for a clarification of the decrease in nitrate levels observed at the Brigantine Wilderness Area).

NESCAUM updated its report "Tracking Visibility Progress" in May 2013. The report updated the visibility trends at Federal Class I areas with visibility data collected in the historic baseline period of 2000-2004 through 2009-2013, using available data.

Figures 2.1 and 2.2, and Tables 2.1 and 2.2 present the initial trends in visibility at the Brigantine Wilderness Area as measured light extinction. The Brigantine Wilderness Area showed an improving trend in visibility levels related to decreasing amounts of sulfates, organic matter, elemental carbon, and nitrates. The changes in emissions as shown in Section 7 of this document have resulted in the improved visibility levels at the Brigantine Wilderness Area.

Figure 2.1: Visibility Improvements on the 20% Worst Days at the Brigantine Wilderness Area

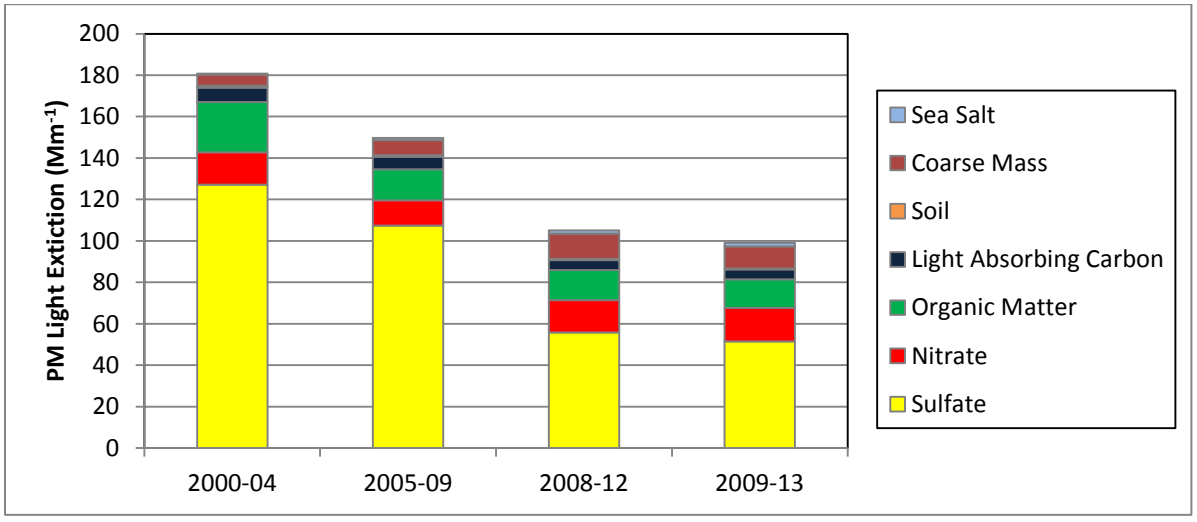


Figure 2.2: Visibility Improvements on 20% Best Days in the Brigantine Wilderness Area

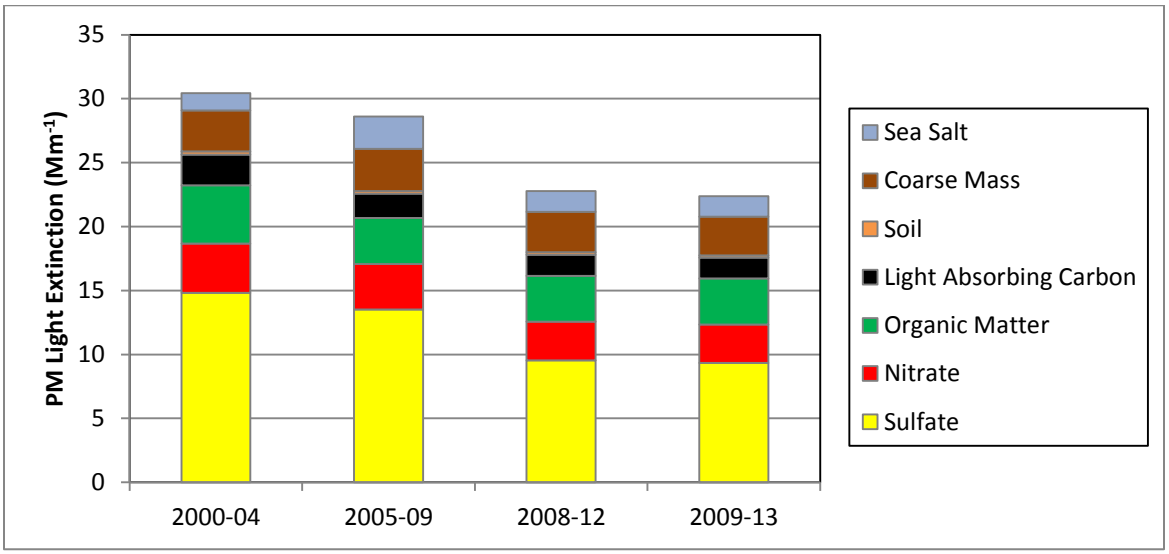


Table 2.1: ***Visibility Improvements on 20% Worst Days at the Brigantine Wilderness Area***

Haziest 20%	Brigantine PM Light Extinction (Mm^{-1})			
	2000-04	2005-09	2008-12	2009-13
Sulfate	127.1	107.4	55.8	51.5
Nitrate	15.7	12.2	15.6	16.1
Organic Matter	24.2	14.9	14.5	13.7
Light Absorbing Carbon	7.0	6.1	4.8	4.8
Soil	1.0	0.7	0.6	0.5
Coarse Mass	5.4	7.3	12.2	10.7
Sea Salt	0.4	1.2	1.6	1.7
Total PM Extinction	180.7	149.8	105.0	99.1
Deciview (dv)	29.0	27.3	24.3	23.8

Table 2.2: ***Visibility Improvements on 20% Best Days at the Brigantine Wilderness Area***

Clearest 20%	Brigantine PM Light Extinction (Mm^{-1})			
	2000-04	2005-09	2008-12	2009-13
Sulfate	14.8	13.5	9.5	9.3
Nitrate	3.9	3.6	3.0	3.0
Organic Matter	4.5	3.6	3.6	3.6
Light Absorbing Carbon	2.4	1.9	1.6	1.6
Soil	0.2	0.2	0.2	0.2
Coarse Mass	3.2	3.3	3.2	3.0
Sea Salt	1.4	2.5	1.6	1.6
Clearest 20%	Brigantine PM Light Extinction (Mm^{-1})			
	2000-04	2005-09	2008-12	2009-13
Total PM Extinction	30.4	28.6	22.8	22.4
Deciview (dv)	14.3	13.9	12.4	12.2

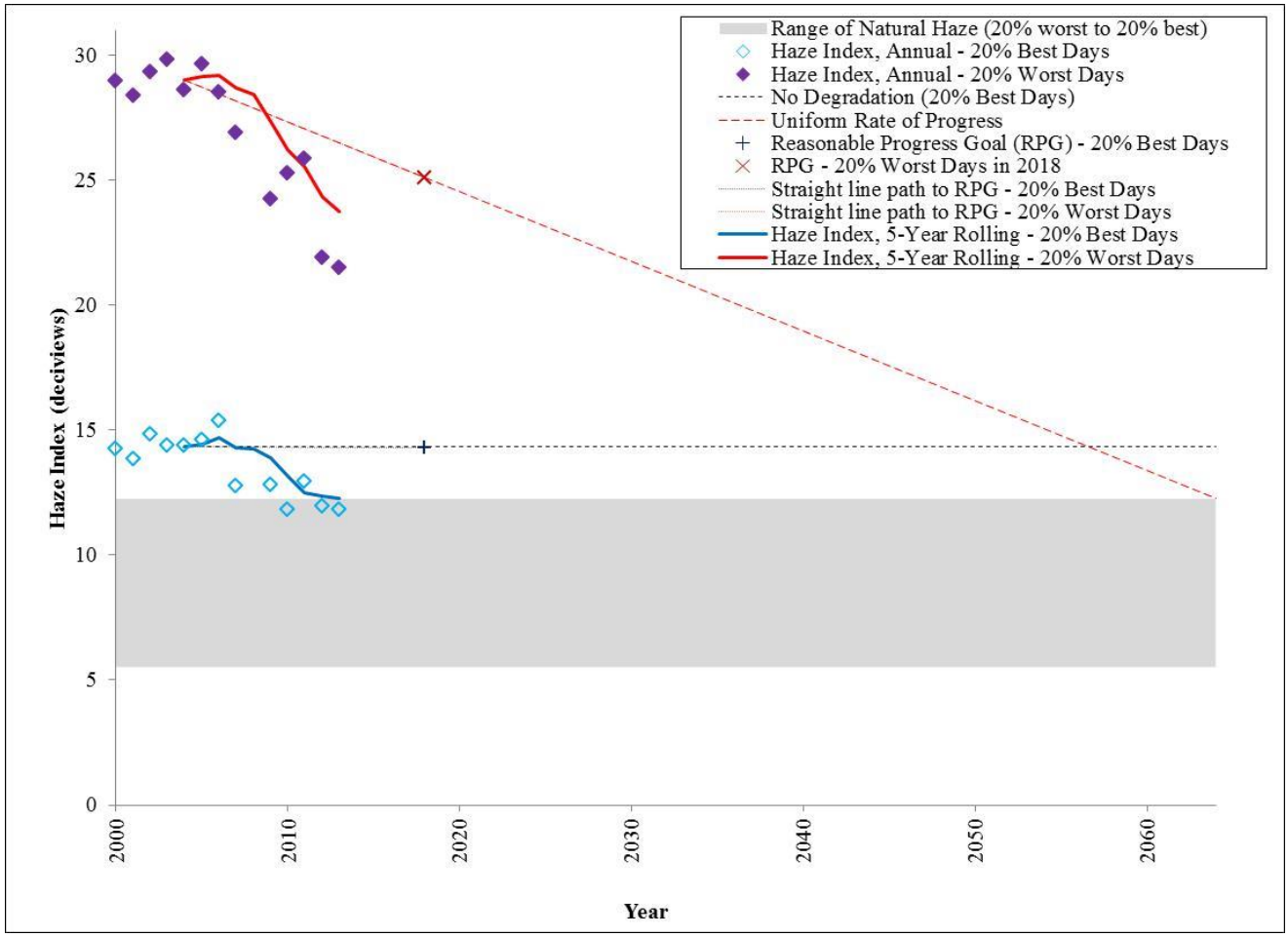
Table 2.3 compares the most recent quality-assured data for 2009 to 2013 from the Brigantine Wilderness Area to the baseline visibility measured for 2000-2004. As required by 40 CFR §51.308(g)(3), visibility is reported as a five-year average in deciviews (dv). Visibility continues to improve at the Brigantine Wilderness Area. The current visibility levels on the 20% worst days are below the 2018 goal for the Brigantine Wilderness Area, and New Jersey is on target for meeting the required visibility improvement goals.

Table 2.3: ***Change in Visibility from Baseline to Current Conditions for Brigantine Wilderness Area***

308(g)(3)(iii) Change in visibility from 2000-04 to 2009-2013		
20% Worst Days		
2000-2004 Baseline Visibility	**2009-2013 Current Visibility**	**2018 Goal**
29.0 dv	*23.8 dv*	*25.1 dv*
20% Best Days		
2000-2004 Baseline Visibility	**2009-2013 Current Visibility**	**2018 Goal (Same as the baseline level)**
14.3 dv	*12.2 dv*	*14.3 dv*

Figure 2.3 shows the reductions in the deciview (dv) levels (i.e.; the improvements in visibility) that have occurred at the Brigantine Wilderness Area since 2002 in comparison to the straight-line (uniform) reductions required by the Regional Haze Rule to meet the 2064 goals on the 20% worst visibility days. Improvements in visibility levels have also occurred on the best visibility days. Figure 2.3 shows the running 5-year average visibility levels since 2002.

<u>Figure 2.3:</u> Measured visibility levels in deciviews at the Brigantine Wilderness Area

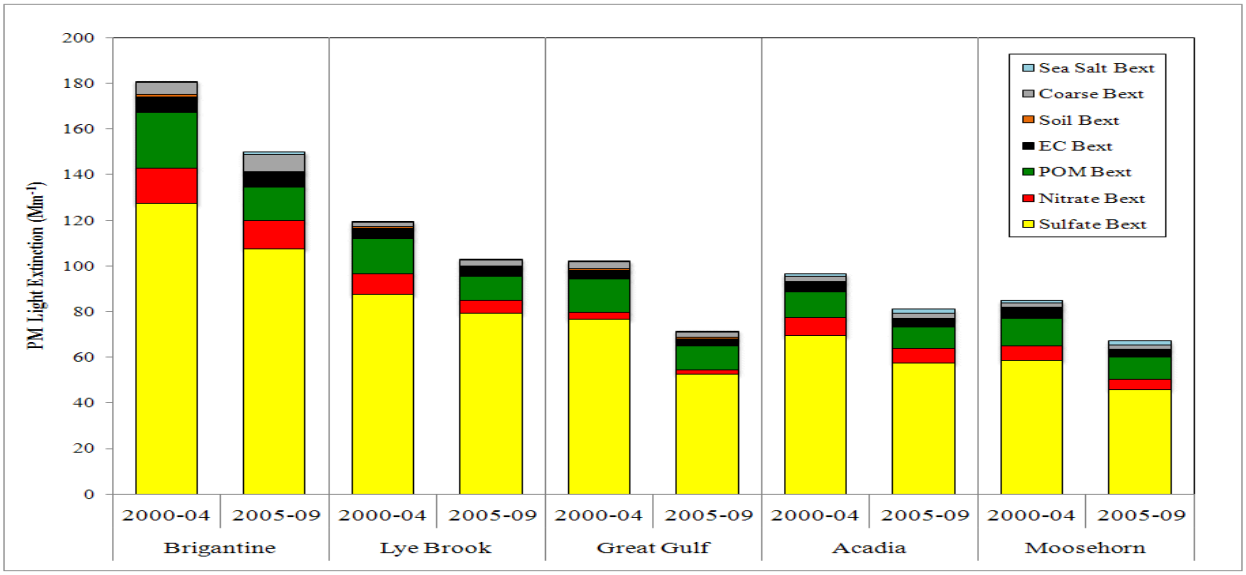


2.2 Visibility Progress at Other MANE-VU Class I Areas

2.2.1 Tracking Visibility Progress at MANE-VU Class I Areas

Figures 2.1.1 and 2.1.2, and Tables 2.1.1 and 2.1.2 present trends in visibility at Class I sites in the MANE-VU region as reported in the IMPROVE Report V.[16]

Figure 2.4.1: Visibility Improvements on Haziest 20% Days in MANE-VU Class I Areas



[16] *Tracking Visibility Progress* is posted on NESCAUM's website at http://www.nescaum.org/topics/regional-haze/regional-haze-documents.

Figure 2.4.2: Visibility Improvements on Clearest 20% Days in MANE-VU Class I Areas

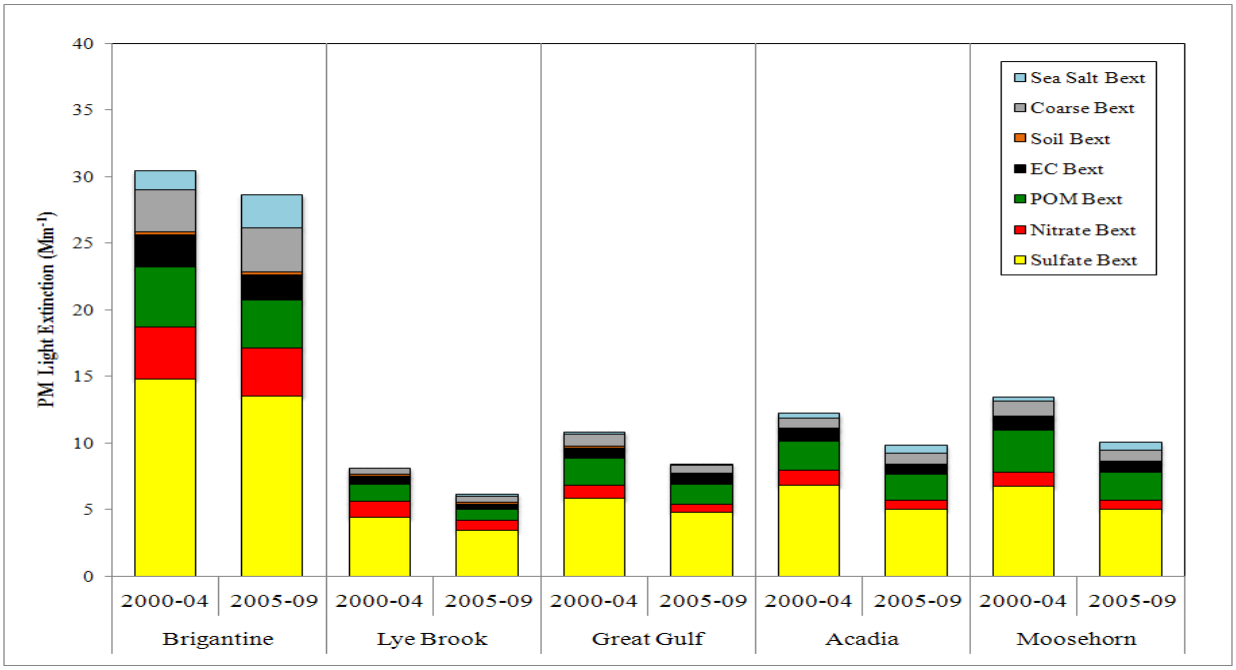


Table 2.4.1: Visibility Improvements on Haziest 20% Days in MANE-VU Class I Areas

Haziest 20%	Brigantine		Lye Brook		Great Gulf		Acadia		Moosehorn	
	2000-04	2005-09	2000-04	2005-09	2000-04	2005-09	2000-04	2005-09	2000-04	2005-09
Sulfate Bext	127.1	107.4	87.3	79.0	76.6	52.5	69.2	57.2	58.5	45.7
Nitrate Bext	15.7	12.2	9.1	5.6	3.0	1.8	8.0	6.4	6.4	4.6
POM Bext	24.2	14.9	15.3	10.8	14.4	10.5	11.2	9.6	11.9	9.7
EC Bext	7.0	6.1	4.8	4.0	3.9	3.2	4.3	3.5	4.4	3.1
Soil Bext	1.0	0.7	0.6	0.5	0.6	0.4	0.5	0.3	0.4	0.3
Coarse Bext	5.4	7.3	1.8	2.5	3.0	2.6	1.9	2.3	2.1	1.7
Sea Salt Bext	0.4	1.2	0.1	0.3	0.1	0.2	1.3	1.6	0.9	1.8
Total PM Bext	180.8	149.8	119.0	102.7	101.6	71.2	96.4	80.9	84.6	66.9
Deciview (dv)	29.0	27.3	24.4	23.0	22.8	20.2	22.9	21.5	21.7	19.9

Table 2.4.2: Visibility Improvements on Clearest 20% Days in MANE-VU Class I Areas

Clearest 20%	Brigantine		Lye Brook		Great Gulf		Acadia		Moosehorn	
	2000-04	2005-09	2000-04	2005-09	2000-04	2005-09	2000-04	2005-09	2000-04	2005-09
Sulfate Bext	14.8	13.5	4.4	3.4	5.8	4.8	6.8	5.0	6.7	5.0
Nitrate Bext	3.9	3.6	1.2	0.8	1.0	0.6	1.1	0.7	1.1	0.7
POM Bext	4.5	3.6	1.3	0.8	2.0	1.5	2.2	1.9	3.1	2.1
EC Bext	2.4	1.9	0.6	0.4	0.8	0.7	0.9	0.7	1.0	0.7
Soil Bext	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Coarse Bext	3.2	3.3	0.5	0.5	0.9	0.6	0.7	0.8	1.1	0.8
Sea Salt Bext	1.4	2.5	0.0	0.1	0.2	0.1	0.4	0.6	0.3	0.6
Total PM Bext	30.4	28.6	8.1	6.1	10.8	8.4	12.2	9.8	13.4	10.0
Deciview (dv)	14.3	13.9	6.4	5.2	7.7	6.6	8.8	7.7	9.2	7.8

NESCAUM updated its report "Tracking Visibility Progress" in May 2013[17], by updating the visibility trends at Federal "Class I areas" with visibility data collected starting in the historic baseline period of 2000-2004 through 2007-2011, the most recent five-year period with available data. The latest data available from the IMPROVE monitoring program also shows that all MANE-VU Class I areas are already below their first 2018 progress goal. New Jersey's emissions, therefore, do not interfere with any state's ability to meet the 2018 reasonable progress goal. For the period 2009-2013 (the most recent 5 years of certified monitoring data at the time of this report), the table below shows visibility improvements relative to 2000-2004 on both best and worst visibility days.

Table 2.4.3 - Observed Visibility vs. Reasonable Progress Goals (All values in deciviews)

Class I Area IMPROVE* Site	2000-2004 5-Year Average	2009-2013 5-Year Average	Met 2018 Progress Goal Already?	2018 Reasonable Progress Goal
20% Worst Days				
Acadia National Park	22.9	17.9	**Yes**	19.4
Moosehorn Wilderness Area**	21.7	16.8	**Yes**	19.0
Great Gulf Wilderness Area***	22.8	16.7	**Yes**	19.1
Lye Brook Wilderness Area	24.4	18.8	**Yes**	20.9
Brigantine Wilderness Area	29	23.8	**Yes**	25.1
20% Best Days				
Acadia National Park	8.8	7.0	**Yes**	8.8
Moosehorn Wilderness Area	9.2	6.7	**Yes**	9.2
Great Gulf Wilderness Area	7.7	5.9	**Yes**	7.7
Lye Brook Wilderness Area	6.4	4.9	**Yes**	6.4
Brigantine Wilderness Area	14.3	12.3	**Yes**	14.3

* IMPROVE = Interagency Monitoring of Protected Visual Environments program.
** The IMPROVE monitor for Moosehorn Wilderness also represents Roosevelt Campobello International Park.
*** The IMPROVE monitor for Great Gulf Wilderness also represents Presidential Range - Dry River Wilderness Area.

[17] Jenny L. Hand, et al., *Spatial and Seasonal Patterns and Temporal Variability of Haze and its Constituents in the United States: Report V*, June 2011, posted on the improve website at http://vista.cira.colostate.edu/improve/publications/Reports/2011/2011.htm.

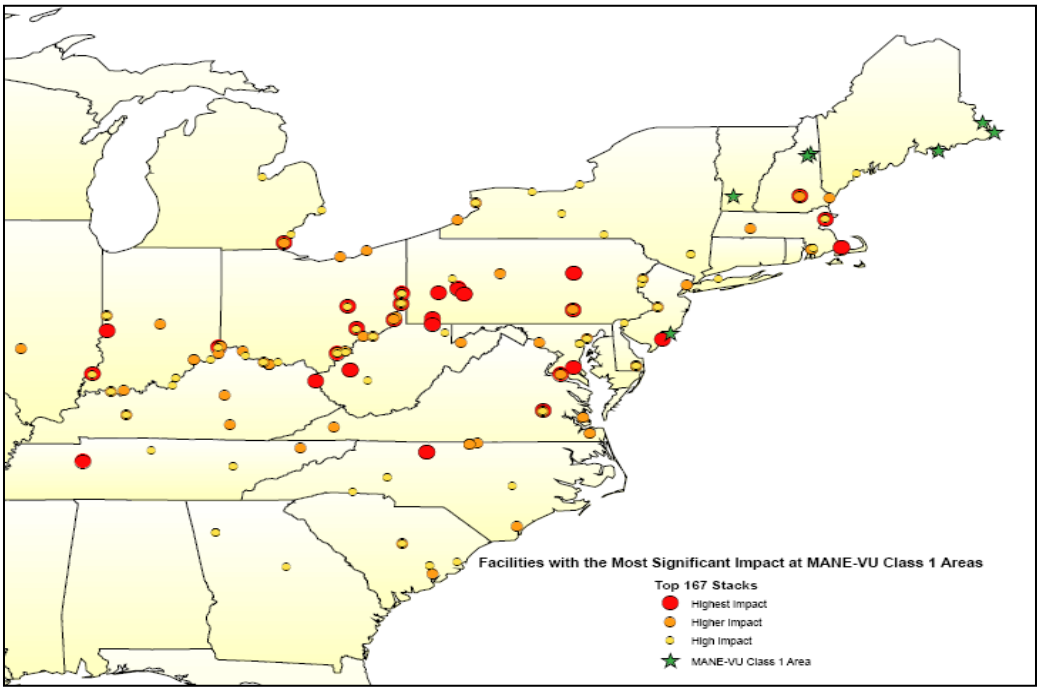
Section 3: Status of Electric Generating Unit (EGU) Controls Including Controls at 167 Key Sources That Most Affect MANE-VU Class I Areas

3.1. Requirement to Track the Implementation of EGU Control Measures

In establishing reasonable progress goals, MANE-VU Class I states relied in part on implementation of emissions reductions at 167 EGU sources, or other alternative measures, by 2018. These 167 sources[18] identified by MANE-VU were determined to most affect visibility in the MANE-VU Class I areas. The location of these sources is shown in Figure 3.1.

As a reasonable measure, New Jersey requested that MANE-VU and other contributing states implement a 90% reduction in SO_2 emissions at these sources or, if infeasible to achieve that level of reduction from the unit, alternative measures of equal reductions were to be pursued by the state.

Figure 3.1: 167 EGU Stacks Affecting MANE-VU Class I Area(s)



[18] NJDEP, State Implementation Plan (SIP) for Regional Haze. July 28, 2009, Appendix I

3.2. Status of New Jersey's Power Plant (Electric Generating Unit –EGU) Control Measures

Four of the 167 EGU stacks identified by MANE-VU as contributing to visibility impairment are located in New Jersey. These units include the following coal fired EGU boilers: BL England – 1 unit, PSEG / Hudson – 1 unit, and PSEG / Mercer - 2 units. New Jersey has met its obligations to implement the MANE-VU "Ask" for EGUs based on enforceable actions (Administrative Consent Orders and Consent Decrees) at the four stacks located in the State.

The SO_2 emission reductions from the control measures implemented at the four New Jersey EGU stacks are shown in Table 3.1.

Table 3.1: SO_2 Emission Reductions from the 4 New Jersey EGU stacks that are part of the MANE-VU 167 Stacks

			Actual			Goal		
Plant ID	**Unit ID**	**Unit Name**	**Actual 2002 Emissions (Tons)**	**Actual 2012 Emissions (Tons)**	**% Reduction (2012)**	**Projected 2018 Emissions (Tons)**	**% Reduction Expected in 2018**	**Achieved Goal**
61057	1	Mercer 1	8,137	105	99%	814	90%	Y
61057	2	Mercer 2	5,918	105	98%	592	90%	Y
12202	2	Hudson 2	18,541	139	99%	1,225	93%	Y
73242	1	BL England 1	10,080	934	91%	274	97%	Y

As shown in Table 3.1, the SO_2 emission reductions at the four stacks provide more reductions than expected by 2018 to meet the reasonable progress goal at Brigantine. On October 16, 2009, New Jersey sent letters to the MANE-VU Commissioners, Secretaries and Air Directors, the USEPA, the USFWS, and the USDA Forest Service informing them that New Jersey has met its obligations to implement the MANE-VU "Ask" for EGUs.

Additionally, on December 6, 2004, New Jersey adopted a mercury rule[19] that sets performance standards for coal-fired boilers for companies that choose the multi-pollutant strategy in that rule. All four of the167 EGU stacks located in New Jersey are committed to multi-pollutant controls as part of their mercury rule compliance plan.

[19] N.J.A.C 7:27-27.7

In addition to the mercury rule, New Jersey adopted rules[20,21] on March 20, 2009 setting-performance standards (NO_x and VOC) for all ten coal-fired electric generating units in the state. These standards were effective on December 15, 2012. Lowering the maximum allowable emission rates of particles, NO_x and SO_2 from these coal-fired boilers contributed to reductions in regional haze. At that time, New Jersey also adopted[22] more stringent NO_x emission standards for gas- and oil-fired boilers serving EGUs well in advance of the 2018 reasonable progress goal milestone.

[20] N.J.A.C. 7:27-16: Control and Prohibition of Air Pollution by Volatile Organic Compounds (40 N.J.R. 4390(a), 41 N.J.R. 1752 (a))
[21] N.J.A.C. 7:27-19: Control and Prohibition of Air Pollution from Oxides of Nitrogen (40 N.J.R. 4390(a), 41 N.J.R. 1752 (a))
[22] Ibid

Section 4: Status of Low Sulfur Oil Strategy

4.1. Requirement to Track Implementation of Low Sulfur Fuel Oil Strategy

Sulfur in fuel forms SO_2 after combustion. Removing sulfur from the fuel will reduce the amount of SO_2 that causes visibility impairing pollutants. The Low Sulfur Fuel Oil Strategy of the MANE-VU "Ask" requested that states implement a rule to require the sulfur content for distillate fuel oil to be lowered from up to 5,000 parts per million (ppm) down to 15 ppm. The Inner Zone states were defined as New Jersey, New York, and Pennsylvania, with the remainder of the MANE-VU States placed in the Outer Zone. Table 4.1 shows the commitment to the MANE-VU Low Sulfur Fuel Oil Strategy at these zones.

Table 4.1: The Low Sulfur Fuel Oil Strategy

	Strategy	Phase 1	Phase 2
Low Sulfur Fuel Oil - Inner Zone (NJ, NY, PA)	Distillate	500 ppm by 2012	15 ppm by 2016
	#4 fuel oil	0.25% sulfur	0.25% sulfur
	#6 fuel oil	0.3-0.5 % sulfur	0.3-0.5 % sulfur
Low Sulfur Fuel Oil - Outer zone (CT, DC, DE, MA, MD, ME, NH, RI, VT,)	Distillate	500 ppm by 2016	15 ppm by 2018
	#4 fuel oil		0.25% sulfur
	#6 fuel oil		0.3-0.5 % sulfur

4.2. Status of New Jersey's Low Sulfur Oil Strategy

New Jersey has met the requirements for the Low Sulfur Fuel Oil Strategy to address the 2018 reasonable progress goal for Brigantine Wilderness Area. On October 25, 2010, New Jersey adopted rules[23] to modify the sulfur in fuels limits in accordance with the definition of reasonable measures needed to meet this goal. The New Jersey rule (N.J.A.C. 7:27-9 et seq.) lowered the sulfur content of all distillate fuel oils (#2 fuel oil and lighter) to 500 ppm beginning on July 1, 2014 and to 15 ppm beginning on July 1, 2016. The sulfur content for #4 fuel oil was lowered to 2,500 ppm and for #6 fuel oil to a range of 3,000 to 5,000 ppm sulfur content[24] beginning July 1, 2014.

[23] N.J.A.C. 7:27- 9: Sulfur in Fuels (42 N.J.R. 2244)

[24] The maximum sulfur content of #6 fuel oil will vary depending on the county where the fuel oil is burned. The northern part of New Jersey has a lower maximum sulfur content for residual fuel oil at 3,000 ppm while the southern part of New Jersey will have a maximum sulfur content of 5,000 ppm. See N.J.A.C. 7:27-9 et seq.

Section 5: Status of New Jersey's Best Available Retrofit Technology (BART) Measures in the Regional Haze SIP

5.1. Requirement for Best Available Retrofit Technology (BART) Implementation

In establishing the 2018 reasonable progress goals, New Jersey relied in part on the timely implementation of BART requirements by the MANE-VU and other States whose emissions impact visibility at the Brigantine Wilderness Area and other MANE-VU Class I areas. BART is a level of air pollution control based upon an analysis of available technologies for existing, rather than new, sources of air pollution. The BART-eligible[25] sources are required to install BART control to reduce these emissions in a timely manner.

States must require sources to comply with any BART determinations as expeditiously as practicable, but not later than five years after USEPA's approval of SIPs. New Jersey must require BART compliance by July 2014. To date, not all states with emission sources significantly impairing visibility impairment have fully implemented the BART control requirements where some BART controls have been required but not yet installed. New Jersey has fully implemented BART as shown in Section 5.2.

5.2 Status of New Jersey's Best Available Retrofit Technology (BART)

NJDEP identified five New Jersey facilities as potentially BART-eligible in the 2009 Regional Haze SIP.[26] All five facilities performed the required BART analysis and provided it to the NJDEP. [27] NJDEP's review determined that only three of the five facilities have BART-eligible sources. The three facilities with BART-eligible emission units are: 1) Chevron Products, 2) ConocoPhillips Bayway Refinery, and 3) PSEG Hudson Generating Station. The USEPA Region 2 subsequently identified three more EGUs in New Jersey that were BART-eligible: 1) Vineland Municipal Electric Utility (VMEU) – Howard M. Down, Unit 10, and 2) BL England Generating Station, Units 1 and 2. These units were not included in the final MANE-VU list of applicable BART-eligible sources in the NESCAUM June 2007 Five Factor Analysis report because, at the time, these sources were anticipated to permanently shut down as a result of enforceable agreements that were negotiated concurrent with the regional BART process. NJDEP has consequently determined that these facilities are subject to BART, under the Regional Haze Rule, and that the enforcement obligations now in place, including options to shut down, add controls or repower, are consistent with the Federal BART requirements.

Table 5.1 summarizes New Jersey's BART determinations and the status of implementing BART requirements.

[25] 64 Fed. Reg. 35737; July 1, 1999
[26] http://www.state.nj.us/dep/baqp/sip/siprevs.htm
[27] http://www.state.nj.us/dep/baqp/2008%20Regional%20Haze/Appendix%20G-8%28Final%20Only%29.pdf

Table 5.1: Status of BART Adoption and Implementation

Facility	Unit	Description of BART Control	Implementation Deadline	Status (as of 2/26/14)	Met Requirement ?
Chevron Products (PI#18058) –Perth Amboy, Middlesex County	E1501, E1502	Chevron proposed an enforceable permit limit to cap out facility's NO_x emission to less than 250 tons per year (tpy) potential to emit (PTE) cutoff from these two furnaces. The cumulative annual allowable NO_x PTE from both units will be reduced by five percent to 249 tpy from 262.5 tpy which is below the 250 tpy BART eligibility cutoff.	March 15, 2011 BOP 100001	Units shut down BOP 120003	Yes
ConocoPhillips Bayway Refinery (PI#41805) – Linden, Union County	E241, E242, E243, E245, E246, E247, E248, E249, E250, E253, E258	**Consent Decree** (January 27, 2005) – Consent Decree requires all BART-qualified process heaters at the Bayway facility to eliminate oil burning, and to only burn refinery fuel gas with an hydrogen sulfide (H_2S) content less than 162 ppmvd based on New Source Performance Standard (NSPS) subpart J.	June 30, 2011	In compliance	Yes
PSEG Fossil LLC Hudson Generating Station (PI#12202) – Jersey City, Hudson County	E1	PSEG submitted an application (BPO110001) to modify operating permit to include NO_x emission limits, 1.0 lb/MW-hr (natural gas) and 2.0 lb/MW-hr (No. 6 fuel oil) to coincide with N.J.A.C. 7:27-19.4, and to burn No. 6 fuel oil, already restricted to 0.3% sulfur by wt., when natural gas is curtailed.	May 1, 2015 – N.J.A.C 7:27-19.4. December 31, 2011	Unit Shut down	Yes
	E2, E22, E23	Federally enforceable emission limits due to consent decree. Year-round operation of selective catalytic reduction (SCR) to reduce NO_x; Use of 100% ultra-low sulfur coal; Installation of new dry flue gas desulfurization (FGD) with spray dryer absorber (SDA) and full-size baghouse for NO_x, SO_2 and PM, for E2, and existing PM controls for E22 and E23.	December 31, 2010	In compliance	Yes
Vineland Municipal Electric Utility (PI#75507)	E10	Consent Decree and Administrative Consent Order install selective non-catalytic reduction (SNCR) or permanently cease operation	September 1, 2012 BOP 110001	Shut down and removed from permit. BOP120001	Yes

Facility	Unit	Description of BART Control	Implementation Deadline	Status (as of 2/26/14)	Met Requirement ?
BL England Generating Station (PI#73242)	E1	Administrative Consent Order (ACO), over fire air (OFA), selective catalytic reduction (SCR), dry scrubber, and electrostatic precipitator (ESP).	December 15, 2013 BOP 100003	Unit shut down	Yes
	E2	Administrative Consent Order (ACO), over fire air (OFA), selective catalytic reduction (SCR), wet scrubber and sorbent injector, and electrostatic precipitator (ESP).	May 1, 2017	Expected to shut down in 2017	Yes

* "Repower" means the replacement of an existing coal-fired boiler with a new heat source (e.g. natural gas or distillate oil), or new coal-combustion technology (e.g. circulating fluidized bed boilers or integrated gasification combined-cycle (IGCC") technology as defined in 01/24/2006 Administrative Consent Order).

The final list of BART-eligible sources in the MANE-VU region, including New Jersey, can be found in Appendix A of the NESCAUM 2007 report, "Five-Factor Analysis of BART-Eligible Sources."[28]

Table 5.2 summarizes the emission reductions achieved in New Jersey's BART-eligible facilities due to installation of BART controls. The emission reductions shown in Table 5.2 as a result of BART controls resulted in an over 90 percent reduction in emissions at most of the facilities.

Table 5.2: Changes in Emissions at BART-eligible facilities located in New Jersey due to BART controls

Facility	Pollutant	Actual 2002 Emissions (Tons)	Actual 2012 Emissions (Tons)	Change in Emissions
Chevron Products (PI#18058) – Perth Amboy, Middlesex County	NO_x	138.54	3.78	-134.76 (-97.3%)
	SO_2	18.18	0.01	-18.17 (-99.9%)
	PM	8.91	0.44	-8.47 (-95.1%)
ConocoPhillips Bayway Refinery (PI#41805) – Linden, Union County	NO_x	2,212.94	906.13	-1,306.81 (-59.0%)
	SO_2	957.50	69.73	-887.77 (-92.7%)
	PM	178.49	205.58	+ 27.09 (+15.2%)*
PSEG Fossil LLC Hudson Generating Station (PI#12202) – Jersey City, Hudson County	NO_x	9005.09	384.85	-8,620.24 (95.7%)
	SO_2	18,936.68	145.02	-18,791.66 (-99.0%)
	PM	2,632.27	20.33	-2,611.94 (-99.2%)

[28] NESCAUM, Five-Factor Analysis of BART-Eligible Sources Survey of Options for Conducting BART Determinations. Boston, MA; June 2007.

Facility	Pollutant	Actual 2002 Emissions (Tons)	Actual 2012 Emissions (Tons)	Change in Emissions
Vineland Municipal Electric Utility (PI#75507)	NO_x	204.46	5.55	-198.91 (-97.3%)
	SO_2	454.17	4.14	-450.03 (-99.1%)
	PM	29.94	0.91	-29.03 (-97.0%)
BL England Generating Station (PI#73242)	NO_x	3,719.18	401.78	-3,317.70 (-89.2%)
	SO_2	12,124.04	1,043.06	-11,080.98 (-91.4%)
	PM	334.95	109.04	-225.91 (67.4%)

* As actual emissions between 2002 and 2012 are reported, this increase represents normal variation in refinery production and processes.

Section 6: Status of Additional Measures in New Jersey's Regional Haze SIP

In addition to the MANE-VU "Asks" and in accordance with Federal Regional Haze Rules,[29] New Jersey implemented additional measures to help meet the 2018 reasonable progress goal for the Brigantine Wilderness Area. These measures ranged from mitigating emissions from construction activities to smoke management.

6.1. Measures to Mitigate Impacts from Construction Activities

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

The following are measures implemented by New Jersey to mitigate impacts from construction activities:

- ***Standards[30] That Reduce "Fugitive Dust" Emissions From Construction*** - These standards were adopted by the New Jersey Department of Transportation and New Jersey Department of Agriculture under the "Soil Erosion and Sediment Control Standards: Standards for Dust Control." The standard covers the control of dust on construction sites and roads, the control of flowing sediment from accessing construction sites, and the control of on-site construction traffic to minimize land disturbance.

- ***Rules To Address Exhaust Emissions*** - New Jersey has existing rules to limit the idling of vehicles and equipment.[31] On November 16, 2009, New Jersey promulgated a rule revision to further reduce allowable smoke from on-road diesel engines.[32] These measures will help reduce emissions and regional haze.

- ***New Jersey's Executive Order #60*** - Pursuant to this order signed on April 20, 2011, tailpipe emission control technology was installed on 175 pieces of construction equipment used in selected New Jersey Department of Transportation (NJDOT) projects.

- ***General Conformity Rules*** - Federal actions taken in New Jersey must comply with the Federal General Conformity Rules[33] in a nonattainment or maintenance area for ozone, fine particulate matter ($PM_{2.5}$), and CO. The General Conformity Rule requires that VOC, NO_x, CO, and $PM_{2.5}$ direct and indirect emissions from a project that exceed *de*

[29] 40 CFR 51.308(d)(3)(v)(B)
[30] Standards for Soil Erosion and Sediment Control in New Jersey. Promulgated by the New Jersey State Soil Conservation Committee. Adopted July 1999.
[31] N.J.A.C. 7:27-14.3 for diesel fueled vehicles and N.J.A.C. 7:27-15.8 for gasoline fueled vehicles.
[32] N.J.A.C. 7:27-14: Control and Prohibition of Air Pollution from Diesel-Powered Motor Vehicles (Including Idling) (41 N.J.R. 4195 (b)).
[33] 40 CFR 93.150

minimis levels be mitigated, unless the activities are exempt. Emission reductions obtained through the implementation of measures required by the Federal conformity regulation will also reduce emissions from projects and help reduce regional haze.

6.2. Agricultural and Forestry Smoke Management

In accordance with Federal Regional Haze Rules,[34] this sub-section discusses the implementation status of New Jersey's smoke management techniques related to agricultural and forestry management to improve visibility at Brigantine Wilderness Area and other Class I areas impacted by emissions from New Jersey. The State addresses smoke management through its Open Burning Rules, as follows:

- ***Open Burning*** - New Jersey has one of the most stringent Open Burning Rules[35] in the nation. The existing New Jersey rules prohibit or limit all types of open burning within the State. These rules have been in effect since 1956, with subsequent revisions further restricting open burning. The limited instances where open burning is allowed, after an air pollution control and Forest Fire Service permit has been obtained, include:

    - Prescribed burning;
    - Limited agricultural management burning as follows:
        - Infested plant life;
        - Herbaceous plant life and hedgerows;
        - Orchard pruning and culling;
        - Land clearing for farming;
    - Emergencies; and,
    - Dangerous material.

All New Jersey open burning permits prohibit open burning on days forecasted as unhealthy for air quality. This condition currently applies in all but emergency situations.

New Jersey coordinates with the New Jersey Forest Fire Service to consider the effects on the Brigantine Wilderness Area when reviewing open burning permit applications for certain nearby areas, especially for prescribed burning. New Jersey's periodic area source emissions inventories include estimated emissions from permitted open burning, such as the following:

[34] 40 CFR 51.308(d)(3)(v)(E)
[35] N.J.A.C. 7:27-2

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

- ***Agricultural Management Burning*** - A few other categories where open burning is currently allowed with a permit in New Jersey, but limited in its scope, are conducted on agricultural lands. These categories include infested plant life, herbaceous plant life and hedgerows, orchard pruning and culling, and land clearing for agricultural purposes. NJDEP issues open burning permits to agricultural operations and establishments to ensure that only certain agricultural materials are burned.

New Jersey has several additional existing measures that help improve visibility at the Brigantine Wilderness Area and other Class I areas impacted by emissions from New Jersey. These measures include:

- ***Residential Wood Burning Outreach and Education*** - Fine particulate matter from wood smoke contributes to regional haze. Residential wood burning from woodstoves and fireplaces is one of the largest sources of direct $PM_{2.5}$ emissions in New Jersey. Although New Jersey does not regulate wood stoves and fireplaces, NJDEP continues to provide educational outreach to the general public. The NJDEP has a website that provides information to the public on proper wood burning techniques, health effects of wood burning, and links to other useful web pages related to reducing emissions from wood smoke.[36] New Jersey's County Environmental Health Act (CEHA) agencies also provide assistance to communities where wood smoke is prevalent and is a nuisance problem to local residents.

- ***Measures to Reduce Organic Carbon Emissions*** - Organic carbon is one of the major contributors to visibility impairment and a major component of PM. In addition to SO_2, PM precursors include NO_x and VOCs. VOCs also contribute to the organic fraction of visibility impairment by forming secondary organic aerosol (SOA) after condensation and oxidation processes in the atmosphere. New Jersey is taking actions to reduce these emissions as shown in Table 6.1.

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

Table 6.1: Measures to Reduce Organic Carbon Emissions in New Jersey

Measures	Description
Industrial/Commercial/Institutional (ICI) Boilers and Other Indirect Heat Exchangers (N.J.A.C 7:27-19.7)	Existing rule sets emission standards for any boilers greater than 25 MMBTU, and requires annual tune-ups for any ICI boiler or other indirect heat exchanger with a maximum gross heat input (HI) rate of at least 5 MMBTU per hour, but less than 10 MMBTU per hour. This rule reduced NO_x and organic carbon emissions. Revised RACT rule requires low NO_x burners (LNBs) or other reasonable cost NO_x technologies, and is expected to reduce NO_x emissions by about 50 percent (%) from affected units between 25 and 50 MMBTUs per hour. Larger boilers were previously required to implement such measures.
Diesel Idling Rule (N.J.A.C. 7:27-14.3)	Existing rule requires that vehicles not idle for more than 3 minutes, makes it illegal to tamper with a vehicle or retrofit, provide requirements and standards for State emission test – opacity or on board diagnostic testing along with visible smoke and light checks.
Diesel Retrofit Program (N.J.A.C 7:27-32)	Existing rule requires the installation of retrofit emission control technology on certain garbage trucks, commercial buses and publicly owned on-road vehicles and non-road equipment. The retrofits are scheduled to occur between 2008 and 2016. These rules have and will reduce the emissions of fine particles. The program regulates publicly-owned and certain privately-owned fleets. Over 1,300 publicly-owned diesel vehicles and off-road equipment have been retrofit with emission control devices that reduce harmful soot. About 5,000 more public vehicles are due to be retrofitted over the next year. Retrofitting these vehicles will result in 24 less tons of soot per year, which is equivalent to taking 1,500 trucks off the road.
Heavy Duty Trucks (N.J.A.C. 7:27-14)	On April 3, 2009, the NJDEP adopted rules that require tighter opacity limits to be used in the Inspection and Maintenance (I/M) program of heavy duty trucks. This rule reduces emissions of organic carbon.

6.3. **Prevention of Significant Deterioration** (PSD)

New Jersey performs the required review of proposed new or modified sources impact on visibility in accordance with Federal rules[37], by implementing the Prevention of Significant Deterioration (PSD) permit rules for major sources of air pollutants located within 100 kilometers of Brigantine, or within a larger radius on a case-by-case basis. The PSD permit requirements establish pollutant increments for Class I areas. The PSD increments are the maximum allowable increase in a pollutant's concentration that is allowed to occur so that the air quality in clean areas is prevented from deteriorating. New Jersey ensures as part of the PSD permit review, that the individual SO_2, NO_2, PM_{10}, and $PM_{2.5}$ Class I PSD increments are not violated.

The PSD program also includes a requirement to perform an analysis of the new or modified source's visibility impact on any nearby Class I areas. Guidance on conducting the visibility analysis is available in the document: "Federal Land Managers' Air Quality Related Values Work Group (FLAG) Phase 1 Report – Revised (2010)," documented in Appendix C. In some cases, the Federal Land Manager (FLM) may exempt smaller, more distant PSD sources from having to do the visibility analysis. The larger sources with the greatest chance of adversely impacting visibility at Brigantine must quantify their impact on the Class I area using the detailed guidance given in the 2010 FLAG Phase 1 Report. The criteria used by the FLM to determine if a visibility analysis is conducted at the Class I area is the following: if the total NO_x, SO_2, sulfuric acid, and PM_{10} emissions in tons per year is divided by the distance to the Class I area in kilometers (km) and the value is greater than 10, then a visibility analysis must be done. Whether a non-PSD source will be reviewed for visibility impacts will be assessed on a case-by-case basis and will depend on its emissions and the distance from the Class I area.

The status of state and Federal control measures that New Jersey has implemented post 2002 are included in Appendix B of New Jersey's Infrastructure SIP titled "State of New Jersey State Implementation Plan. Sections 110(a)(1) and 110(a)(2) for the Lead, Sulfur Dioxide, Nitrogen Dioxide, Ozone, $PM_{2.5}$ and PM_{10}, Carbon Monoxide National Ambient Air Quality Standards and Regional Haze, September 2014." These control measures lowered the amount of visibility impairing pollutants from New Jersey's 2002 baseline level of emissions. These reductions from new control measures, along with continued emission reductions in other states, will result in achieving the targeted visibility levels in 2018 at the Brigantine Wilderness Area. Some of these measures were included in the 2018 Regional Haze modeling[38] to establish the targeted levels of visibility at the Brigantine Wilderness Area. The measures not used in the modeling are also noted.

[37] 40 CFR § 52.26 and 52.28

[38] MANE-VU Modeling for Reasonable Progress Goal. Prepared by NESCAUM. February 7, 2008.

Section 7: Status of the MANE-VU "Asks" in Other States

7.1. Status of 167 EGU Control Measures in Other States

The MANE-VU "Ask" requested a 90% or greater reduction in SO_2 emissions from 2002 levels at each of the 167 stacks identified by MANE-VU as contributing to visibility impairment at the MANE-VU Class I areas. If it is infeasible for a state to achieve this level of reduction from a unit, alternative measures will be obtained.

The 167 EGUs were located in 19 states; 8 of the states are members of MANE-VU and 11 are outside of MANE-VU. All of the states where these 167 EGUs are located met the reductions requested by New Jersey, but not necessarily through controls implemented at the specifically-listed stack. New Jersey, New Hampshire and Illinois achieved the 90 percent SO_2 emission reductions by addressing the specific EGU identified in the 167 EGU stacks list as located in the state. States that could not get the requested emission reduction from the specific stacks met the 90 percent SO_2 emission reduction through control measures implemented elsewhere in the state. For example, Delaware did not get the 90 percent SO_2 reduction from two units in the Indian River plant located in Delaware. They were able to get additional reductions from other units in the state to bring the statewide SO_2 reduction below the level requested within the "Ask."

1. The emission reductions at all the 167 EGU units identified by MANE-VU that impact MANE-VU Class I areas including Brigantine are shown in Table 7.1. The emission reductions in the table were calculated as follows. The column "Total 2002 State SO_2 TPY from listed 167 stacks" represents the total SO_2 emissions in tons per year (tpy) from all the units included in the listed 167 stacks in each state. This was calculated by finding the sum of the 2002 SO_2 emissions in tons per year from all the identified 167 EGU stacks in the state.
2. "90% requested SO_2 TPY total reduction based on "Ask"" represents the total SO_2 emissions in tons per year requested from each state to satisfy the EGU "Ask." This was calculated by multiplying the total 2002 state SO_2 emissions from the listed 167 stacks by 0.9.
3. The column "Total CAMD SO_2 TPY achieved reduction 2002-2013 (all EGUs)" and represents the total SO_2 emission reductions achieved at all the EGUs in the state between 2002 and 2013 based on Clean Air Markets Division (CAMD) data. This was calculated by finding the sum of the emission reductions between 2002 and 2013 from all the EGUs in the state.
4. "Statewide SO_2 % change relative to "Ask" amount" shows the percent change in the total statewide SO_2 emissions reduction from all EGUs relative to the amount requested by the EGU "Ask." This was calculated by finding the percent change between the requested 90% SO_2 reduction from the 167 stacks and the actual reduction between 2002 and 2013 from all the EGUs in the state.

<u>Table 7.1</u>: Status of Emission Reductions at the top 167 EGU stacks Impacting MANE-VU Class I Areas

				Unit				Statewide				
State Name	ORIS ID	Plant Name	CEMS Unit	2002 CAMD SO_2 TPY stack-level	2013 CAMD SO_2 TPY stack-level	% Change 2002/2013 stack-level	Achieved Goal (Unit)	Total 2002 state SO_2 TPY from listed 167 stacks	90% requested SO_2 TPY total reduction based on "Ask"	Total CAMD SO_2 TPY achieved reduction 2002-2013 (all EGUs)	Statewide SO_2 % change relative to "Ask" amount	Achieved Goal (State)
Delaware	593	EDGE MOOR	D005935	2,132	21	-99%	**Y**					
	594	INDIAN RIVER	D005944	7,491	959	-87%	**N**					
			D005943	4,682	1,189	-75%	**N**					
			D005942	3,833	0	-100%	**Y**					
			D005941	3,950	0	-100%	**Y**	22,088	-19,879	-30,031	-151.1%	**Y**
Georgia	703	BOWEN	D007032LR	37,778	199	-99%	**Y**					
			D007034LR	41,014	833	-98%	**Y**					
			D007033LR	43,696	1,825	-96%	**Y**					
			D007031LR	38,186	653	-98%	**Y**					
	709	HARLLEE BRANCH	D00709C02	47,746	16,196	-66%	**N**	208,419	-187,577	-431,726	-230.2%	**Y**
Illinois	861	COFFEEN	D00861C01	42,331	109	-100%	**Y**	42,331	-38,098	-217,840	-571.8%	**Y**
Indiana	983	CLIFTY CREEK	D00983C01	20,016	8,240	-59%	**N**					
			D00983C02	18,182	11,322	-38%	**N**					
	988	TANNERS CREEK	D00988U4	46,485	10,346	-78%	**N**					
			D00988C03	16,047	4,606	-71%	**N**					
	990	ELMER W STOUT	D0099070	30,896	2,046	-93%	**Y**					
	1001	CAYUGA	D010011	29,379	2,355	-92%	**Y**					
			D010012	26,237	2,272	-91%	**Y**					
	1008	R GALLAGHER	D01008C01	23,994	1,461	-94%	**Y**					
			D01008C02	23,773	1,034	-96%	**Y**					
	1010	WABASH RIVER	D01010C05	60,901	29,048	-52%	**N**					
	6113	GIBSON	D06113C03	71,817	4,547	-94%	**Y**					
			D06113C04	37,600	6,236	-83%	**N**					
	6166	ROCKPORT	D06166C02	53,196	51,636	-3%	**N**					
	6705	WARRICK	D067054	41,049	2,125	-95%	**Y**					
			D06705C02	28,691	1,870	-93%	**Y**	528,263	-475,437	-510,652	-107.4%	**Y**

				Unit				Statewide				
State Name	ORIS ID	Plant Name	CEMS Unit	2002 CAMD SO2 TPY stack-level	2013 CAMD SO2 TPY stack-level	% Change 2002/2013 stack-level	Achieved Goal (Unit)	Total 2002 state SO2 TPY from listed 167 stacks	90% requested SO2 TPY total reduction based on "Ask"	Total CAMD SO2 TPY achieved reduction 2002-2013 (all EGUs)	Statewide SO2 % change relative to "Ask" amount	Achieved Goal (State)
Kentucky	1353	BIG SANDY	D01353C02	41,899	18,733	-55%	**N**					
	1355	E W BROWN	D01355C03	38,490	1,789	-95%	**Y**					
	1356	GHENT	D01356C02	25,782	5,620	-78%	**N**					
	1364	MILL CREEK	D013644	7,212	9,361	30%	**N**					
	1378	PARADISE	D013783	47,558	2,698	-94%	**Y**					
			D013782	20,889	9,202	-56%	**N**					
	1384	COOPER	D01384CS1	22,713	4,604	-80%	**N**					
	6018	EAST BEND	D060182	12,918	2,198	-83%	**N**					
	6041	H L SPURLOCK	D060411	19,032	758	-96%	**Y**					
			D060412	21,478	1,735	-92%	**Y**	257,971	-232,174	-294,540	-126.9%	**Y**
Maine	1507	WILLIAM F WYMAN	D015074	1,159	668	-42%	**N**	1,159	-1,043	-1,149	-110.2%	**Y**
Maryland	602	BRANDON SHORES	D006022	19,498	1,481	-92%	**Y**					
			D006021	20,476	1,389	-93%	**Y**					
	1552	C P CRANE	D015521	17,971	831	-95%	**Y**					
			D015522	14,415	2,140	-85%	**N**					
	1554	HERBERT A WAGNER	D015543	10,096	8,554	-15%	**N**					
	1571	CHALK POINT	D01571CE2	48,731	4,444	-91%	**Y**					
	1572	DICKERSON	D01572C23	33,905	850	-97%	**Y**					
	1573	MORGANTOWN	D015732	32,587	1,048	-97%	**Y**					
			D015731	37,757	1,374	-96%	**Y**	235,435	-211,892	-231,523	-109.3%	**Y**
Massachusetts	1599	CANAL	D015991	13,066	11	-100%	**Y**					
			D015992	8,948	36	-100%	**Y**					
	1606	MOUNT TOM	D016061	5,282	130	-98%	**Y**					
	1613	SOMERSET	D016138	4,399	0	-100%	**Y**					
	1619	BRAYTON POINT	D016193	19,450	4,479	-77%	**N**					
			D016192	8,853	1,625	-82%	**N**					
			D016191	9,254	1,383	-85%	**N**					

				Unit				Statewide				
State Name	ORIS ID	Plant Name	CEMS Unit	2002 CAMD SO2 TPY stack-level	2013 CAMD SO2 TPY stack-level	% Change 2002/2013 stack-level	Achieved Goal (Unit)	Total 2002 state SO2 TPY from listed 167 stacks	90% requested SO2 TPY total reduction based on "Ask"	Total CAMD SO2 TPY achieved reduction 2002-2013 (all EGUs)	Statewide SO2 % change relative to "Ask" amount	Achieved Goal (State)
Massachusetts (Continued)	1626	SALEM HARBOR	D016264	2,886	130	-95%	**Y**					
			D016263	4,999	1,946	-61%	**N**					
			D016261	3,425	0	-100%	**Y**	80,562	-72,506	-79,886	-110.2%	**Y**
Michigan	1702	DAN E KARN	D01702C09	4,589	70	-98%	**Y**					
	1733	MONROE	D01733C34	43,228	1,200	-97%	**Y**					
			D01733C12	48,676	42,565	-13%	**N**					
	1743	ST CLAIR	D017437	15,980	10,643	-33%	**N**					
	1745	TRENTON CHANNEL	D017459A	19,237	16,254	-16%	**N**	131,709	-118,538	-149,707	-126.3%	**Y**
New Hampshire	2364	MERRIMACK	D023641	9,754	364	-96%	**Y**					
			D023642	20,902	1,036	-95%	**Y**					
	8002	NEWINGTON	D080021	5,226	329	-94%	**Y**	35,883	-32,294	-40,780	-126.3%	**Y**
New Jersey	2378	B L ENGLAND	D023781	10,080	560	-94%	**Y**					
	2403	HUDSON	D024032	18,899	133	-99%	**Y**					
	2408	MERCER	D024082	5,954	41	-99%	**Y**					
			D024081	8,308	30	-100%	**Y**	43,241	-38,917	-47,319	-121.6%	**Y**
New York	2480	DANSKAMMER	D024804	8,330	0	-100%	**Y**					
	2516	NORTHPORT	D025163	7,407	310	-96%	**Y**					
	2526	GOUDEY	D02526C03	15,071	0	-100%	**Y**					
	2527	GREENIDGE	D025276	13,370	0	-100%	**Y**					
	2549	C R HUNTLEY	D02549C01	26,689	3,218	-88%	**N**					
			D02549C02	12,309	0	-100%	**Y**					
	2554	DUNKIRK	D02554C03	32,141	0	-100%	**Y**					
	2594	OSWEGO	D025945	1,746	177	-90%	**Y**					
	2642	ROCHESTER 7	D02642CS2	14,726	0	-100%	**Y**					
	8006	ROSETON	D080062	2,996	98	-97%	**Y**					
			D080061	3,825	18	-100%	**Y**	138,609	-124,748	-216,885	-173.9%	**Y**

				Unit				Statewide				
State Name	ORIS ID	Plant Name	CEMS Unit	2002 CAMD SO2 TPY stack-level	2013 CAMD SO2 TPY stack-level	% Change 2002/2013 stack-level	Achieved Goal (Unit)	Total 2002 state SO2 TPY from listed 167 stacks	90% requested SO2 TPY total reduction based on "Ask"	Total CAMD SO2 TPY achieved reduction 2002-2013 (all EGUs)	Statewide SO2 % change relative to "Ask" amount	Achieved Goal (State)
North Carolina	2709	LEE	D027093	9,459	0	-100%	**Y**					
	2712	ROXBORO	D02712C03	30,610	2,968	-90%	**Y**					
			D027122	29,718	4,457	-85%	**N**					
			D027121	12,028	2,013	-83%	**N**					
			D02712C04	23,254	3,204	-86%	**N**					
	2713	L V SUTTON	D027133	14,492	8,187	-44%	**N**					
	2721	CLIFFSIDE	D027215	19,429	460	-98%	**Y**					
	2727	MARSHALL	D027274	27,323	2,467	-91%	**Y**					
			D027273	26,381	849	-97%	**Y**					
	6250	MAYO	D06250C05	27,410	4,570	-83%	**N**					
	8042	BELEWS CREEK	D080421	57,849	2,472	-96%	**Y**					
			D080422	45,236	2,603	-94%	**Y**	323,190	-290,871	-420,736	-144.6%	**Y**
Ohio	2828	CARDINAL	D028281	37,832	4,636	-88%	**N**					
			D028282	21,367	3,993	-81%	**N**					
			D028283	15,552	2,049	-87%	**N**					
	2830	WALTER C BECKJORD	D028306	30,511	31,029	2%	**N**					
	2832	MIAMI FORT	D028327	46,563	5,182	-89%	**N**					
			D02832C06	23,573	19,958	-15%	**N**					
	2836	AVON LAKE	D0283612	41,840	39,562	-5%	**N**					
	2837	EASTLAKE	D028375	37,474	0	-100%	**Y**					
	2840	CONESVILLE	D028404	87,590	1,674	-98%	**Y**					
			D02840C02	23,655	0	-100%	**Y**					
	2850	J M STUART	D028501	31,836	3,655	-89%	**N**					
			D028503	28,225	2,806	-90%	**Y**					
			D028502	29,710	2,122	-93%	**Y**					
			D028504	27,778	2,959	-89%	**N**					
	2864	R E BURGER	D02864C01	35,454	0	-100%	**Y**					

				Unit				Statewide				
State Name	ORIS ID	Plant Name	CEMS Unit	2002 CAMD SO2 TPY stack-level	2013 CAMD SO2 TPY stack-level	% Change 2002/2013 stack-level	Achieved Goal (Unit)	Total 2002 state SO2 TPY from listed 167 stacks	90% requested SO2 TPY total reduction based on "Ask"	Total CAMD SO2 TPY achieved reduction 2002-2013 (all EGUs)	Statewide SO2 % change relative to "Ask" amount	Achieved Goal (State)
Ohio (Continued)	2866	W H SAMMIS	D028667	33,995	1,329	-96%	**Y**					
			D028665	19,990	601	-97%	**Y**					
			D02866C02	26,425	2,545	-90%	**Y**					
			D02866M6A	39,937	1,646	-96%	**Y**					
			D02866C01	24,766	2,374	-90%	**Y**					
	2872	MUSKINGUM RIVER	D02872C04	85,125	20,104	-76%	**N**					
			D028725	30,401	12,919	-58%	**N**					
	2876	KYGER CREEK	D02876C01	74,452	9,434	-87%	**N**					
	6019	W H ZIMMER	D060191	21,492	18,457	-14%	**N**					
	6031	KILLEN STATION	D060312	19,664	7,885	-60%	**N**					
	7253	RICHARD GORSUCH	D07253C01	31,006	0	-100%	**Y**					
	8102	GEN J M GAVIN	D081021	18,856	14,719	-22%	**N**					
			D081022	13,524	13,133	-3%	**N**	958,593	-862,734	-850,100	98.5%	**Y**
Pennsylvania	3113	PORTLAND	D031132	14,569	774	-95%	**Y**					
			D031131	9,741	1,327	-86%	**N**					
	3122	HOMER CITY	D031221	45,759	55,726	22%	**N**					
			D031222	55,358	55,451	0%	**N**					
	3131	SHAWVILLE	D03131CS1	22,252	15,422	-31%	**N**					
	3136	KEYSTONE	D031361	87,714	14,600	-83%	**N**					
			D031362	62,906	11,797	-81%	**N**					
	3140	BRUNNER ISLAND	D031403	39,266	6,277	-84%	**N**					
			D03140C12	29,666	5,899	-80%	**N**					
	3148	MARTINS CREEK	D03148C12	17,134	0	-100%	**Y**					
	3149	MONTOUR	D031492	50,441	6,440	-87%	**N**					
			D031491	61,005	5,996	-90%	**Y**					
	3178	ARMSTRONG	D031782	16,741	0	-100%	**Y**					
	3179	HATFIELD'S FERRY	D03179C01	82,123	1,728	-98%	**Y**					
	8226	CHESWICK	D082261	42,018	1,686	-96%	**Y**	636,693	-573,023	-645,298	112.6%	**Y**

				Unit				Statewide				
State Name	ORIS ID	Plant Name	CEMS Unit	2002 CAMD SO2 TPY stack-level	2013 CAMD SO2 TPY stack-level	% Change 2002/2013 stack-level	Achieved Goal (Unit)	Total 2002 state SO2 TPY from listed 167 stacks	90% requested SO2 TPY total reduction based on "Ask"	Total CAMD SO2 TPY achieved reduction 2002-2013 (all EGUs)	Statewide SO2 % change relative to "Ask" amount	Achieved Goal (State)
South Carolina	3297	WATEREE	D03297WT1	18,125	2,664	-85%	**N**					
			D03297WT2	18,253	2,884	-84%	**N**					
	3298	WILLIAMS	D03298WL1	25,544	908	-96%	**Y**					
	3319	JEFFERIES	D033194	12,169	0	-100%	**Y**					
			D033193	11,394	0	-100%	**Y**					
	6249	WINYAH	D062491	18,028	97	-99%	**Y**	103,514	-93,162	-172,358	185.0%	**Y**
Tennessee	3403	GALLATIN	D03403C34	20,226	10,808	-47%	**N**					
	3405	JOHN SEVIER	D03405C34	19,666	0	-100%	**Y**					
	3406	JOHNSONVILLE	D03406C10	108,788	12,072	-89%	**N**					
	3407	KINGSTON	D03407C15	38,076	2,914	-92%	**Y**					
			D03407C69	39,495	2,509	-94%	**Y**	226,251	-203,626	-280,612	137.8%	**Y**
Virginia	3775	CLINCH RIVER	D03775C02	17,658	2,807	-84%	**N**					
	3797	CHESTERFIELD	D037976	40,924	1,248	-97%	**Y**					
			D037975	20,270	497	-98%	**Y**					
			D037974	9,476	181	-98%	**Y**					
	3803	CHESAPEAKE	D038033	9,558	6,664	-30%	**N**					
			D038034	10,974	3,818	-65%	**N**					
	3809	YORKTOWN	D03809CS0	22,464	8,652	-61%	**N**					
			D038093	10,567	399	-96%	**Y**	141,890	-127,701	-192,880	151.0%	**Y**
West Virginia	3935	JOHN E AMOS	D03935C02	63,884	2,089	-97%						
			D039353	43,734	3,605	-92%						
	3936	KANAWHA RIVER	D03936C02	15,862	6,833	-57%						
	3938	PHILIP SPORN	D0393851	13,037	0	-100%						
			D03938C04	27,209	9,032	-67%						
	3942	ALBRIGHT	D039423	10,136	0	-100%						
	3943	FORT MARTIN	D039432	45,891	3,382	-93%						
			D039431	45,229	3,385	-93%						
	3947	KAMMER	D03947C03	39,096	10,580	-73%						
	3948	MITCHELL	D03948C02	56,009	2,482	-96%						

				Unit				Statewide				
State Name	ORIS ID	Plant Name	CEMS Unit	2002 CAMD SO2 TPY stack-level	2013 CAMD SO2 TPY stack-level	% Change 2002/2013 stack-level	Achieved Goal (Unit)	Total 2002 state SO2 TPY from listed 167 stacks	90% requested SO2 TPY total reduction based on "Ask"	Total CAMD SO2 TPY achieved reduction 2002-2013 (all EGUs)	Statewide SO2 % change relative to "Ask" amount	Achieved Goal (State)
West Virginia (Continued)	3954	MT STORM	D03954CS0	20,426	2,866	-86%						
	6004	PLEASANTS	D060041	21,667	8,888	-59%						
			D060042	20,242	5,589	-72%						
	6264	MOUNTAINEER	D062641	43,224	2,903	-93%		465,647	-419,083	-423,920	101.2%	**Y**
Totals				**4,581,447**	**890,292**	**-81%**	**N**	**4,581,447**	**-4,123,302**	**-5,237,941**	**127.0%**	**Y**

7.2. Status of Low Sulfur Fuel Oil Strategy in other States

The Low Sulfur Fuel Strategy of the MANE-VU "Ask" requested that states implement a rule to require the sulfur content for distillate fuel oil to be lowered from up to 5,000 parts per million (ppm) down to 15 ppm. The Inner Zone states were defined as New Jersey, New York, and Pennsylvania, with the remainder of the MANE-VU States placed in the Outer Zone. Table 7.2 shows the MANE-VU Low Sulfur Fuel Oil Strategy.

Table 7.2: The Low Sulfur Fuel Oil Strategy

	Strategy	Phase 1	Phase 2
Low Sulfur Fuel Oil - Inner Zone (NJ, NY, PA)	Distillate	500 ppm by 2012	15 ppm by 2016
	#4 fuel oil	0.25% sulfur	0.25% sulfur
	#6 fuel oil	0.3-0.5 % sulfur	0.3-0.5 % sulfur
Low Sulfur Fuel Oil - Outer zone (CT, DC, DE, MA, MD, ME, NH, RI, VT,)	Distillate	500 ppm by 2016	15 ppm by 2018
	#4 fuel oil		0.25% sulfur
	#6 fuel oil		0.3-0.5 % sulfur

Several MANE-VU states have adopted regulations implementing this strategy; however, the District of Columbia, Maryland, and Pennsylvania have only partially met the "Ask." New Hampshire has not made any progress in implementing this strategy. Table 7.3 shows the status of the implementation of the Low Sulfur Fuel strategy at the MANE-VU states.

Table 7.3: Status of the Implementation of the Low Sulfur Fuel Oil Strategy in MANE-VU States (as of November 2, 2015)

State Name	Low Sulfur Fuel Oil Strategy	Achieved "Ask"?
Connecticut	Distillate - 500ppm by 2014, 15ppm by 2018 Residual - 0.3% by 2018	Yes
District of Columbia	Rule Proposed	No
Delaware	Distillate - 15ppm by 2016 Residual - 0.5% by 2016	Yes
Maine	Residual - Statute in place	Yes
Maryland	Distillate - 500ppm by 2016, Will work on rule in 2015 to get to 15ppm by 2018 Residual - No rule in place	No
Massachusetts	Distillate - 500ppm by 2014, 15ppm by 2018 Residual - 1% by 2014, 0.5% by 2018	Yes

State Name	Low Sulfur Fuel Oil Strategy	Achieved "Ask"?
New Hampshire	No	No
New Jersey	Distillate - 500ppm by 2014, 15 ppm by 2016. Residual - #4 2,500ppm and #6 3,000ppm-5,000ppm (0.5%) by 2014, depending on the county	Yes
New York	Distillate - 15ppm, purchase 2012 and 2014, use - 2016 Residual - 0.3% in New York City, 0.37% in Nassau/Westchester Counties, and 0.5% elsewhere.	Yes
Pennsylvania	Distillate - 500ppm by 2016. Residual - Rule or Statute in place	No
Rhode Island	Distillate - 500ppm by 2014 - 2018, 15ppm by 2018 Residual - 0.5% by 2018	Yes
Vermont	Distillate - 500ppm by 2014, 15ppm by 2018 Residual - #4 0.25% by 2016, #5 and #6, 0.5% by weight	Yes

In lieu of the Low Sulfur Fuel Strategy in the MANE-VU "Ask," MANE-VU requested that non-MANE-VU states that contribute to visibility impairment at MANE-VU Class I areas reduce SO_2 emissions from non-electric generating units by 28%. Table 7.4 shows the status of the implementation of the 28% SO_2 emission reduction by states that contribute to visibility impairment at the Brigantine Wilderness Area.

***Table 7.4:** Status of the Implementation of the 28% SO2 Emission Reduction at non-MANE-VU States (as of November 2, 2015)*

State Name	28% Sulfur Dioxide (SO2) Emission Reduction from non-Electric Generating Units
Georgia	Did not address the MANE-VU "Ask" in SIP
Illinois	Did not address the MANE-VU "Ask" in SIP
Indiana	Did not address the MANE-VU "Ask" in SIP
Kentucky	Yes
Michigan	Did not address the MANE-VU "Ask" in SIP
North Carolina	Did not address the MANE-VU "Ask" in SIP
Ohio	Did not address the MANE-VU "Ask" in SIP
South Carolina	Did not address the MANE-VU "Ask" in SIP
Tennessee	Did not address the MANE-VU "Ask" in SIP
Virginia	Did not address the MANE-VU "Ask" in SIP
West Virginia	Yes

The Kentucky Regional Haze 5-year progress report[39] states that Kentucky's estimated SO_2 emissions reduction is over 300,000 tons from 2002 to 2012. This SO_2 reduction exceeds the total MANE-VU SO_2 emission reduction request of 243,565 tons from Kentucky. Kentucky's

[39] Kentucky Regional Haze 5-Year Periodic Report SIP Revision, September 2014

emission reduction already achieved or planned are due to retirements, fuel switching and installing controls, and are expected to continue to exceed the MANE-VU "Ask."

The West Virginia Regional Haze 5-year progress report[40] reports SO_2 reductions of 46,350 tons, which is more than the 17,277 tons requested by New Jersey and MANE-VU "Ask." West Virginia's SO_2 emission reductions are due to shut downs and the installation of controls, and have taken place well in advance of 2018.

7.3. Status of Best Available Retrofit Technology (BART) in Other States

Table 7.5 shows the status of BART implementation in MANE-VU and non-MANE-VU states. BART implementation is not applicable to Rhode Island and Vermont because the two states do not have BART-eligible sources. All MANE-VU states, except Pennsylvania, met the BART requirements. Only Illinois met the BART requirements among the non-MANE-VU states. A Federal Implementation Plan (FIP) was put in place by the USEPA in all the states that did not meet the BART requirements.

Table 7.5: Status of Best Available Retrofit Technology (BART) Implementation in MANE-VU and non-MANE-VU States (as of November 2, 2015)

MANE-VU STATES		
States	**USEPA Action**	**Met Requirement?**
Connecticut	Approved. 79 Fed. Reg. 39322; July 10, 2014	Yes
District of Columbia	Approved. 77 Fed. Reg. 5191; February 2, 2012	Yes
Delaware	Approved. 79 Fed. Reg. 25506; May 5, 2014	Yes
Maine	Approved. 77 Fed. Reg. 24385; April 24, 2012	Yes
Maryland	Approved. 77 Fed. Reg. 39938; July 6, 2012	Yes
Massachusetts	Approved. 78 Fed. Reg. 57487; September 19, 2013	Yes
New Hampshire	Approved. 77 Fed. Reg. 50602; August 22, 2012	Yes
New Jersey	Approved. 77 Fed. Reg. 19; January 3, 2012	Yes
New York	Federal Implementation Plan in place for 2 sources. Approved for all others. 77 Fed. Reg. 51915; August 28, 2012	Yes
Pennsylvania	Disapproved because of reliance on CAIR. Federal Implementation Plan in place. Final Rule. 77 Fed. Reg. 33642; June 7, 2012	No
Rhode Island	N/A	N/A
Vermont	N/A	N/A

[40] West Virginia State Implementation Plan Revision: Regional Haze 5-Year Periodic Report (Covering 2008-2013) Describing Progress Towards the Reasonable Progress Goals for Visibility in Class I Federal Areas and Determination of Adequacy of Existing Implementation Plan. Proposed March 2013.

NON-MANE-VU STATES		
States	**USEPA Action**	**Met Requirement?**
Georgia	Disapproved because of reliance on CAIR. Federal Implementation Plan in place. Final Rule. 77 Fed. Reg. 33642; June 7, 2012	No
Illinois	Approved. 77 Fed. Reg. 39943 July 6, 2012	Yes
Indiana	Disapproved because of reliance on CAIR. Federal Implementation Plan in place. Final Rule. 77 Fed. Reg. 33642; June 7, 2012	No
Kentucky	Disapproved because of reliance on CAIR. Federal Implementation Plan in place. Final Rule. 77 Fed. Reg. 33642; June 7, 2012	No
Michigan	Disapproved because of reliance on CAIR. Federal Implementation Plan in place. Final Rule. 77 Fed. Reg. 33642; June 7, 2012	No
North Carolina	Disapproved because of reliance on CAIR. Federal Implementation Plan in place. Final Rule. 77 Fed. Reg. 33642; June 7, 2012	No
Ohio	Disapproved because of reliance on CAIR. Federal Implementation Plan in place. Final Rule. 77 Fed. Reg. 33642; June 7, 2012	No
South Carolina	Disapproved because of reliance on CAIR. Federal Implementation Plan in place. Final Rule. 77 Fed. Reg. 33642; June 7, 2012	No
Tennessee	Disapproved because of reliance on CAIR. Federal Implementation Plan in place. Final Rule. 77 Fed. Reg. 33642; June 7, 2012	No
Virginia	Disapproved because of reliance on CAIR. Federal Implementation Plan in place. Final Rule. 77 Fed. Reg. 33642; June 7, 2012	No
West Virginia	Disapproved because of reliance on CAIR. Federal Implementation Plan in place. Final Rule. 77 Fed. Reg. 33642; June 7, 2012	No

Section 8: Analysis of Emission Changes from Visibility Impairing Pollutants

8.1 Requirement to Analyze and Track New Jersey Emissions Trends

Federal Regional Haze Rules[41] require an assessment of any changes in anthropogenic (man-made) emissions within or outside the State that have limited or impeded progress in reducing pollutant emissions and improving visibility. The analysis must be based on the most recent updated emissions inventory, with estimates projected forward as necessary and appropriate, to account for emissions changes during the applicable 5-year period. The most recent available, updated inventory for New Jersey and the region is the final New Jersey 2011 Periodic Emissions Inventory.[42] For this first progress report, a longer than 5 year increment between the 2002 "base year" and the 2018 "target year" is warranted because the period of time between the 2002 base year and the 2018 target year is 16 years. The mid-point between the base and target year is 8 years or in 2010. The closest inventory year to the mid-point year is the final New Jersey 2011 Periodic Emissions Inventory which was used in this analysis and is the latest nationally available inventory for other states emissions.

Baseline conditions represent the visibility conditions which existed on the best and worst days at the time the regional haze program was established for each Class I area. The baseline is the five-year average visibility levels (in deciviews) on the 20% most impaired days, or "worst" days, and on the 20% least impaired days, or "best days," for the five year average visibility levels from the years 2000 through 2004.[43] To mitigate the impacts of inter-annual (i.e. year-to-year) variability in measuring visibility levels, the Regional Haze Rule mandates the use of 5-year-averaged visibility values of both the annual mean 20% best and 20% worst days determined for each site.

The goal of the Regional Haze Rule is to restore natural visibility conditions to each of the nation's 156 Class I areas. The Regional Haze SIPs contain measures that make "reasonable progress" toward this goal by reducing anthropogenic (manmade) emissions that cause haze. For each Class I area, the three metrics of visibility that are part of the determination of reasonable progress are:

1) baseline conditions,
2) natural conditions (in 2064), and
3) current conditions.

The 2002 Modeling Inventory was used as the base year for developing the 2018 visibility targets in the Regional Haze SIP. This inventory was based off of the 2002 National Emissions Inventory to gauge progress for this report. The 2002 Modeling Inventory was compared to New

[41] 40 CFR 51.308(g)(4)
[42] Final New Jersey State Implementation Plan for 75 ppb 8-Hour Ozone National Ambient Air Quality Standard Reasonably Available Control Technology (RACT) Determination, 2011 Periodic Emission Inventory, and 8-Hour Carbon Monoxide National Ambient Air Quality Standards and Maintenance and Monitoring Plan. June 2015.
[43] USEPA. Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5, and Regional Haze. Pg. 76. EPA-454/B-07-002. April 2007.

Jersey's 2011 Emissions Inventory, proposed on July 21, 2014, and included in the New Jersey "75 ppb 8-Hour Ozone Reasonably Available Control Technology (RACT) Determination" SIP revision. The analysis of the emission changes between these two inventories are shown in table 8.1.

Table 8.1: Source-Specific Emission Changes in New Jersey

Nitrogen Oxide (tpy)			
Source Sector	**2002 Modeling Inventory**	**2011 Statewide Emissions**	**Change in Emissions**
Point	51,593	14,793	-36,800
Area	26,692	24,157	-2,535
Onroad	152,076	92,356	-59,720
Nonroad	63,479	50,834	-12,645
State Total	**293,840**	**182,140**	**-111,700 (38%)**
Direct PM2.5 (tpy)			
Source Sector	**2002 Modeling Inventory**	**2011 Statewide Emissions**	**Change in Emissions**
Point	4,779	2,710	-2,069
Area	19,350	14,420	-4,930
Onroad	2,469	3,557	1,088
Nonroad	4,997	3,567	-1,430
State Total	**31,595**	**24,254**	**-7,341 (23%)**

Sulfur Dioxide (tpy)			
Source Sector	**2002 Modeling Inventory**	**2011 Statewide Emissions**	**Change in Emissions**
Point	61,217	6,415	-54,802
Area	10,744	6,669	-4,075
Onroad	3,649	879	-2,770
Nonroad	15,686	2,836	-12,850
State Total	**91,296**	**16,799**	**-74,498 (82%)**
Volatile Organic Compounds (tpy)			
Source Sector	**2002 Modeling Inventory**	**2011 Statewide Emissions**	**Change in Emissions**
Point	14,401	7,320	-7,081
Area	167,882	93,726	-74,156
Onroad	89,753	40,206	-49,547
Nonroad	83,919	40,938	-42,981
State Total	**355,955**	**182,190**	**-173,765 (49%)**

Significant reductions in the emissions of all pollutants have occurred in New Jersey since 2002 and this downward trend is expected to continue to 2018. Table 8.1 shows a statewide decrease for all pollutants contributing to visibility impairment from all sources in New Jersey since 2002.

The decreases range from twenty-three percent (23%) for direct $PM_{2.5}$ to eighty-two percent (82%) for SO_2.

The 2018 MANE-VU projected inventory included in New Jersey's 2009 Regional Haze SIP was estimated from the 2002 Modeling Inventory. The projected 2018 MANE-VU inventory assumed that reductions in emissions would occur due to on-going emission control programs determined to be reasonable and able to be implemented by the 2018 milestone year. This inventory was used to determine the deciview reductions needed to set the 2018 reasonable progress goal for the Brigantine Wilderness Area.

Another 2018 emissions inventory, called the 2018 Modeling Platform,[44] was recently developed by the USEPA using the current 2011 NEI, v.1 as the base year. The changes in emissions between the 2018 MANE-VU projected inventory and the 2018 Modeling Platform emissions inventory are shown in Table 8.2. This table shows that the latest projection of emissions from the USEPA 2018 Modeling Platform are lower than the emissions originally projected for 2018 by MANE-VU to establish the 2018 target levels for visibility in the Brigantine Wilderness Area. Therefore, New Jersey is on target to reach the required 2018 goal for visibility improvement in the Brigantine Wilderness Area.

[44] http://www.epa.gov/pdfs/Emissions_Modeling_Platform.pdf

Table 8.2: ***Differences between Projected 2018 Emissions in New Jersey using the latest available USEPA projected emissions and the original MANE-VU projected emissions***

Source	Latest USEPA 2018 Modeling Platform	MANE-VU 2018 Inventory Used to set Brigantine's Target Goal	Emissions from Latest Projected 2018 Inventory (Modeling Platform) Lower than Emissions Used to Set Target?
Nitrogen Oxide (tpy)			
Point	14,154	31,100	**YES**
Area	23,912	21,684	
OnRoad	30,820	30,150	
Nonroad	37,863	41,166	
State Total	**106,749**	**124,100**	
Direct $PM_{2.5}$ (tpy)			
Point	3,449	7,745	**YES**
Area	11,116	15,220	
OnRoad	2,086	1,140	
Nonroad	2,585	3,143	
State Total	**19,236**	**27,247**	
Sulfur Dioxide (tpy)			
Point	8,394	23,421	**YES**
Area	725	1,781	
OnRoad	243	785	
Nonroad	1,005	832	
State Total	**10,367**	**26,819**	
Volatile Organic Compound (tpy)			
Point	7,073	20,267	**YES**
Area	86,708	134,089	
OnRoad	16,995	31,415	
Nonroad	28,057	53,625	
State Total	**138,833**	**239,396**	

8.2 Emissions Trends from Contributing MANE-VU States

Regional haze is caused by numerous sources located over a wide area. Decreasing emission trends in states other than New Jersey will be needed for continued improvement in visibility levels at the Brigantine Wilderness Area. This section discusses emission trends within the MANE-VU region.

As discussed previously, several data sources were integrated to produce the emissions trends reported in this document. While we present estimates of emissions for 2002, 2011, and 2018, there are several reasons why it is difficult to make comparisons among emissions for those years.

Data sources used to develop the information in this sub-section include:

- The MANE-VU 2002 base year modeling inventory with a projection to 2018 (MANE-VU Version 3.3);
- Final New Jersey 2011 Periodic Emissions Inventory;
- The 2018 MANE-VU projected inventory from the 2002 base year; and
- The 2018 USEPA Modeling Platform emissions projected from the 2011 USEPA NEI, v.1 inventory.

Figures 8.1 through 8.6 show the emissions trends for the pollutants that contribute to regional haze in MANE-VU states. Please note that the emissions from 2018 shown in these figures are from the 2018 MANE-VU Inventory as shown in Table 8.2 while the 2002 and 2011 emissions are shown in Table 8.1.

Figure 8.1: MANE-VU State Level Nitrogen Oxide Emissions

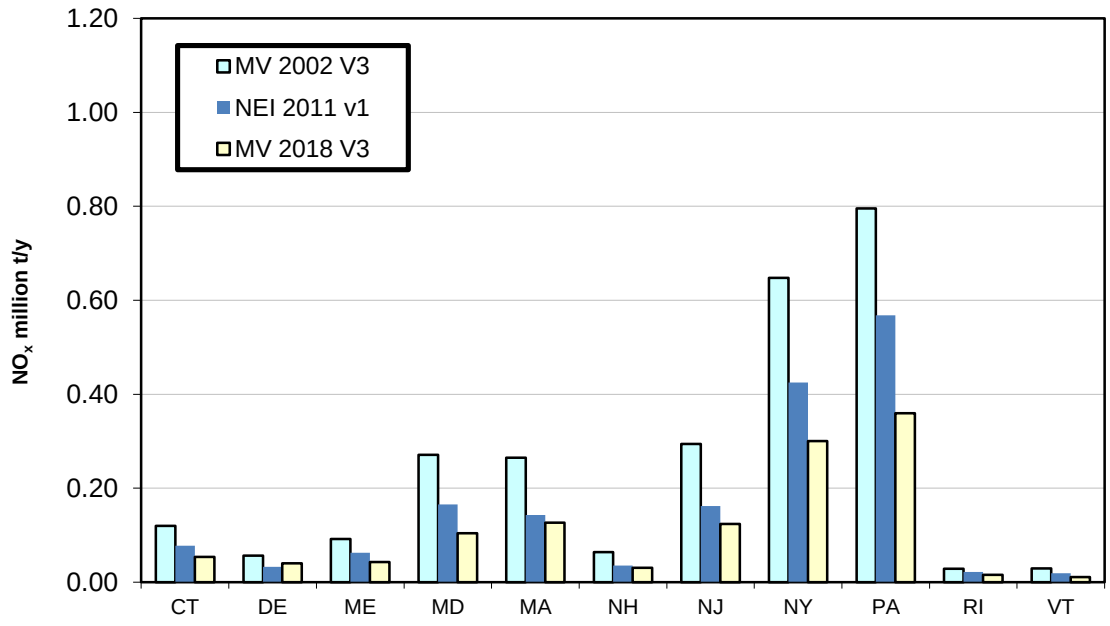


***Figure 8.2*: MANE-VU State Level Ammonia Emissions**

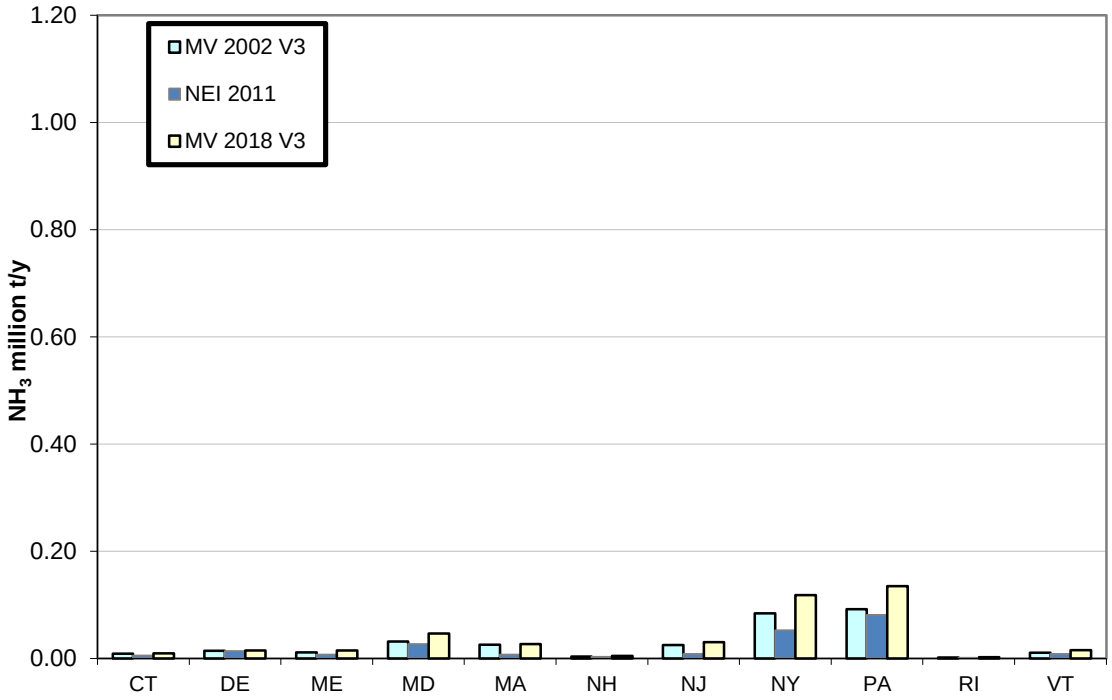


***Figure 8.3:* MANE-VU State Level Primary $PM_{2.5}$ Emissions**

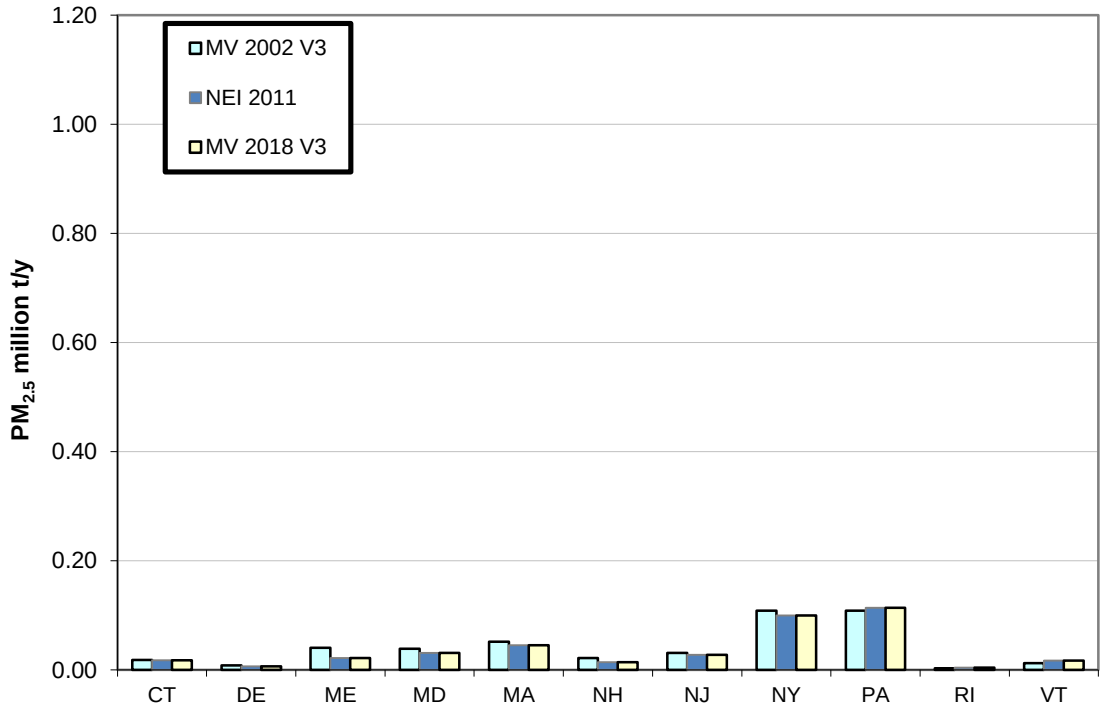


Figure 8.4: MANE-VU State Level Primary PM_{10} Emissions

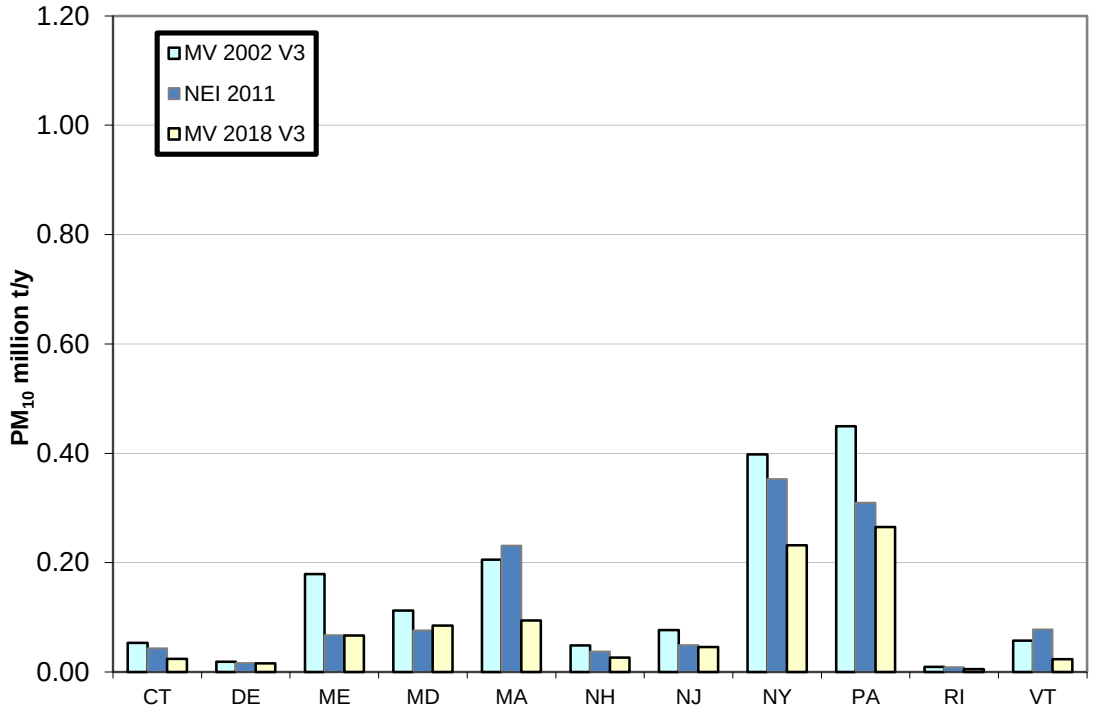


Figure 8.5: MANE-VU State Level SO_2 Emissions

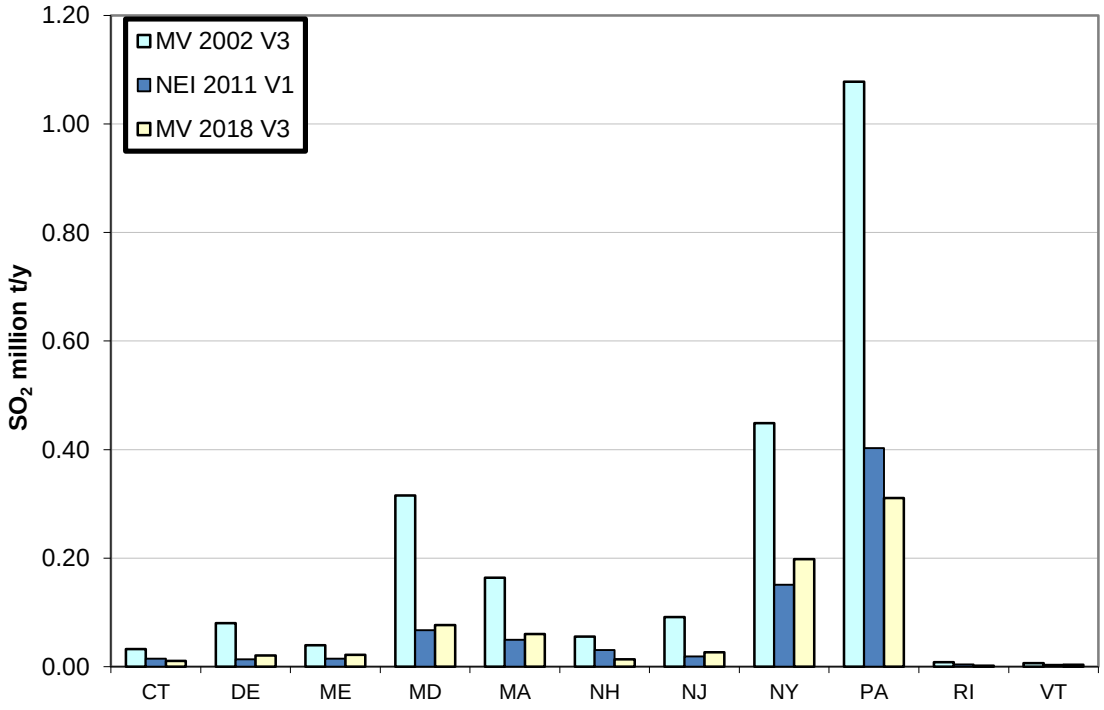
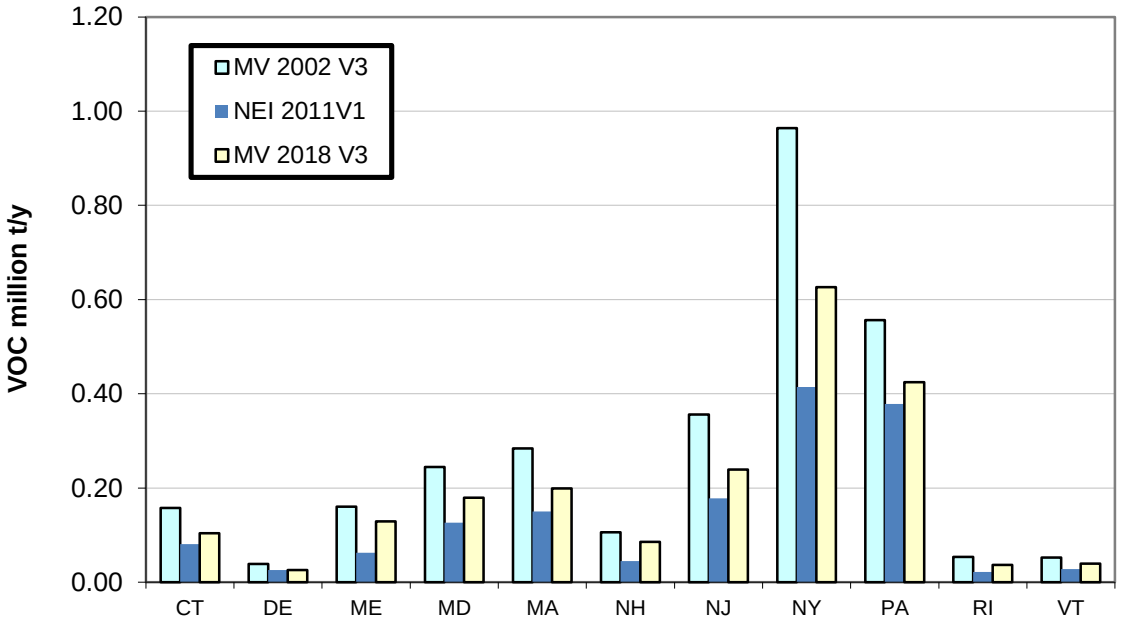


Figure 8.6: ***MANE-VU State Level Volatile Organic Compound Emissions***



The pollutants and source sectors included in these data sources vary and have many inconsistencies, especially the 2011 USEPA NEI inventory. These inconsistencies are the result of:

- different calculation methodologies developed since the 2002 inventory was created (e.g. use of the Mobile 6 model versus the MOVES model to calculate on-road, mobile source emissions);
- different emissions sources included in several of the source categories;
- changes in emission factors have occurred for some pollutants and source types based upon better data being collected to develop those emission factors;
- differences in growth projections to the 2018 projection year have occurred since the 2002 inventory was created versus growth projections to 2018 being made today;
- unexpected shutdowns of several large sources that were anticipated to be operating in 2018;
- new sources or new growth in such areas as natural gas conversions from coal burning sources; and
- new air pollution control programs to take place since the 2002 inventory was developed.

Projections of future emissions involve assumptions, for example, about population growth, growth in fuel consumption, and the balance among different fuels, such as coal and natural gas. Much has changed in the last few years as natural gas prices have declined and old coal-fired units have been shut down due to the relatively higher price of coal. In addition, emissions models used to calculate mobile sources are different now than they were in 2006 when the 2002 and 2018 projected inventories were first developed. These differences make the interpretation of the emission trends difficult in that changes in how emissions were calculated could cause

artificial changes to an inventory that are not real changes due to new controls or reductions in the generation of air pollutants. Only changes that actually reduce emissions, like new air pollution control programs or controls, will realistically reduce emissions, improve air quality, and improve visibility levels at the Brigantine Wilderness Area. Changes in methodologies to calculate emissions may not necessarily result in decreases of emissions but they may improve the accuracy of the inventory and lead to better conclusions of the causes and needed controls of air pollution in the State and region.

Although current visibility levels recorded at the Brigantine Wilderness Area show that adequate progress has been made to meet the 2018 target visibility levels, New Jersey is concerned that oil and gas emissions in the neighboring state of Pennsylvania, as well as in other eastern states, have risen dramatically since 2002 due to the increased activity of horizontal drilling for new oil and gas reserves (i.e.; fracking). These emissions were estimated to be 40,604 tons per year of NO_x, 18,911 tons per year of VOC, 1,952 tons per year of SO_2, and 1,301 tons per year of $PM_{2.5}$ in 2011 for the state of Pennsylvania alone.[45] Increases in this sector may offset emission decreases in other sectors and the USEPA should track emission increases in this sector for other states.[46]

[45] USEPA 2011 NEI, v.1

[46] There have been no drilling activities for natural gas in the State of New Jersey and, therefore, no emissions from this sector occur.

Section 9: Other Requirements

9.1 Monitoring Strategy

Federal Regional Haze Rules[47] require a monitoring strategy for measuring, characterizing, and reporting regional haze visibility impairment that is representative of all mandatory Class I areas within the State. This section gives an update of the monitoring strategy for New Jersey that relies on the continued availability of the Interagency Monitoring of Protected Visual Environments (IMPROVE) network.

In 1985, the IMPROVE monitoring program was established to measure visibility impairment in mandatory Class I areas throughout the United States. This monitoring is designed to aid the creation of Federal and state implementation plans for the protection of visibility in Class I areas stipulated in the 1977 amendments to the Clean Air Act.

As part of the original Regional Haze Program requirements, visibility conditions within the Brigantine Wilderness Area are monitored by the federally operated IMPROVE monitoring program. Data from the IMPROVE monitoring program has been collected at the Brigantine Wilderness Area since 1990. Data collected at these sites are used by land managers, industry planners, scientists, public interest groups, and air quality regulators to understand and protect the visual air quality resource in Class I areas. Most importantly, the IMPROVE program scientifically documents the visual air quality of wilderness areas and national parks.

The IMPROVE monitoring site at the Brigantine Wilderness Area is operated and maintained through a formal cooperative relationship between the USEPA, the U.S. Fish and Wildlife Service, and NJDEP's Bureau of Monitoring. The IMPROVE monitor for the Brigantine Wilderness Area (indicated as BRIG1 in the IMPROVE monitoring network database) is located outside the Edwin B. Forsythe National Wildlife Refuge Headquarters in Oceanville, New Jersey at an elevation of 5 meters, a latitude of 39.47˚ and a longitude of -74.45˚.

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

[47] 40 CFR § 51.308(d)(4)

***Figure 9.1*: The IMPROVE Monitor at the Brigantine Wilderness Area – BRIG1**

The planned monitoring at this site includes:

- Continuous Ozone;
- Fine Particulate – $PM_{2.5}$ (measured by the Federal Reference Method);
- Fine Particulate – $PM_{2.5}$ (measured by a continuous instrument);
- Trace Gas Analyzer for SO_2;
- An On-Site Camera to observe visibility levels;[48] and a
- Nephelometer.

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

[48] The camera results from Brigantine is available on a real time basis at http://www.hazecam.net/brigantine.html

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

New Jersey has evaluated its monitoring network and determined that no changes from the original SIP network are needed.

9.2 Consultation with Federal Land Managers

New Jersey provided the Federal Land Managers at U.S. Fish and Wildlife Service an opportunity for consultation, in person and at least 60 days before holding any public hearing on this progress report. An outline of the consultation process follows:

- New Jersey sent the 5-year progress report to the FLMs on November 4, 2015.
- New Jersey sent the 5-year progress report to the FLMs as part of the public review comment period on December 16, 2015.
- New Jersey notified the FLMs of opportunity for the public hearings, potentially to be held on February 23, 2016 if any member of the public requests such a hearing.
- New Jersey considered for incorporation the FLMs comments on the 5-year progress report, along with other comments from the public (see Appendix B). All comments will be addressed and changes to this progress report will be made when appropriate to do so.

New Jersey will continue to coordinate and consult with the Federal Land Managers on future SIP revisions, including progress reports, as well as during the implementation of programs having the potential to contribute to visibility impairment in the mandatory Class I areas.

Section 10: Conclusion

This progress report demonstrates that the implementation of reasonable measures for visibility improvement have resulted in a decline in haze-causing emissions. Additional emission reductions are anticipated to occur in some areas when new major control programs or regulations take effect and these reductions are reflected in the emissions trends section of this report.

The analyses and summaries in the previous sections include all relevant significant emission sources and show that none have limited or impeded progress for the Regional Haze Program during this report period. Current visibility levels recorded at the Brigantine Wilderness Area show that adequate progress has been made to meet the 2018 target visibility levels. All sectors (i.e.; point, area, on-road mobile, and off-road mobile) are expected to have lower emissions of all visibility-impairing pollutants in 2018 than current emission levels as evidenced by the final New Jersey 2011 Periodic Emission Inventory and the USEPA 2018 Modeling Platform.

New Jersey is concerned, however, that oil and gas emissions in the neighboring state of Pennsylvania, as well as in other eastern states, have risen dramatically since 2002 due to the increased activity of horizontal drilling for new oil and gas reserves (i.e.; fracking). Increases in this sector may offset emission decreases in other sectors and the USEPA should track emission increases in this sector for other States.[49]

This progress report demonstrates that New Jersey's existing Regional Haze SIP is sufficient to meet the reasonable progress goal for the Brigantine Wilderness Area. Current visibility levels measured in the Brigantine Wilderness Area of 23.8 deciviews (dv) meets the uniform rate of progress target of 25.1 dv as described in Section 2 of this report. Emission reductions due to on-going and new air pollution control programs will be sufficient to continue improvements in visibility levels at the Brigantine Wilderness Area.

New Jersey is working with MANE-VU partners to develop strategies for future success. A new SIP will be developed in 2018, and new goals will be established for 2028. The 2018 SIP will consider any strategies developed through the regional evaluation of new control measures when it establishes the reasonable progress goal for the Brigantine Wilderness Area.

[49] There have been no drilling activities for natural gas in the State of New Jersey and, therefore, no emissions from this sector occur.