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Draft
Massachusetts
Regional Haze Progress Report

December 14, 2017

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Executive Summary

Section 169A of the federal Clean Air Act (CAA) requires states to protect visibility in 156 national parks and wilderness areas designated as Federal Class I areas. In 1999, the U.S. Environmental Protection Agency (EPA) finalized the Regional Haze Rule, which requires states to develop State Implementation Plans (SIPs) to reduce haze-causing pollution to improve visibility in Class I areas. The overall goal of the regional haze program is to restore natural visibility conditions at Class I areas by 2064.

Regional haze is caused by fine particle pollution that impairs visibility over a large region by scattering or absorbing light. The predominant cause of haze pollution in the Mid-Atlantic/Northeast region is sulfate particles (aerosols) formed from emissions emitted by power plants that burn coal or oil.

The first Regional Haze SIPs were due in 2008 and cover the period 2008-2018. States must update SIPs every ten years[1] and also must submit progress reports every five years to evaluate whether the SIP is meeting visibility goals.

The Massachusetts Department of Environmental Protection (MassDEP) submitted its first Regional Haze SIP to EPA on December 30, 2011 (with further revisions in August 2012), and EPA approved the SIP in September 2013. MassDEP has prepared this draft Progress Report to meet the requirement of the Regional Haze Rule at 40 CFR 51.308(g).

Massachusetts is a member of the Mid-Atlantic/Northeast Visibility Union (MANE-VU) and in its Regional Haze SIP MassDEP committed to implementing MANE-VU's long-term strategy to improve visibility. The MANE-VU strategy for 2018 includes:

- Timely implementation of Best Available Retrofit Technology (BART);
- Reducing the sulfur content of fuel oil;
- Reducing sulfur dioxide emissions from electric power plants;
- Seeking to reduce emissions outside MANE-VU that impair visibility in our region; and
- Continuing to evaluate other measures such as energy efficiency, alternative clean fuels, and measures to reduce emissions from wood and coal combustion.

This Progress Report demonstrates that MassDEP is implementing its SIP commitments, emissions of pollutants that cause haze are declining, and the 2018 visibility goals set in the first SIPs by the MANE-VU Class I states will be met. Based on this progress report, MassDEP has determined that no changes are needed to the Massachusetts Regional Haze SIP at this time.

[1] On December 14, 2016, EPA finalized amendments to the Regional Haze Rule extending the deadline for the next SIPs to July 31, 2021 (from July 31, 2018).

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1. INTRODUCTION

A. Background

On December 30, 2011, the Massachusetts Department of Environmental Protection (MassDEP) submitted its first Regional Haze State Implementation Plan (SIP) to the U. S. Environmental Protection Agency (EPA) to comply with EPA's Regional Haze Rule (40 CFR 51.300-309). Subsequently, MassDEP submitted revisions to the SIP on August 9, 2012 and August 28, 2012.[2] EPA approved the Massachusetts SIP on September 19, 2013.[3]

EPA's Regional Haze Rule requires protection of visibility in 156 Federal Class I areas. Federal Class I areas include all national parks greater than 6,000 acres, all national wilderness areas and national memorial parks greater than 5,000 acres, and one international park.

Massachusetts is a member of the Mid-Atlantic/Northeast Visibility Union (MANE-VU) regional planning organization.[4] There are seven Class I areas in MANE-VU (see Figure 1.1). Massachusetts has no Class I areas, but sources in Massachusetts contribute to visibility impairment in the MANE-VU Class I areas, with the exception of the Brigantine Class I area located in New Jersey.

Section 51.308(g) of the Regional Haze Rule requires each state to submit a report to EPA five years after submitting its regional haze SIP in which the state evaluates progress towards meeting the goals identified in the SIP and determines whether changes to the SIP are needed to meet the SIP's goals.

B. Progress Report Requirements

Progress reports must meet the requirements of 40 CFR 51.308(g), (h) and (i), and must contain the following elements:

1. A description of the status of implementation of all measures included in the Regional Haze SIP for achieving reasonable progress goals for mandatory Federal Class I areas within and outside the state.
2. A summary of the emission reductions achieved in the state through implementation of the above measures.
3. For each mandatory Federal Class I area within the state, an assessment of the following

[2] Available at www.mass.gov/eea/agencies/massdep/air/reports/state-implementation-plans.html#6
[3] Federal Register, Vol. 78, No. 182, Thursday, September 19, 2013.
[4] MANU-VU members are Connecticut; Delaware; District of Columbia; Maine; Maryland; Massachusetts; New Hampshire; New Jersey; New York; Pennsylvania; Penobscot Nation; Rhode Island; St. Regis Mohawk Tribe; Vermont; U.S. Environmental Protection Agency; U.S. Fish and Wildlife Service; U.S. Forest Service; U.S. National Park Service. More information about MANE-VU is available at http://www.otcair.org/manevu/index.asp

visibility conditions and changes, with values for most impaired and least impaired days expressed in terms of 5-year averages of these annual values:

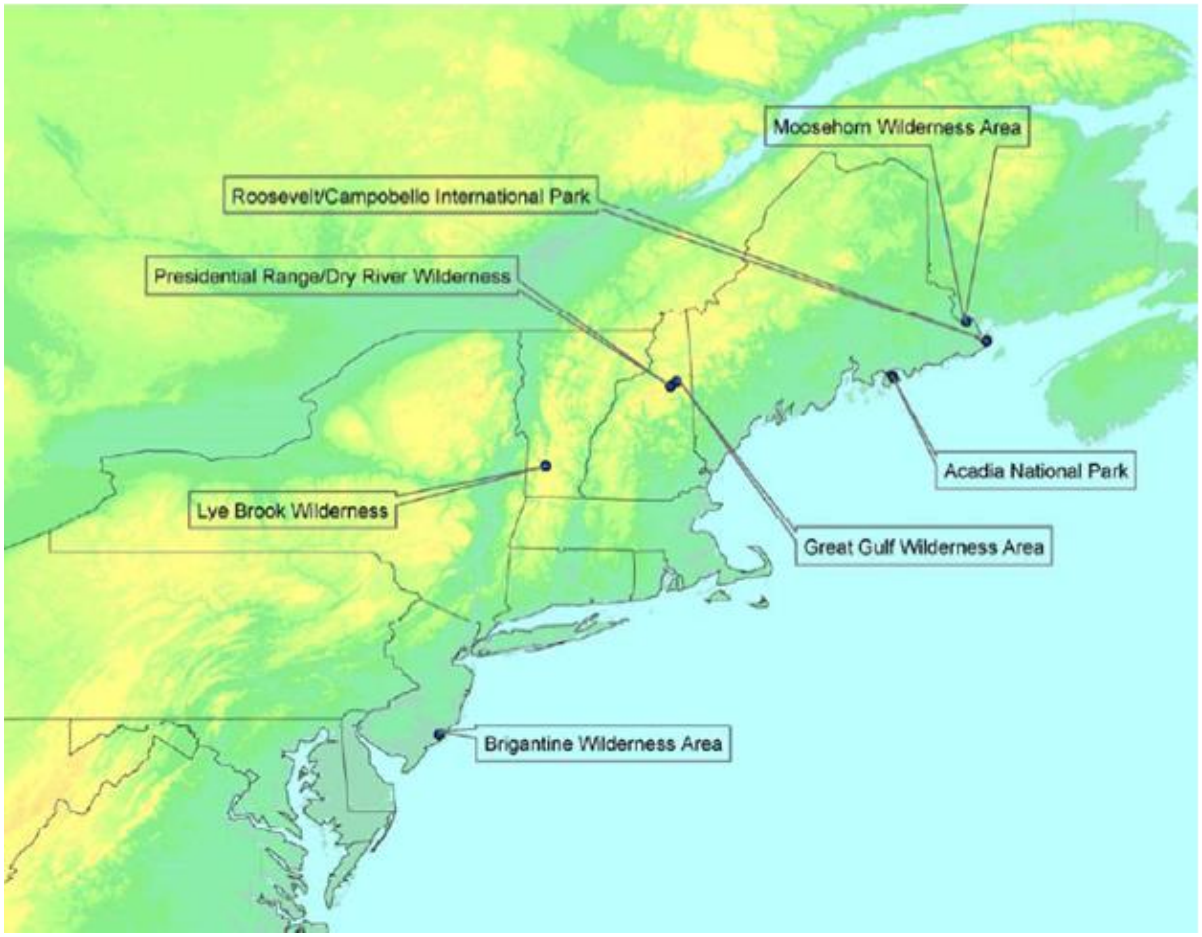
a) The current visibility conditions for the most impaired and least impaired days;
b) The difference between current visibility conditions for the most impaired and least impaired days and baseline visibility conditions; and
c) The change in visibility impairment for the most impaired and least impaired days over the past 5 years.

4. An analysis of the change in emissions of pollutants contributing to visibility impairment from all sources and activities within the state in the previous 5 years. Emissions changes should be identified by type of source or activity. The analysis must be based on the most recent emissions inventory, with estimates projected forward as necessary to account for emissions changes during the 5-year period.
5. An assessment of any significant changes in anthropogenic emissions within or outside the state that have occurred over the past 5 years that have limited or impeded progress in reducing pollutant emissions and improving visibility.
6. An assessment of whether the current implementation plan elements and strategies are sufficient to enable the state, or states with mandatory Federal Class I areas affected by emissions from the state, to meet all established reasonable progress goals.
7. A review of the state's visibility monitoring strategy and any modifications to the strategy that may be necessary.

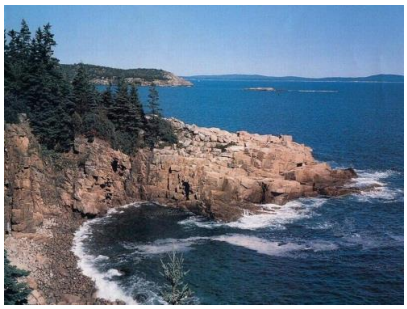
Elements 3 and 7 above apply only to states with Class I areas and therefore do not apply to Massachusetts.

MassDEP has prepared this Draft Progress Report in accordance with EPA guidance to meet the requirements in the Regional Haze Rule at 40 CFR 51.308 (g), (h) and (i). Progress reports must be in the form of SIP revisions and must comply with the procedural requirements of 40 CFR 51.102 (e.g., 30-day public notice and opportunity for public hearing) and 51.103 (submittal to EPA as a SIP revision). After public hearing and addressing public comments, MassDEP will submit a final Progress Report to EPA for approval into the Massachusetts SIP.

Figure 1.1. MANE-VU's Class I Areas



Source: Massachusetts Regional Haze SIP



Acadia National Park

People have been drawn to the rugged coast of Maine throughout history. Awed by its beauty and diversity, early 20th-century visionaries donated the land that became Acadia National Park, the first national park east of the Mississippi River. The park is home to the tallest mountain on the U.S. Atlantic coast. Today visitors come to Acadia to hike granite peaks, bike historic carriage roads, or relax and enjoy the scenery.

Roosevelt Campobello International Park

A memorial to Franklin Delano Roosevelt and symbol of Canadian-American friendship, Roosevelt Campobello International Park is a combination indoor/outdoor site renowned internationally. Its historic beauty contributes to the tourism in both the Province of New Brunswick and the State of Maine. Wooded paths and fields offer vistas of nearby islands, bays, and shores.

Brigantine Wilderness

This trail-less area, a tidal wetland and shallow bay habitat along New Jersey's Atlantic coastline, is one of the most active flyways for migratory water birds in North America. Birdwatchers, binoculars in hand, have zoomed in on close to 300 species, including Atlantic Brant and American Black Duck.

Great Gulf Wilderness

Cradled within the rugged crescent of New Hampshire's Presidential Range lies the Great Gulf Wilderness. This steep-walled bowl begins at Mount Washington, and is flanked by Mounts Jefferson, Adams, and Madison. Great Gulf is the largest cirque in the White Mountains of New Hampshire with the small and beautiful Spaulding Lake lying at its floor. From the cirque's low end, the West Branch of the Peabody River flows eastward.

Lye Brook Wilderness

The Lye Brook Wilderness is in the southern Green Mountains of Vermont. Lye Brook flows through the western half of this wilderness, which ranges from 900 feet to 2900 feet above sea level. Most of the wilderness is above 2500 feet, on a high plateau with several ponds and bogs. Waterfalls and rocky streams are found here as well as reflecting pools. The western section is extremely steep, facing west-northwest towards U.S. Route 7 and Manchester. Four and a half miles of the Appalachian/Long Trail cross the northwest tip of the wilderness.

Moosehorn Wilderness

This wilderness is located within northern Maine's Moosehorn National Wildlife Refuge, a refuge and breeding ground for migratory birds, endangered species, and other wildlife. Scientists at Moosehorn have provided valuable information to stem the decline in the American Woodcock, also called a Timberdoodle. Bald eagles frequent the refuge, and black bears and white-tailed deer are common. Ducks, geese, and loons congregate on more than 50 lakes.

Presidential Range/Dry River Wilderness

The large glacial cirque known as Oakes Gulf lies at the headwaters of the Dry River in New Hampshire. This river - and just to the east the Rocky Branch - carve sharply down through the heart of this Wilderness and offer contrast to the surrounding long, high ridgelines of the Southern Presidential Range and Montalban Ridge. The Dry River is something of a misnomer, as anyone who has tried to cross it after a period of even moderate rain can attest. The streams in this Wilderness are flashy and swift and run cold and clear from snow that melts well into the summer.

Photo credits: National Park Service, US Fish and Wildlife Service, www.wilderness.net

2. CHANGES IN VISIBILITY IN MANDATORY FEDERAL CLASS I AREAS IN MANE-VU REGION

A. Reasonable Progress Goals

The goal of the Regional Haze Rule is to restore natural visibility conditions to each of the 156 Class I areas identified in the 1977 Clean Air Act Amendments. Section 51.301(q) defines natural conditions: "Natural conditions includes naturally occurring phenomena that reduce visibility as measured in terms of light extinction, visual range, contrast, or coloration." Regional Haze SIPs must contain measures that make "reasonable progress" toward this goal by reducing anthropogenic emissions that cause haze.

Regional haze impairs visibility. The deciview is a measure of visibility which is calculated from light extinction based on measurements of various air pollutants. In the first haze SIPs MANE-VU states with Class I areas identified baseline visibility for the 5-year period from 2000 through 2004 and established reasonable progress goals for improving visibility at Class I areas by 2018 (see Table 2.1). Baseline visibility and reasonable progress goals were established for the 20% of days with the worst visibility. The Class I states also ensured no visibility degradation for the 20% best visibility days.

B. Changes in Visibility

Section 51.308(g)(3) of the Regional Haze Rule requires states with Class I areas to compare the "current" visibility conditions with "baseline" visibility conditions. The visibility conditions are calculated using 5-year averaged values of the annual mean 20% best and 20% worst days for each area. Baseline conditions are calculated for the period 2000-2004.

Progress in improving visibility at Class I areas is measured by a nationwide Interagency Monitoring of Protected Visual Environments (IMPROVE) monitoring network. The IMPROVE program was established in response to the 1977 Clean Air Act Amendments by a partnership of the National Park Service (NPS), the Fish and Wildlife Service (FWS), the Bureau of Land Management (BLM), the Forest Service (FS) and EPA. This monitoring network has collected speciated fine aerosol and related visibility data in or near Federal Class 1 areas in the United States since 1988.

In 2013, NESCAUM prepared a report, *Tracking Visibility Progress: 2004-2011,* which analyzes visibility data from the 2000-2004 baseline through the period 2007-2011.[5] Additional visibility data, including data for 2015, is now available. Table 2.1 and Figures 2.1.a-e provide the most recent quality-assured data and visibility trends in the MANE-VU Class I areas. These data indicate that visibility at all MANE-VU Class I areas has improved and all areas exceed the 2018 reasonable progress goals set by the Class I states.

In Figures 2.1.a-e, the "Uniform Rate of Progress" (URP) line indicates the rate of progress needed to achieve natural visibility by 2064 (the target set by the Regional Haze Rule). All

[5] http://www.nescaum.org/topics/regional-haze/regional-haze-documents

MANE-VU Class I states established reasonable progress goals for 2018 that provide for a faster rate of improvement than the uniform rate.

In addition to NESCAUM's analysis, an IMPROVE report published in 2011 shows that visibility at all MANE-VU Class I Areas improved for the 2005-2009 period compared to the 2000-2004 baseline period.[6] Visibility for subsequent 5-year periods was calculated with the most recent available IMPROVE data.

[6] 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

IMPROVE data are available from the Federal Land Manager Environmental Database (FED) website: http://views.cira.colostate.edu/fed/DataWizard/

Table 2.1. Baseline, Reasonable Progress Goals, and Observed Visibility[7]

	Class I Area	Baseline (2000 – 2004)[1]	Reasonable Progress Goal (2018)[1]	5-Year Average Observed (2011 - 2015)[2]	Natural Conditions[1]
20% Haziest Days	Acadia National Park (ME)	22.9	19.4	17.4	12.4
	Brigantine Wilderness (NJ)	29.0	25.1	22.6	12.2
	Great Gulf Wilderness (NH)	22.8	19.1	16.4	12.0
	Presidential Range-Dry River Wilderness (NH)				
	Lye Brook Wilderness (VT)	24.4	20.9	18.0	11.7
	Moosehorn Wilderness (ME)	21.7	19.0	16.3	12.0
	Roosevelt Campobello International Park (ME)				
20% Clearest Days	Acadia National Park (ME)	8.78	8.3	7.1	4.7
	Brigantine Wilderness (NJ)	14.3	14.3	12.0	5.5
	Great Gulf Wilderness (NH)	7.7	7.2	5.7	3.7
	Presidential Range-Dry River Wilderness (NH)				
	Lye Brook Wilderness (VT)	6.4	5.5	5.3	2.8
	Moosehorn Wilderness (ME)	9.2	8.6	6.9	5.0
	Roosevelt Campobello International Park (ME)				

Units: Visibility in deciviews.

Source:

[1] *Tracking Visibility Progress: 2004-2011*, NESCAUM, April 30, 2013 (Revised May 24, 2013) http://www.nescaum.org/topics/regional-haze/regional-haze-documents

[2] Maine Department of Environmental Protection - Bureau of Air Quality, Division of Air Quality Assessment, Atmospheric Science and Analysis Section. July 2016. http://www.maine.gov/dep/ftp/MVTSC/

[7] There are no monitors in the Presidential Range-Dry River Wilderness and the Roosevelt Campobello International Park Class I areas; the monitors in the Great Gulf Wilderness Area and the Moosehorn Wilderness Area, which respectively are located near these areas, serve as surrogates.

Figure 2.1. MANE-VU Class 1 Area 2000 – 2015 Visibility Trends

Figure 2.1.a. Acadia National Park

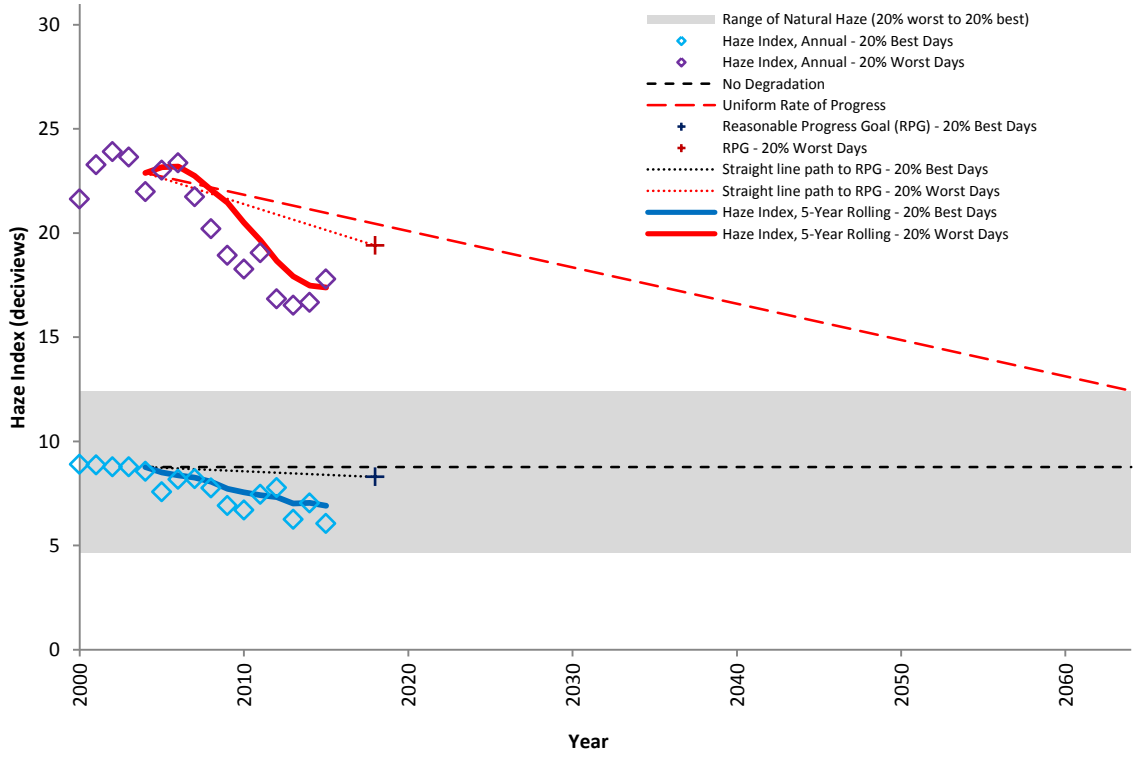


Figure 2.1.b. Moosehorn Wilderness

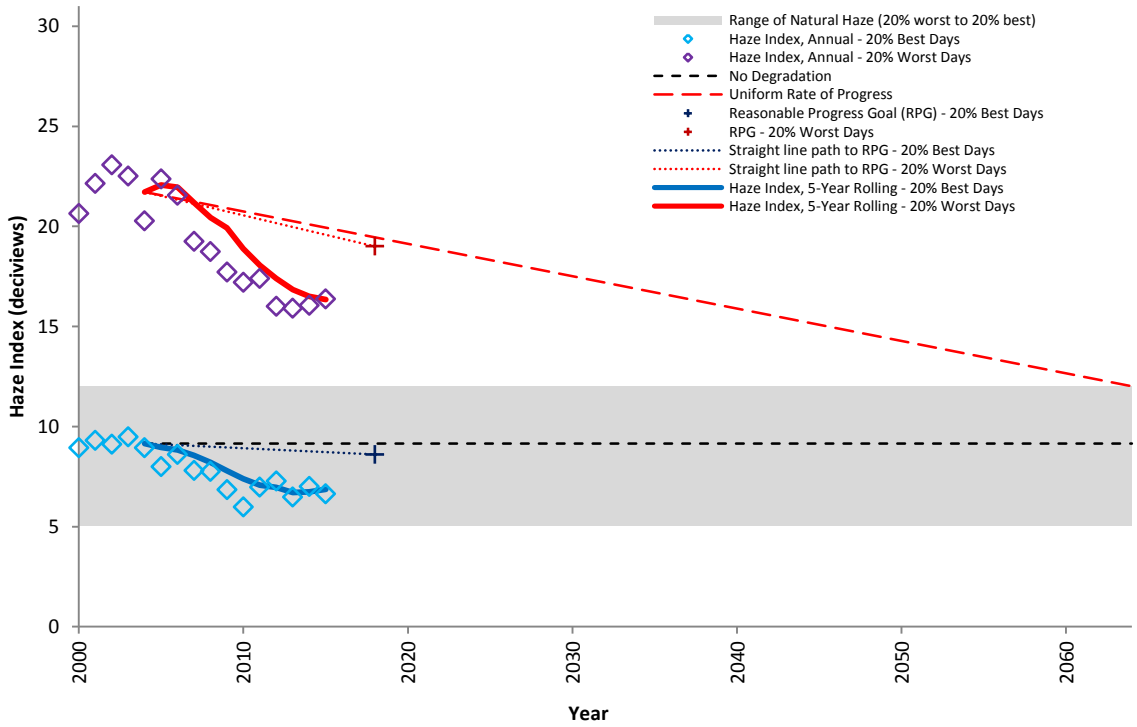


Figure 2.1.c. Great Gulf Wilderness

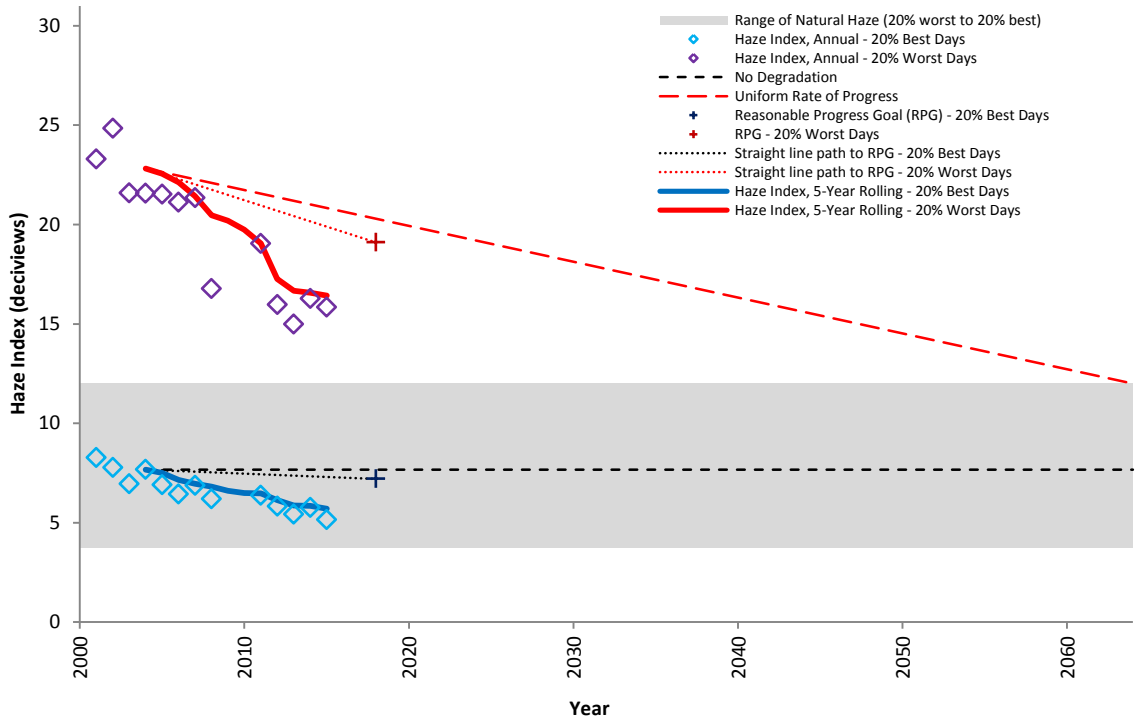


Figure 2.1.d. Lye Brook Wilderness

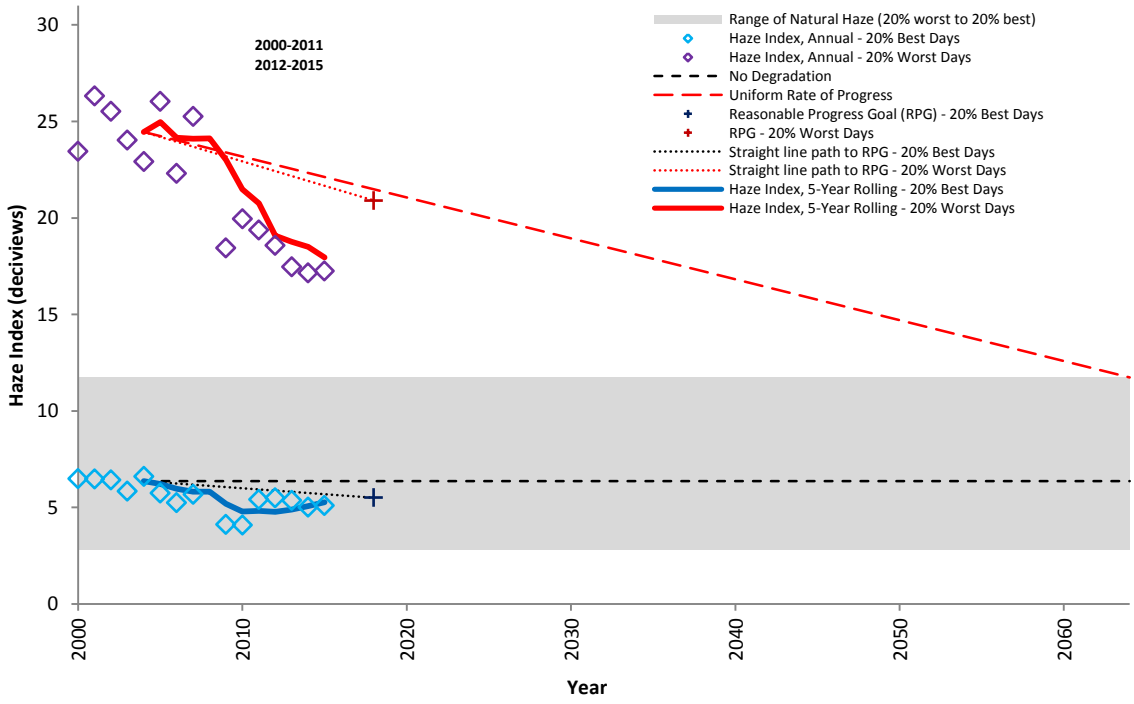
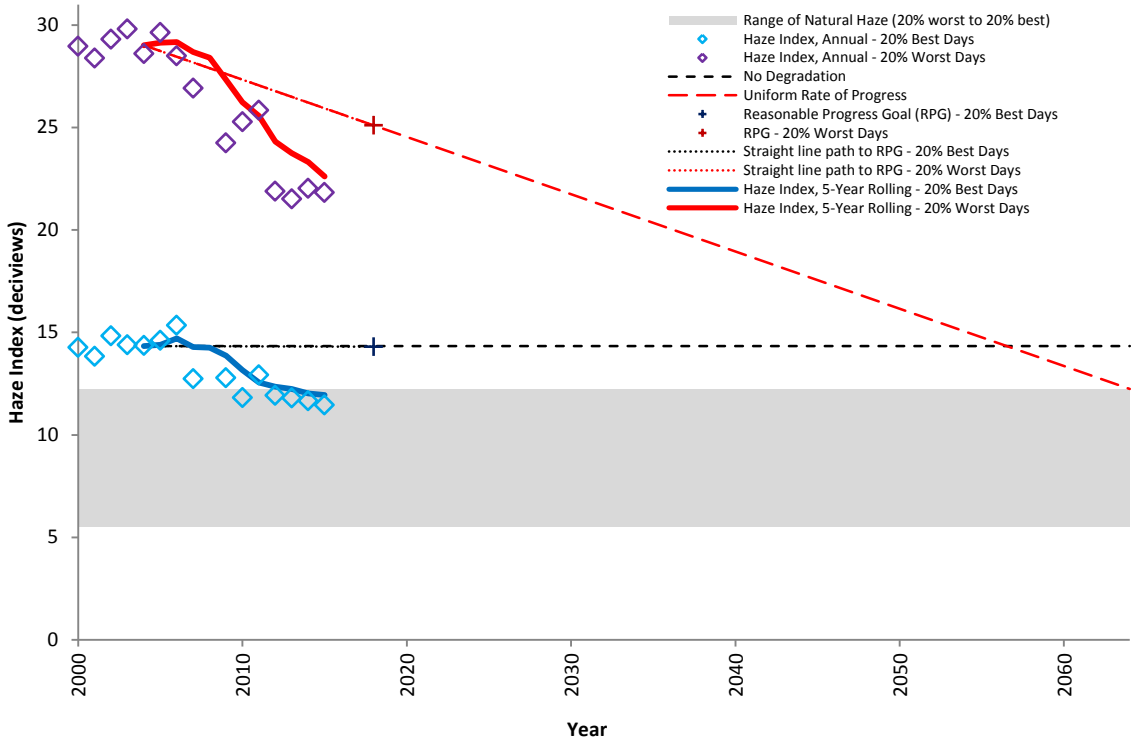


Figure 2.1.e. Brigantine Wilderness



Source: ***Analysis by*** Maine Department of Environmental Protection - Bureau of Air Quality, Division of Air Quality Assessment, Atmospheric Science and Analysis Section (MANE-VU unpublished file via personal communication July 2016). /. IMPROVE data is from the Federal Land Manager Environmental Database (FED) website: http://views.cira.colostate.edu/fed/DataWizard/

C. MANE-VU Focus on Sulfates and EGUs

The MANE-VU Contribution Assessment[8] concluded that sulfate is the most important single constituent of haze-forming fine particle pollution and the principal cause of visibility impairment across the region. According to this report, sulfate alone accounted for between one-half to two-thirds of total fine particle mass on the 20% haziest days during the baseline period at MANE-VU Class I Areas. During the 20% clearest days, sulfate generally accounted for the largest fraction (40% or more) of total fine particle mass in the region. Additionally, sulfate has a higher impact on visibility than other particle constituents. Sulfate typically accounted for 70 to 82% of estimated particle-induced light extinction at northeastern and mid-Atlantic Class I Areas.

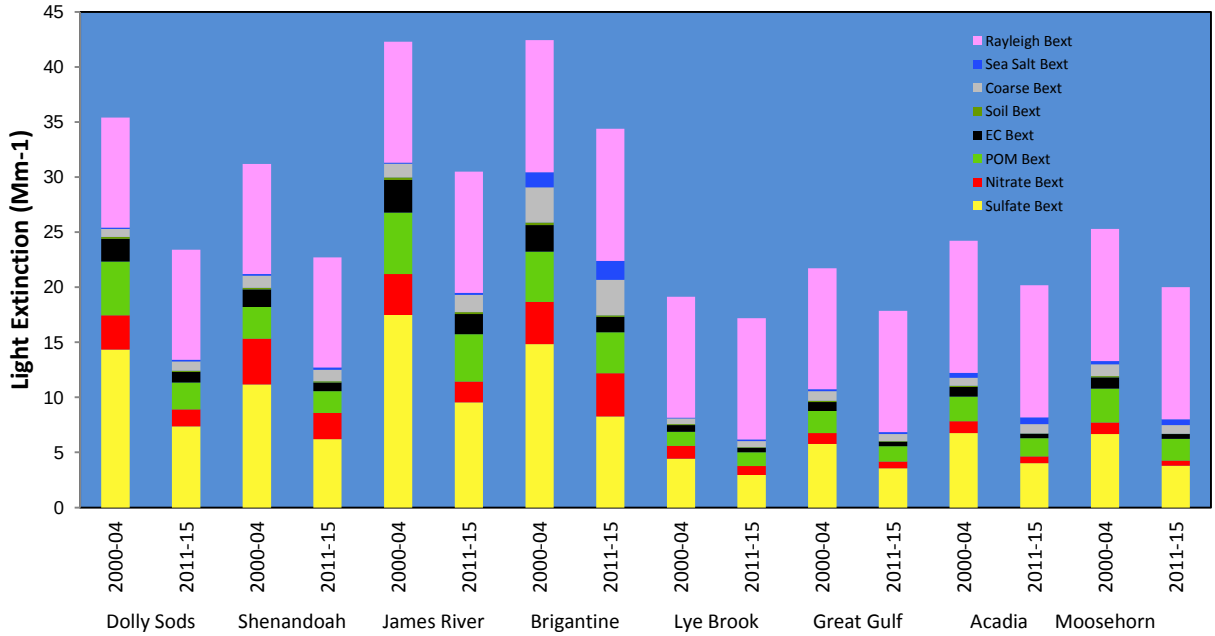
The MANE-VU Contribution Assessment also indicated that sulfur dioxide (SO_2) emissions from within MANE-VU in 2002 were responsible for approximately 25% of the sulfate at MANE-VU Class I Areas. Sources in the Midwest and Southeast regions contributed 15 to 25% each. Therefore, MANE-VU's long-term strategy included additional measures to control sources of SO_2 both within the MANE-VU region and in other states that were determined to contribute to regional haze at MANE-VU Class I Areas. Figure 2.2 shows the visibility trends in MANE-VU Class I areas and contribution of each particulate constituent to the visibility impairment on the clearest 20% days and haziest 20% days.

The report found that point sources dominated the inventory of SO_2 emissions. The largest source category responsible for SO_2 emissions was determined to be EGUs. Massachusetts EGU control measures are discussed in Section 3 of this report, Implementation of Regional Haze Measures.

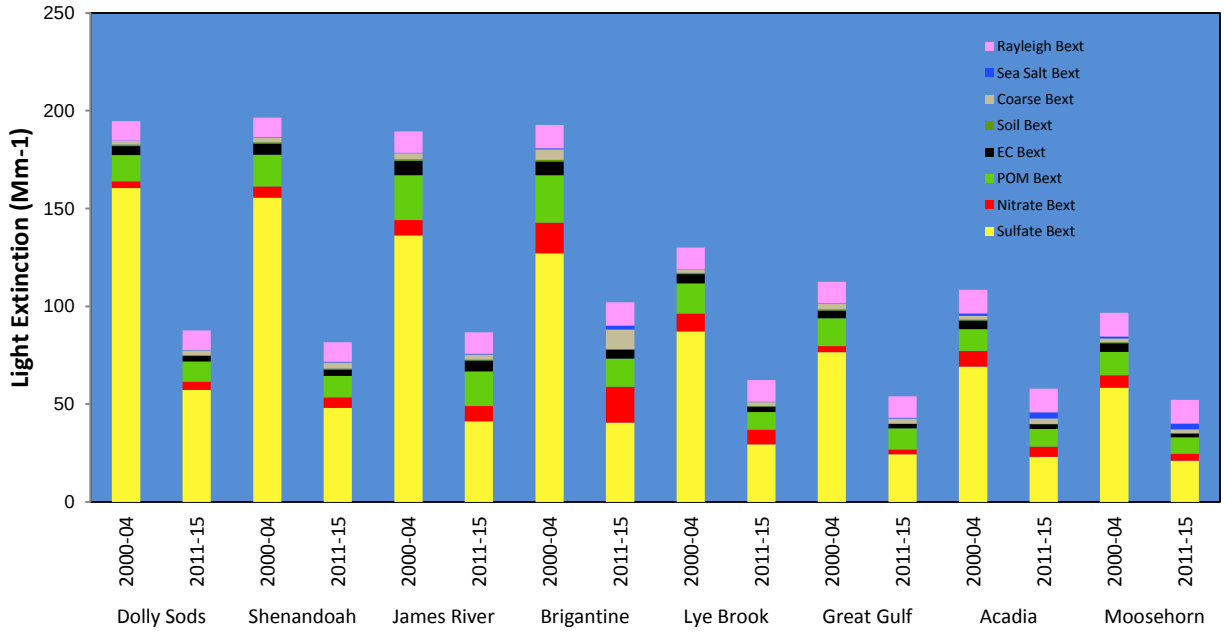
[8] Contributions to Regional Haze in the Northeast and Mid-Atlantic United States. NESCAUM, 2006

Figure 2.2. Constituent Contribution to Light Extinction in MANE-VU Class I Areas – 2000-2015

Clearest 20% Days



Haziest 20% Days



Units of light extinction: inverse megameters (Mm-1).

Source: ***Analysis by*** Maine Department of Environmental Protection - Bureau of Air Quality, Division of Air Quality Assessment, Atmospheric Science and Analysis Section (MANE-VU unpublished file via personal communication July 2016). /. IMPROVE data is from the Federal Land Manager Environmental Database (FED) website: http://views.cira.colostate.edu/fed/DataWizard/

3. IMPLEMENTATION OF REGIONAL HAZE MEASURES

On June 20, 2007, the MANE-VU states, including Massachusetts, agreed to pursue a coordinated strategy (referred to as the MANE-VU "Ask") to reduce haze within MANE-VU and to leverage the multi-pollutant benefits that such measures provide for protecting public health and the environment. Given the dominant role of sulfates in the formation of regional haze in the MANE-VU region, the strategy focuses on control measures for SO_2 emissions. In its Regional Haze SIP, MassDEP committed to implementing the MANE-VU strategy. The measures that comprise the "Ask" for MANE-VU states including Massachusetts are:

- Timely implementation of BART requirements;
- A low sulfur fuel oil strategy in the inner zone States (New Jersey, New York, Delaware and Pennsylvania, or portions thereof) to reduce the sulfur content of distillate oil to 0.05 % sulfur by weight (500 ppm) by no later than 2012, of #4 residual oil to 0.25 % sulfur by weight by no later than 2012, of #6 residual oil to 0.3 – 0.5 % sulfur by weight by no later than 2012, and to further reduce the sulfur content of distillate oil to 15 ppm by 2016;
- A low sulfur fuel oil strategy in the outer zone States (the remainder of the MANE-VU region) to reduce the sulfur content of distillate oil to 0.05 % sulfur by weight (500 ppm) by no later than 2014, of #4 residual oil to 0.25 – 0.5 % sulfur by weight by no later than 2018, and of #6 residual oil to no greater than 0.5 % sulfur by weight by no later than 2018, and to further reduce the sulfur content of distillate oil to 15 ppm by 2018, depending on supply availability;
- A 90 % or greater reduction in sulfur dioxide (SO_2) emissions from each of the top 100 electric generating units (EGUs) identified by MANE-VU (comprising a total of 167 stacks) as reasonably anticipated to cause or contribute to impairment of visibility in each mandatory Class I Federal area in the MANE-VU region. If it is infeasible to achieve that level of reduction from a unit, alternative measures are to be pursued in such State; and
- Continued evaluation of other control measures including energy efficiency, alternative clean fuels, and other measures to reduce SO_2 and nitrogen oxide (NO_x) emissions from all coal-burning facilities by 2018 and new source performance standards for wood combustion. These measures and other measures identified were to be evaluated during the consultation process to determine if they were reasonable and cost-effective.

40 CFR 51.308(g)(1) requires that states provide information in their progress reports on the status of implementation of all measures included in the SIP for achieving reasonable progress goals for Class I areas. The status of these measures in Massachusetts is described in the subsections below.

A. Best Available Retrofit Technology (BART)

i. BART Requirements

In the Regional Haze Rule, EPA included provisions designed specifically to reduce emissions of visibility-impairing pollutants from large sources that, because of their age, were exempted from new source performance standards (NSPS) established under the Clean Air Act. These provisions, known as Best Available Retrofit Technology, or BART, are located at 40 CFR 51.308(e). The Rule allows a state to make individual BART determinations for its sources or to implement alternative measures that will achieve greater reasonable progress toward natural visibility conditions.

ii. Status of BART Measures

MassDEP's Regional Haze SIP identified two municipal waste combustor (MWC) units and ten electricity generating units (EGUs) as BART sources requiring action. MassDEP made a BART determination for the two MWC units (Wheelabrator-Saugus) and adopted an alternative to BART for the EGUs. Table 3.1 describes the status of the specific BART and Alternative BART measures.

a. MWC BART Determination

For each of Wheelabrator-Saugus' two units, MassDEP determined that a NO_x emissions rate target of 185 ppm (30-day average), no further SO_2 controls, and a PM emissions limit of 25 milligrams per dry standard cubic meter (mg/dscm) represents BART. MassDEP issued a modified Emission Control Plan for Wheelabrator-Saugus with the BART NO_x, PM, SO_2 emission limits in March 2012, and EPA approved this control plan into the Massachusetts SIP[9]. Wheelabrator-Saugus is operating in accordance with its BART emissions limitations and therefore this control is fully implemented.

b. EGU Alternative to BART

MassDEP adopted an Alternative to BART that covers all BART-eligible EGUs plus all additional coal- and oil-fired EGUs subject to MassDEP's regulation 310 CMR 7.29, Emissions Standards for Power Plants. MassDEP's Alternative to BART for EGUs includes the following measures:

1. 310 CMR 7.29, Emissions Standards for Power Plants, which establishes NO_x and SO_2 emissions rates (as well as mercury and carbon dioxide emissions limits) for certain EGUs.
2. The retirement of Somerset Power.
3. Permit restrictions for Brayton Point, Salem Harbor, and Mt. Tom Station that limit or retire SO_2 and/or NO_x emissions.[10]

[9] 78 FR 57487, September 19, 2013.
[10] Mt. Tom Station and Salem Harbor shut down in 2014 (see Appendix A). Brayton Point's owners announced retirement planned in June 2017.

4. 310 CMR 7.19, Reasonably Available Control Technology (RACT) for Sources of NO_x, which establishes NO_x emission rates for various sources, including EGUs.
5. 310 CMR 7.05, Fuels All Districts, which requires EGUs to limit the sulfur content of residual oil to 0.5% by weight beginning July 1, 2014.

MassDEP issued Emission Control Plans for Salem Harbor, Brayton Point, and Mt. Tom to implement the Alternative to BART. MassDEP submitted the Emission Control Plans as part of the Regional Haze SIP, and they remain in effect for operational units. Table 3.1 lists the BART measures.

Table 3.2 shows that in 2015 the EGUs subject to the Alternative to BART already had achieved more emission reductions than the 2018 reduction targets.

Table 3.1. Massachusetts BART and Alternative to BART

Source Type	Source	Unit	BART-Eligible EGU or MWC	Description of BART Controls Implemented (Implementation Deadline)	Current Operation Status
BART (MWCs)					
MWC	Wheelabrator-Saugus	1, 2	Yes	Emission Control Plan with emission limits for NO_x, PM and SO_2 (March 2012)	Operating
Alternative to BART (EGUs)					
EGU	Cleary Flood	8, 9	Yes	Regulation 310 CMR 7.05, Fuels All Districts, requiring EGUs that burn residual oil to limit the sulfur content to 0.5% by weight (July 1, 2014)	Operating
EGU	Mystic Station	7	Yes	Regulation 310 CMR 7.05, Fuels All Districts, requiring EGUs that burn residual oil to limit the sulfur content to 0.5% by weight (July 1, 2014)	Operating
EGU	Canal Station	1, 2	Yes	Regulation 310 CMR 7.05, Fuels All Districts, requiring EGUs that burn residual oil to limit the sulfur content to 0.5% by weight (July 1, 2014)	Operating
EGU	Brayton Point	1, 2, 3, 4	Yes	Regulation 310 CMR 7.29 (existing) Prohibit the use of 310 CMR 7.29 SO_2 Early Reduction Credits and federal Acid Rain Allowances for compliance (June 1, 2014) Regulation 310 CMR 7.05, Fuels All Districts, requiring EGUs that burn residual oil to limit the sulfur content to 0.5% by weight (July 1, 2014)	Operating
EGU	Salem Harbor	4	Yes	Shutdown (June 1, 2014)	Retired See Appendix A

Source Type	Source	Unit	BART-Eligible EGU or MWC	Description of BART Controls Implemented (Implementation Deadline)	Current Operation Status
EGU	Salem Harbor	1	No (Alternative to BART)	Regulation 310 CMR 7.29 (existing) Prohibit use of 310 CMR 7.29 SO_2 Early Reduction Credits and federal Acid Rain Allowances for compliance (June 1, 2014); An annual cap of 276 tons of NO_x	Retired See Appendix A
EGU	Salem Harbor	2	No (Alternative to BART)	An annual cap of 300 tons of SO_2 (June 1, 2014) An annual cap of 50 tons of NO_x	Retired See Appendix A
EGU	Salem Harbor	3	No (Alternative to BART)	Shutdown (June 1, 2014)	Retired See Appendix A
EGU	Mont Tom Station	1	No (Alternative to BART)	Prohibit use of 310 CMR 7.29 SO_2 Early Reduction Credits and federal Acid Rain Allowances for compliance (May 15, 2009)	Retired See Appendix A
EGU	Somerset Power	8	No (Alternative to BART)	Retirement (2010)	Retired

Table 3.2. Alternative to BART Unit Emissions

Facility Name	Facility ID (ORISPL)	Unit ID	2002		2011		2015	
			SO_2 (tons)	NO_x (tons)	SO_2 (tons)	NO_x (tons)	SO_2 (tons)	NO_x (tons)
Brayton Point	1619	1	9,253.5	2,513.2	4,298.3	635.0	371.8	183.8
Brayton Point	1619	2	8,852.7	2,270.3	3,535.0	827.0	306.9	632.3
Brayton Point	1619	3	19,450.3	7,334.9	10,768.9	1,134.5	353.6	326.4
Brayton Point	1619	4	2,036.9	552.0	46.2	40.0	413.4	223.9
Canal Station	1599	1	13,065.9	3,338.8	99.1	20.2	304.8	75.2
Canal Station	1599	2	8,948.2	2,260.0	28.8	13.5	187.6	137.5
Cleary Flood	1682	8	39.2	12.5	21.8	6.7	4.6	2.2
Cleary Flood	1682	9	67.6	160.8	4.6	46.2	0.9	141.3
Mount Tom	1606	1	5,281.7	1,969.3	128.8	70.1		
Mystic	1588	7	3,727.3	804.5	21.7	66.8	723.0	195.5
Salem Harbor Station	1626	1	3,425.5	920.0	893.3	204.3		
Salem Harbor Station	1626	2	2,821.2	755.2	304.9	68.5		
Salem Harbor Station	1626	3	4,999.0	1,331.2	2,343.8	277.8		
Salem Harbor Station	1626	4	2,886.1	787.4	69.4	21.3		
Somerset	1613	8	4,399.0	1,444.9				
Totals			**89,254**	**26,455**	**22,565**	**3,432**	**2,667**	**1,918**
Reductions					**66,689**	**23,023**	**86,587**	**24,537**
Percent Reduction					**75**	**87**	**97**	**93**
Reduction Targets by 2018							***54,986***	***13,117***

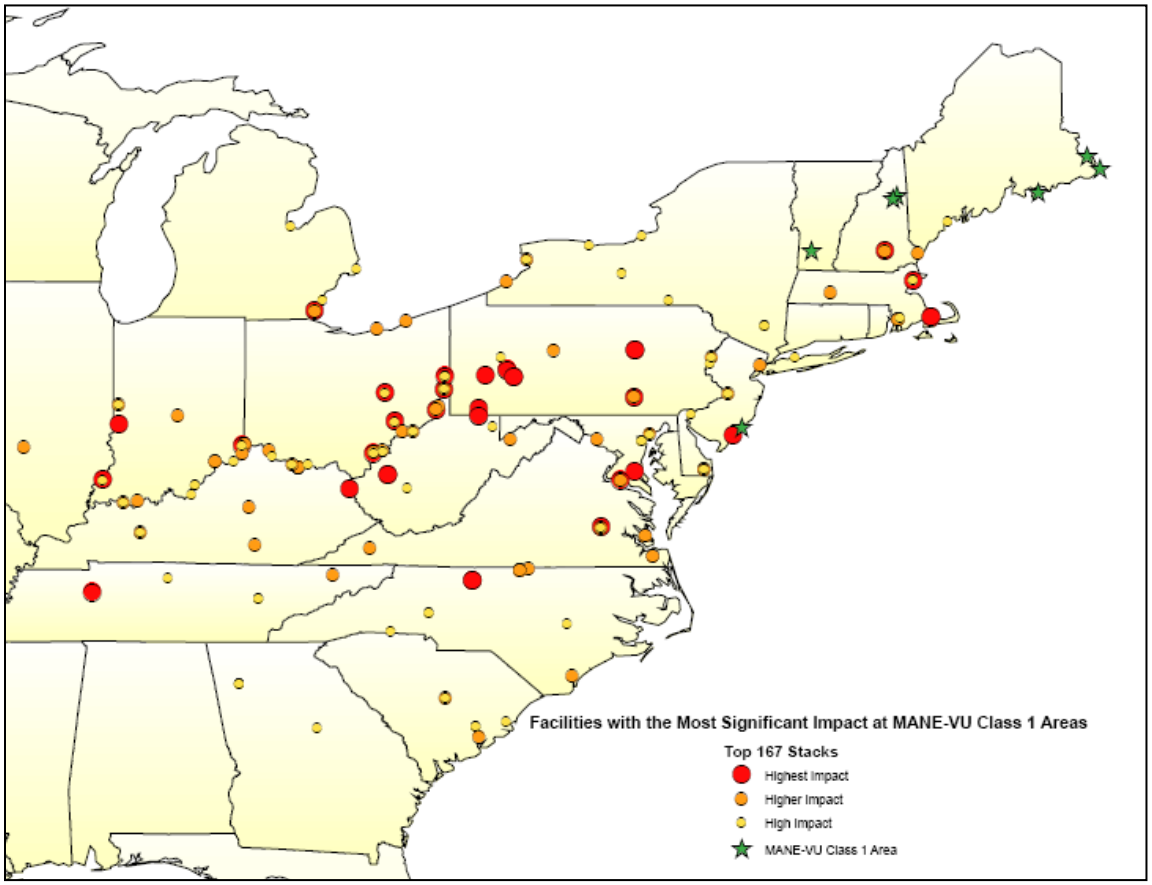
Source: CAMD for EGUs, and Massachusetts Regional Haze SIP (2012 revision), Table 17, and 19 for Reduction Targets by 2018.

B. Targeted EGU Strategy

MANE-VU identified 167 EGU sources whose 2002 emissions contributed significantly to visibility impairment in MANE-VU Class I areas. The MANE-VU Long-Term Strategy called for a 90% reduction in emissions at these sources by 2018. If it was infeasible to achieve that level of reduction from a unit, alternative measures were to be pursued by the state. In establishing reasonable progress goals, MANE-VU Class I states relied in part on implementation of emission reductions at these 167 EGU sources or other alternative measures by 2018. Figure 3.1 shows a map of the 167 targeted stacks.

Massachusetts has ten EGUs on the 167 EGU stacks list. In the SIP, MassDEP projected that these EGUs would reduce SO_2 emissions by close to 90% from 2002 to 2018. Table 3.3 shows that emissions from these EGUs decreased by 98% in 2015, exceeding the 90% goal.

Figure 3.1. 167 EGU Stacks Identified as Affecting MANE-VU Class I Areas in 2002



Source: Massachusetts Regional Haze SIP

Table 3.3. SO_2 Emissions at Massachusetts Targeted EGUs

Facility	Unit	2002	2011	2015	*2015 Reductions from 2002 (%)*	2018 Projected (Conservative)	2018 Projected (Likely)	*2018 Projected (90% Target)*
Brayton Point	1	9,254	4,298	372	96	2,928	1,700	*925*
Brayton Point	2	8,853	3,535	307	97	2,783	1,590	*885*
Brayton Point	3	19,450	10,769	354	98	6,442	3,634	*1,945*
Canal Station	1	13,066	99	305	98	7,643	1,069	*1,307*
Canal Station	2	8,948	29	188	98	5,443	1,479	*895*
Mt Tom	1	5,282	129	0	100	1,571	1,033	*528*
Salem Harbor	1	3,425	893	0	100	0	0	*343*
Salem Harbor	3	4,999	2,344	0	100	0	0	*500*
Salem Harbor	4	2,886	69	0	100	0	0	*289*
Somerset	8	4,399	0	0	100	0	0	*440*
Total		**80,562**	**22,165**	**1,525**	**-**	**26,811**	**10,505**	***8,057***
Reduction			**58,396**	**79,037**	**-**	**53,751**	**70,057**	***72,505***
Percent Reduction from 2002			**72**	**98**	**98**	**67**	**87**	***90***

Source: CAMD data for 2015 emissions, and Massachusetts Regional Haze SIP, Section 10, Long-Term Strategies, Table 25, for projected emissions and 2002 and 2011 data. See the SIP (2012 revision) for definitions of 2018 projection scenarios.

C. Low Sulfur Oil Strategy

The MANE-VU strategy included reductions of sulfur in oil. Consistent with the MANE-VU strategy, in July 2012, MassDEP adopted amendments to 310 CMR 7.05: Fuels All Districts to lower the sulfur content of fuel oil as shown in Table 3.4. The first phase of this rule was implemented in 2014.

Table 3.4. Massachusetts Low Sulfur Fuel Limits and Schedule

#2 Distillate Oil	#4 / #6 Residual Oil
500 ppm by 7/1/2014 15 ppm by 7/1/2018	1% by 7/1/2014 (0.5% for power plants) 0.5% by 7/1/2018

D. Emission Reductions Due to Ongoing Controls

40 CFR 51.308(d)(3)(v)(A) requires states to consider emission reductions from ongoing pollution control programs. In developing its long-term strategy, MassDEP considered emission control programs being implemented between the 2002 baseline period and 2018, as described in the Regional Haze SIP. Many of the emission reduction programs represent commitments

already made by Massachusetts to implement air pollution control measures for EGU point sources, non-EGU point sources, and area sources, respectively. These control measures are the same measures that were included in the 2018 emissions inventory and used in the modeling in the Regional Haze SIP. While these control measures were not designed expressly for the purpose of improving visibility, the pollutants they control include those that contribute to visibility impairment in MANE-VU Class I Areas.

i. EGU Emission Controls Expected by 2018

The following EGU emission reduction programs were included in the modeling used to develop the reasonable progress goals and as the basis for the long-term strategy in the Regional Haze SIP.

a. Clean Air Interstate Rule (CAIR)

MANE-VU included implementation of EPA's Clean Air Interstate Rule (CAIR) in the modeling used to develop reasonable progress goals. CAIR was replaced by EPA's Cross-State Air Pollution Rule (CSAPR) in 2011. However, Massachusetts is not subject to CSAPR.

MassDEP adopted its own MassCAIR regulations to implement the federal CAIR rule. Since EPA's CAIR is no longer in effect, MassDEP has proposed new regulations to replace MassCAIR with a rule that will maintain the reductions achieved under MassCAIR. Therefore, the emission reductions achieved by MassCAIR will be preserved.

b. Massachusetts EGU Regulations

Massachusetts adopted 310 CMR 7.29, Emissions Standards for Power Plants, in 2001. This rule applies to 6 fossil fuel-fired power plants listed below (several of these facilities have retired as listed in Table 3.5):

Brayton Point (Units 1, 2, 3, 4)
Mystic (Units 4, 5, 6, 7, 81, 82, 93, and 94)
NRG Somerset (Unit 8)
Mount Tom (Unit 1)
Canal Station (Units 1 and 2)
Salem Harbor (Units 1, 2, 3, and 4).

This rule imposed the following limits on emissions:

SO_2 emissions – 6.0 lbs/MWh each month and 3.0 lbs/MWh as a rolling average incorporating allowances and early reduction credits

NO_x emissions – 3.0 lbs/MWh each month and 1.5 lbs/MWh as a rolling average

Mercury (Hg) emissions – 85% Hg reduction or 0.0075 lbs/GWh in 2008 and 90% Hg reduction or 0.0025 lbs/GWh in 2012

CO_2 emissions – 1,800 lbs/MWh

The Regional Haze SIP assumed these regulations would achieve an emission reduction of approximately 50% in NO_x and 50 - 75% in SO_2.

Table 3.5 shows emission reductions from all Massachusetts EGUs reporting to EPA's Clean Air Markets Division (CAMD) and their emission reductions. These include all of the units controlled by 310 CMR 7.29. Several of these facilities have retired. Since 2002, the NO_x and SO_2 emissions from EGUs have declined by 91% and 97%, respectively.

Table 3.5. Emission reductions from Massachusetts EGUs in CAMD

Facility Name	Facility ID (ORISPL)	Unit ID	2002		2011		2015		Status
			SO_2 (tons)	NO_x (tons)	SO_2 (tons)	NO_x (tons)	SO_2 (tons)	NO_x (tons)	
ANP Bellingham Energy Company, LLC	55211	1	0.62	102.38	1.18	14.39	2.94	35.63	Operating
ANP Bellingham Energy Company, LLC	55211	2	0.23	33.40	1.24	14.32	2.76	32.29	Operating
ANP Blackstone Energy Company, LLC	55212	1	2.01	40.50	2.43	29.88	2.39	31.46	Operating
ANP Blackstone Energy Company, LLC	55212	2	2.24	39.19	2.11	25.16	2.15	30.88	Operating
Bellingham	10307	1		486.94	0.81	124.70	1.38	170.47	Operating
Bellingham	10307	2		459.10	0.83	129.61	1.51	188.95	Operating
Berkshire Power	55041	1	2.97	49.04	2.35	40.18	2.49	46.69	Operating
Blackstone	1594	11		59.16		46.34		44.13	Operating
Blackstone	1594	12		61.41		43.17		41.22	Operating
Brayton Point	1619	1	9253.52	2513.17	4298.30	635.03	371.76	183.81	Operating
Brayton Point	1619	2	8852.74	2270.29	3534.99	826.96	306.94	632.27	Operating
Brayton Point	1619	3	19450.29	7334.88	10768.9	1134.52	353.55	326.39	Operating
Brayton Point	1619	4	2036.91	552.05	46.25	40.00	413.42	223.89	Operating
Canal Station	1599	1	13065.86	3338.85	99.06	20.20	304.81	75.17	Operating
Canal Station	1599	2	8948.20	2259.98	28.84	13.45	187.63	137.53	Operating
Cleary Flood	1682	8	39.23	12.46	21.81	6.68	4.65	2.20	Operating
Cleary Flood	1682	9	67.61	160.78	4.58	46.25	0.90	141.28	Operating
Dartmouth Power	52026	1		55.73	0.28	13.77	0.82	15.07	Operating
Dartmouth Power	52026	2				0.58		0.46	Operating
Dighton	55026	1	1.40	36.53	2.35	48.64	2.03	40.45	Operating
Doreen	1631	10	0.00	2.05		1.50		1.68	Operating
Exelon L Street Generating Station	1587	NBJ-1	0.00	4.68		1.55		3.42	Operating
Fore River Energy Center	55317	11			5.03	59.43	3.79	54.11	Operating
Fore River	55317	12			5.16	60.03	4.53	59.65	Operating

Facility Name	Facility ID (ORISPL)	Unit ID	2002		2011		2015		Status
			SO_2 (tons)	NO_x (tons)	SO_2 (tons)	NO_x (tons)	SO_2 (tons)	NO_x (tons)	
Energy Center									
Framingham Station	1586	FJ-1	0.00	2.27		1.25		1.14	Operating
Framingham Station	1586	FJ-2	0.00	3.46		1.12		1.51	Operating
Framingham Station	1586	FJ-3	0.00	15.10		1.26		2.20	Operating
Indeck-Pepperell	10522	CC1	2.28	31.48					Retired
L'Energia Energy Center	54586	2	0.31	9.52	0.26	5.21	0.36	12.19	Operating
Lowell Cogeneration Company	10802	1	0.09	6.50	0.04	14.33			Retired
MASSPOWER	10726	1		111.66	1.03	53.49	1.14	61.43	Operating
MASSPOWER	10726	2		112.19	1.09	56.62	1.03	54.52	Operating
Medway Station	1592	J1T1	0.00	3.77		3.95		3.32	Operating
Medway Station	1592	J1T2	0.00	3.48		5.25		3.42	Operating
Medway Station	1592	J2T1	0.00	4.05		3.02		2.51	Operating
Medway Station	1592	J2T2	0.00	3.17		3.53		1.85	Operating
Medway Station	1592	J3T1	0.00	4.34		3.76		4.01	Operating
Medway Station	1592	J3T2	0.00	5.68		3.13		3.12	Operating
Milford Power, LLC	54805	1		80.08	0.53	25.73	1.20	57.08	Operating
Millennium Power Partners	55079	1	6.04	111.02	5.11	83.86	4.43	84.81	Operating
Mount Tom	1606	1	5281.65	1969.32	128.80	70.15			Retired
Mystic	1588	4	570.88	153.03					Cold Storage[(a)]
Mystic	1588	5	390.60	105.78					Cold[(a)] Storage
Mystic	1588	6	314.41	78.78					Cold[(a)] Storage
Mystic	1588	7	3727.31	804.51	21.73	66.77	723.01	195.49	Operating
Mystic	1588	81		235.79	5.04	56.10	1.39	19.10	Operating
Mystic	1588	82		82.69	5.17	57.59	1.38	21.21	Operating
Mystic	1588	93					1.62	20.49	Operating
Mystic	1588	94					1.64	22.93	Operating
Mystic	1588	MJ-1	0.00	6.72		0.17		1.67	Operating
New Boston	1589	1	1.03	167.88					Retired
New Boston	1589	2	1.43	256.40					Retired
Pittsfield Generating	50002	1		41.74		5.96		8.76	Operating
Pittsfield Generating	50002	2		42.86		6.67		8.66	Operating
Pittsfield Generating	50002	3		41.77		5.26		8.06	Operating

Facility Name	Facility ID (ORISPL)	Unit ID	2002		2011		2015		Status
			SO_2 (tons)	NO_x (tons)	SO_2 (tons)	NO_x (tons)	SO_2 (tons)	NO_x (tons)	
Potter	1660	3		79.51		14.04			Operating
Potter	1660	4			0.08	1.88	0.07	1.00	Operating
Potter	1660	5			0.07	1.40	0.21	1.27	Operating
Salem Harbor Station	1626	1	3425.45	920.01	893.27	204.27			Retired
Salem Harbor Station	1626	2	2821.21	755.15	304.92	68.50			Retired
Salem Harbor Station	1626	3	4998.98	1331.21	2343.76	277.78			Retired
Salem Harbor Station	1626	4	2886.12	787.36	69.38	21.32			Retired
Somerset	1613	8	4398.98	1444.92					Retired
Somerset	1613	11	0.00	6.62					Retired
Stony Brook	6081	1		171.04		32.40		85.58	Operating
Stony Brook	6081	2		89.36		21.54		7.73	Operating
Stony Brook	6081	3		165.02		27.50		62.26	Operating
Stony Brook	6081	4		10.04		12.37		10.54	Operating
Stony Brook	6081	5		4.97		9.97		8.55	Operating
Waters River	1678	1				10.79		28.06	Operating
Waters River	1678	2	0.00	2.82		10.32		3.32	Operating
West Springfield	1642	3	119.40	74.56	81.02	23.35	4.68	8.03	Operating
West Springfield	1642	10	0.00	2.10		5.90		1.05	Operating
West Springfield	1642	CTG1	0.07	7.09	0.10	3.16	0.04	2.86	Operating
West Springfield	1642	CTG2	0.08	6.45	0.12	6.06	0.05	2.67	Operating
Woodland Road	1643	10	0.00	1.17				1.89	Operating
Totals			**90,670**	**30,227**	**22,688**	**4,663**	**2,713**	**3,343**	
Reductions from 2002					**67,982**	**25,564**	**87,957**	**27,514**	
Percent Reductions					**75**	**85**	**97**	**91**	

[a] Cold Storage means placement in long-term storage in which the facility has made an enforceable commitment not to operate the unit.

A blank cell for unit emissions indicates that there was no value in CAMD.

c. EGU Retirements and Replacements

Table 3.6 lists EGUs that have retired since 2011. This list is limited to sources that report to CAMD. In addition, the Brayton Point facility has informed ISO New England that it intends to retire in June 2017.[11]

The 745 MW Salem Harbor coal-fired power plant has been replaced with the 674 MW Footprint combined cycle gas turbine plant. The Footprint plant is under construction and expected to open in 2017. To date, no other new large EGUs have been constructed or permitted.

Table 3.6. CAMD EGUs Retired After 2011

Facility Name	Facility ID (ORISPL)	Unit ID	Status
Lowell Cogeneration Company	10802	1	Retired
Mount Tom	1606	1	Retired
Salem Harbor Station	1626	1	Retired
Salem Harbor Station	1626	2	Retired
Salem Harbor Station	1626	3	Retired
Salem Harbor Station	1626	4	Retired

ii. Non-EGU Point Source Controls Expected by 2018

MANE-VU applied control factors to the 2018 MANE-VU emissions inventory to represent the following national, regional, and state control measures:

- NO_x SIP Call Phase I (NO_x Budget Trading Program)
- NO_x SIP Call Phase II
- NO_x RACT in 1-hour Ozone SIPs
- NO_x OTC 2001 Model Rule for ICI Boilers
- 2-, 4-, 7-, and 10-year MACT Standards
- Combustion Turbine and RICE MACT
- Industrial Boiler/Process Heater MACT

These measures remain in effect and apply to Massachusetts facilities.

MassDEP also provided source-specific control rates for one non-EGU point source within Massachusetts – Ardagh (a glass furnace). Ardagh is subject to stringent requirements under an

[11] Letter January 27, 2014 from D. Freysinger Executive Vice President-Coal Operations for Brayton Point stating intentions to retire Brayton PT 1-4 on June 1, 2017. See ISO-NE website Nonprice Retirement Requests and Determinations at http://www.iso-ne.com/system-planning/resource-planning/nonprice-retirement

EPA Consent Decree and was permitted in 2010. This facility has implemented all required emission control measures, including limiting its PM emissions to 38.8 tons per year.

iii. Area Source Controls Expected by 2018

MANE-VU developed the 2018 emissions inventory for area sources by applying growth and control factors to the MANE-VU 2002 Version 3.0 emissions inventory.[12] For Massachusetts, these affected only VOC emissions, except for the Residential Wood Heater NSPS. EPA strengthened the NSPS for new residential wood heaters in 2015 with the first requirements taking effect on December 31, 2015.

iv. Mobil Sources Controls Expected by 2018

In its Regional Haze SIP, MassDEP relied on MANE-VU's Version 3.0 emissions inventory that included the control measures in Table 3.7. All these measures continue to be implemented.

E. Prevention of Significant Deterioration (PSD)

Massachusetts is delegated by EPA to implement the federal PSD regulations under a Federal Implementation Plan and an April 2011 delegation agreement with EPA. The PSD program includes an air quality impact evaluation to demonstrate that proposed emissions will not significantly deteriorate air quality or cause or contribute to an exceedance of a NAAQS, and will not cause an adverse impact on visibility in any sensitive area or in any Federal Class I area and will not interfere with reasonable progress toward the remedying of existing man-made visibility impairment in a sensitive area. MassDEP is continuing to implement the PSD permitting program as an integral part of its long-term strategy for meeting its regional haze goals.

F. Agricultural and Forestry Smoke Management

MANE-VU's analysis[13] concluded that fires used for resource benefits are of far less significance to the total inventory of fine-particle pollutant emissions than other sources of wood smoke in the region. The largest MANE-VU wood smoke source categories are residential wood combustion (73 %); open burning (15 %); and industrial, commercial, and institutional wood combustion (9 %). Fires that are covered under smoke management plans, including agricultural and prescribed forest burning, constitute less than one % of total wood smoke emissions in MANE-VU.

Unwanted fires involving buildings and wild lands make up only a minor fraction of wood burning emissions and cannot be reasonably addressed in a SIP. Wild fire emissions occasionally impair visibility, but they are not considered manmade or controllable and are part of "natural background" conditions.

MassDEP's air regulations include 310 CMR 7.07, which bans open burning entirely in 22 urban municipalities and prohibits the use of open burning to clear commercial or institutional land for non-agricultural purposes. The regulations do allow burning for "activities associated with the

[12] MANE-VU inventory protocols have been discussed in Massachusetts Regional Haze (2012 revision).
[13] MANE-VU, "Technical Support Document on Agricultural and Forestry Smoke Management in the MANE-VU Region, September 1, 2006."

normal pursuit of agriculture" and the open burning of brush and debris between January 14 and April 30 "except during periods of adverse meteorological conditions," as well as certain prescribed burning activities upon specific approval from MassDEP.

In its Regional Haze SIP, MassDEP included its outdoor hydronic heater (OHH) regulations, 310 CMR 7.26(50) through (54). These regulations require manufacturers to meet stringent performance standards in order to sell OHHs in Massachusetts and contain operational requirements for owners of current and new heaters. MassDEP continues to implement these regulations.

G. Measures to Mitigate Impacts of Construction Activities

MANE-VU's Contribution Assessment found that, from a regional haze perspective, crustal material generally does not play a major role in visibility impairment at MANE-VU Class I areas. Furthermore, the crustal fraction is largely made up of pollutants of natural origin (e.g., soil or sea salt) that are not targeted under the EPA's Regional Haze Rule. Nevertheless, the crustal fraction at any given location can be heavily influenced by the proximity of construction activities; and construction activities occurring in the immediate vicinity of MANE-VU Class I Areas could have a noticeable effect on visibility.

In its Regional Haze SIP, MassDEP concluded that its existing regulations at 310 CMR 7.09, which regulate dust from construction and demolition activities, were sufficient for mitigating impacts from construction activities. MassDEP continues to implement these regulations.

Table 3.7. Status of Mobile Source Control Measures

Measure	Status
Onroad Sources	
Low Emission Vehicle Regulations (LEV), incorporating California's emissions standards for motor vehicles	In effect since 2001 Updated as California updates its program
Enhanced motor vehicle emissions inspection and maintenance (IM) program	In effect since 1999
Tier 2 Motor Vehicle Standards and Gasoline sulfur program	In effect since 2005
Federal Heavy-Duty Diesel (2007) Engine Emission Standards for Trucks and Buses	Phased in between 2007 and 2010
Nonroad Sources	
"Control of Air Pollution: Determination of Significance for Nonroad Sources and Emissions Standards for New Nonroad Compression Ignition Engines at or above 37 Kilowatts," 59 FR 31306, June 17, 1994	Effective July 18, 1994
"Control of Emissions of Air Pollution from Nonroad Diesel Engines," 63 FR 56967, October 23, 1998	Phased in from 1999 to 2000, 2001-2006, and 2006-2008
"Control of Emissions from Nonroad Large Spark-Ignition Engines and Recreational Engines (Marine and Land-Based)," Final Rule, 67 FR 68241, November 8, 2002	Final Rule November 8, 2002
"Control of Emissions of Air Pollution from Nonroad Diesel Engines and Fuel," Final Rule, April 29, 2004	Phased in starting in mid-2007
Federal Emission Standards for Large Industrial Spark-Ignition Engines and Recreational Vehicles	Took effect in 2004 and fully phased in by 2012

4. EMISSIONS TRACKING

A. Emissions Tracking Requirements

40 CFR 51.308(g)(2) requires that the progress report summarize the emission reductions achieved throughout the state through implementation of the measures included in the state's SIP for achieving reasonable progress at Class I areas. Emission reductions from implementation of BART and EGU controls are discussed in Section 3 of this report.

In addition, 40 CFR 51.308(g)(4) requires each state to analyze and track changes over the past five years in emissions of pollutants contributing to visibility impairment from all sources and activities within the state based on the most recent emissions inventory with estimates projected forward to account for emissions changes during the applicable 5-year period. These emission changes are discussed below.

B. Summary of Key Emission Reductions and Trends in Massachusetts

This section compares the actual and projected emissions included in the Regional Haze SIP to the most recent inventories and projections available from EPA. Table 4.1 summarizes emissions data for the 2002 baseline inventory, 2011 National Emissions Inventory (NEI), 2014 v.1 NEI (the most recent available inventory), 2018 projections in the Haze SIP, and the latest 2018 EPA projections for NO_x, SO_2, and $PM_{2.5}$.[14]

Table 4.1 demonstrates significant overall emission reductions in Massachusetts. Emissions in 2014 for all pollutants and all sources were already below the projections for 2018 contained in the SIP. Reductions achieved by 2014 are 55% for NO_x, 85% for SO_2, and 25% for $PM_{2.5}$.

The latest EPA projections for 2018 show NO_x, SO_2, and $PM_{2.5}$ levels substantially below levels previously projected for 2018 in the SIP. Comparisons between 2002 emissions and the latest 2018 projections indicate substantial additional declines in total emissions of NO_x (65%), SO_2 (96%), and $PM_{2.5}$ (54%).

It should be noted that emissions estimation methods have been refined since 2002. For details on the differences between the methods and models used for each emissions inventory, see documentation at MassDEP's Emissions Inventory website:
http://www.mass.gov/eea/agencies/massdep/air/reports/emissions-inventories.html .
Technical support documents for each inventory are at EPA's emissions inventory website:
https://www.epa.gov/air-emissions-inventories .

[14] On page 7 of EPA's April 2013 guidance titled *General Principles for the 5-Year Regional Haze Progress Reports for the Initial Regional Haze State Implementation Plans*, EPA states: "Because nearly all of the initial regional haze SIPs (those submitted to satisfy the first 10-year implementation period only) considered only SO_2, nitrogen oxide (NO_x), and particulate matter (PM) as visibility-impairing pollutants, the first 5-year reports are usually not required to identify or quantify emission reductions for other pollutants, such as ammonia or VOC."

Table 4.1. NO_x, SO_2, and $PM_{2.5}$ Emissions and Reductions in Massachusetts in Tons

Sector	2002 from SIP	2011 NEI	NEI 2014	*2014 Reductions from 2002*	Projected 2018 from SIP	2018 with Point & Area Adjustments[a]
NO_x						
EGU Point	27,298[f]	5,169	4,200	23,098	17,418[f]	1,966
Non-EGU Point	18,292[g]	10,517	9,286	9,006	23,040[g]	14,031
Point [b]	45,590	15,686	13,486	32,104	40,458	15,997
Area	34,371	21,216	25,790	8,581	36,199	22,264
Onroad [c]	143,368	66,997	39,519	103,849	22,813	27,767
Nonroad	42,769	40,667	41,259	1,510	27,040	27,005
TOTAL	**266,098**	**144,566**	**120,054**	**146,044**	**126,510**	**93,033**
SO_2						
EGU Point	86,283[f]	22,776	7,121	79,162	36,923[f]	890
Non-EGU Point	14,766[g]	3,850	2,136	12,630	18,955[g]	2,831
Point [b]	101,049	26,626	9,257	91,792	55,878	3,721
Area	25,585	20,779	9,109	16,476	1,804	1,731
Onroad [c]	4,399	526	498	3,901	1,937	183
Nonroad	3,791	3,812	1,018	2,773	442	219
TOTAL	**134,824**	**51,743**	**19,882**	**114,942**	**60,061**	**5,854**
$PM_{2.5}$ (Primary)						
EGU Point	1,208[f]	314	348	860	3,167[f]	123
Non-EGU Point	2,953[g]	443	404	2,549	3,660[g]	1,141
Point [b], [d]	4,161	757	752	3,409	6,827	1,264
Area [e]	43,203	33,546	34,151	9,052	31,237	18,935
Onroad [c]	2,410	3,039	1,571	839	840	1,875
Nonroad	3,226	2,895	2,525	701	2,052	1,766
TOTAL	**53,000**	**40,237**	**39,000**	**14,001**	**40,956**	**23,840**

(a) 2018 projections are from EPA. Source: Data file named "2018ed_v6_11f_state_sector_totals.xlsx" dated 01/07/2014 on EPA FTP site at ftp://ftp.epa.gov/EmisInventory/2011v6/v1platform/reports/2018_emissions/.

(b) Point source emissions are the sum of EGU Point and Non-EGU Point emissions.

(c) Onroad sources include nonroad modeled emissions, and the categories of marine, aircraft, and locomotive emissions.

(d) EPA-NEI PM Point Source Augmentation - 2008 $PM_{2.5}$ estimated at 3,518 tons by EPA.

(e) Note that the annual emissions for $PM_{2.5}$ for 2002 and 2008 are substantially different from the previously published values for these inventories. The values have been adjusted to correct an error in the calculation of fugitive dust from roads. For more information, see the correction notes published for the 2002 inventory on the MassDEP emissions inventory website http://www.mass.gov/eea/agencies/massdep/air/reports/emissions-inventories.html.

(f) These values were calculated from the difference between the Point and Non-EGU Point source values.

(g) Values are from Appendix N of the Massachusetts Regional Haze SIP (2012 revision), Table 2-2, pp 2-17, 2-18, and 2-20.

5. ASSESSMENT OF SIGNIFICANT ANTHROPOGENIC EMISSION CHANGES IN THE LAST FIVE YEARS

A. Requirement to Assess Whether Emissions Changes Have Impeded Progress

40 CFR 51.308(g)(5) requires an assessment of any significant changes in anthropogenic emissions within or outside the state that have occurred over the past five years that have limited or impeded progress in reducing pollutant emissions and improving visibility.

EPA has indicated that a significant change that can limit or impede progress could be either:

(1) a significant unexpected increase in anthropogenic emissions that occurred over the five-year period (that is, an increase that was not projected in the analysis of the SIP); or

(2) a significant expected reduction in anthropogenic emissions that did not occur (that is, a projected decrease in emissions in the analyses for the SIP that was not realized).

B. Assessment

The data presented in Section 2 of this report show that visibility in Class 1 areas potentially affected by emissions from Massachusetts has improved substantially. For the period 2009-2014 (the most recent 5 years of certified monitoring data), all Class I areas affected by Massachusetts emissions showed visibility improvements relative to the 2000-2004 baseline period on both the best and worst visibility days. Observed haze levels were already better than the 2018 reasonable progress goals for the Class I areas.

The analyses and summaries in this Progress Report include all relevant emission sources and demonstrate declining emissions. The visibility and emissions evidence together show that no significant increase in emissions or decrease in any expected reductions has occurred that has impeded progress in reducing emissions and improving visibility during this report period.

6. ADEQUACY OF THE CURRENT SIP TO MEET REASONABLE PROGRESS GOALS

40 CFR 51.308(g)(6) requires an assessment of whether the current implementation plan elements and strategies are sufficient to enable the state, or other states with mandatory Federal Class I areas affected by emissions from the state, to meet all established reasonable progress goals.

Based on the information in this Progress Report, MassDEP concludes that the elements and strategies relied on in the Massachusetts Regional Haze SIP are sufficient to enable states that have Class I areas affected by Massachusetts' emissions to meet all their established reasonable progress goals. This conclusion is based on the following:

1. Visibility has improved at all Class I areas affected by Massachusetts emission for the most impaired days and no degradation of visibility has occurred for the least impaired

days. Therefore, these Class I areas are on track to meet the reasonable progress goals for 2018 based on the observed visibility improvement.

2. SO_2 emissions from Massachusetts EGUs in 2015 already are less than the 2018 projections in the SIP, and are projected to decline even further.

40 CFR 51.308(h) requires the state to determine the adequacy of its regional haze SIP based on information presented in its progress report.

Based on the information presented in this report, MassDEP determines that the existing Regional Haze SIP requires no substantive revision at this time to achieve the reasonable progress goals for Class I areas affected by Massachusetts sources. The basis for this determination is based on the following:

1. Visibility has improved at all Class I areas in the MANE–VU region potentially affected by Massachusetts sources.
2. SO_2 and NO_x emissions from Massachusetts EGUs have decreased well below the 2018 projections in the SIP.
3. MassDEP expects additional NOx reductions from the mobile sector in the near future due to the continued phase-in of federal standards related to mobile source pollutions controls, fuels, fuel economy and greenhouse gas emissions, and repair and replacement of the existing fleet.
4. Visibility and emissions trends indicate that the affected Class I areas will be able to meet or exceed the Class I area reasonable progress goals for 2018.

7. CONSULTATION WITH FEDERAL LAND MANAGERS

A. Requirement to Consult Federal Land Managers

40 CFR 51.308(i) requires that the state provide the Federal Land Managers (FLMs) responsible for Class I areas affected by emissions from within the state an opportunity for consultation, in person and at least 60 days before holding any public hearing on this progress report.

B. Consultation Process

MassDEP submitted a pre-proposal draft of its Progress Report to FLMs and EPA on January 24, 2017. Comments on the pre-proposal draft were incorporated into this draft Progress Report. The FLMs' comments are included in Appendix B. MassDEP also notified FLMs and EPA about the availability of this draft Progress Report and welcomes their further comment.

MassDEP will continue to consult with FLMs on future Haze SIP revisions and progress reports, as well as during implementation of programs having the potential to contribute to visibility impairment in mandatory Class I areas.

Appendix A

EGU Retirement Documentation

Mt. Tom Station Letter

Salem Harbor EGU Letter

Mt. Tom Station
200 Northampton Street
Holyoke, MA 01040
Ph: (413) 536-9562
Fax: (413) 536-9513
Email: howard.person@gdfsuezna.com

Howard Person
Plant Manager

December 4, 2015

Mr. Michael Gorski
Regional Director
Massachusetts DEP Western Regional Office
436 Dwight Street
Springfield, MA 01103

Re: Mt Tom Title V Operating Permit Termination

Dear Mr. Gorski,

Mount Tom Generating Company, LLC (Mt. Tom) announced on May 27th, 2014 that the facility was permanently shut down. As such, Mt. Tom wishes to terminate its Title V Air Operating Permit (and all other associated air permits).

If you have any questions or comments pertaining to the above, please be sure to contact me at the letterhead address or telephone number of (413) 536-9562. You may also contact me electronically at howard.person@gdfsuezna.com.

Sincerely,

Howard Person
Plant Manager / RO

cc: GDF; Mr. R. Maggiani, Mr. J. Shue, File.
MADEP; Mr. D. Howland, Mr. M. Simpson.

MassDEP

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection
Northeast Regional Office • 205B Lowell Street, Wilmington MA 01887 • 978-694-3200

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Matthew A. Beaton
Secretary

Martin Suuberg
Commissioner

June 10, 2015

Scott G. Silverstein
Footprint Power Salem Harbor Operations, LLC
1140 Route 22 East, Suite 303
Bridgewater, New Jersey 08807

RE: SALEM
Class: OP53
FMF No.: 404157
Termination of
Final Operating Permit as Amended
and Operating Permit Minor
Modification Applications

Dear Mr. Silverstein:

The Massachusetts Department of Environmental Protection ("MassDEP"), Bureau of Waste Prevention, Northeast Regional Office received your letter dated June 24, 2014 regarding your request to terminate the Final Operating Permit as amended (Application No. MBR-95-OPP-025A3) for the Footprint Power Salem Harbor Operations, LLC ("Footprint") facility located at 24 Fort Avenue in Salem, Massachusetts due to permanent cessation of operations as of June 1, 2014 [1]. Your letter indicated several reports and due dates for submittal by Footprint as required by your Operating Permit, the latest of which was due to be submitted by April 15, 2015. In response to your request, MassDEP issued a letter on October 30, 2014 stating that MassDEP would act on this request to terminate the Operating Permit once all of the obligations as required by Footprint's Operating Permit were met.

MassDEP has determined that all of Footprint's obligations under the Final Operating Permit as amended have been met. Therefore, in accordance with 310 CMR 7.00: Appendix C(3)(m), MassDEP hereby terminates Footprint's Final Operating Permit (Application No. MBR-95-OPP-025A3) and two applications (Transmittal Nos. X256744 and X252593) submitted as Minor Modifications to the Operating Permit.

[1] The Operating Permit which is being terminated concerns the coal and oil-fired electric generating facility which is commonly known as Salem Harbor Station, which operated from approximately 1951 through June 1, 2014.

This information is available in alternate format. Call Michelle Waters-Ekanem, Diversity Director, at 617-292-5751. TTY# MassRelay Service 1-800-439-2370
MassDEP Website: www.mass.gov/dep
Printed on Recycled Paper

Should you have any questions concerning this matter, please contact Cosmo Buttaro at (978) 694-3281, or at the letterhead address.

Sincerely,

This final document copy is being provided to you electronically by the Department of Environmental Protection. A signed copy of this document is on file at the DEP office listed on the letterhead.

Cosmo Buttaro
Environmental Engineer

This final document copy is being provided to you electronically by the Department of Environmental Protection. A signed copy of this document is on file at the DEP office listed on the letterhead.

Susan P. Ruch
Acting Regional Permit Chief &
Deputy Regional Director
Bureau of Waste Prevention

cc: United States Environmental Protection Agency (EPA) - New England Regional Office
5 Post Office Square, Suite 100, Mail Code OEP05-2, Boston, Massachusetts 02109-3912,
Attn: Ida McDonnell, Air Permits Program Manager

MassDEP - Wilmington: Mary Persky

ecc: EPA - New England Regional Office: Donald Dahl
MassDEP - Boston: Jay Eberle, Yi Tian
MassDEP - Wilmington: Ed Braczyk, Martha Bolis

Appendix B

Response to Comments from Federal Land Managers

MassDEP sent a pre-proposal draft of its Regional Haze Progress Report to Federal Land Managers (FLMs) on January 24, 2017. MassDEP received comments (also attached) from the following FLMs that are summarized below:

1. Thomas G. Wagner, U.S. Department of Agriculture Forest Service (FS)

2. Patricia Brewer, U.S. Department of Interior National Park Service (NPS)

1. Comment: (FS) I concur with MassDEP that the Massachusetts Regional Haze SIP is sufficient to enable states that have Class I areas affected by Massachusetts emissions to meet the reasonable progress goals for 2018 based on the observed visibility improvements.

***Response*:** MassDEP appreciates the comments.

2. Comment: (NPS) We recommend that MassDEP provide a discussion of aerosol composition of the IMPROVE monitoring data on the haziest and clearest days at MANE-VU Class I Areas to establish which pollutants are predominant contributors to haze and which emission reduction would be most effective to improve visibility. With this addition we agree that Massachusetts is meeting its commitments to the MANE-VU states and that substantive revision of the current regional haze state implementation plan is not necessary at this time.

***Response*:** MassDEP has added a new section 2.C. **MANE-VU Focus on Sulfates and EGUs** that discusses the aerosol composition of the IMPROVE monitoring data as recommended.

USDA United States Department of Agriculture | Forest Service | White Mountain National Forest | 71 White Mountain Drive
Campton, NH 03223
603-536-6100

File Code: 2580
Date: March 10, 2017

Mark Wert
Branch Chief, Air Planning
Bureau Of Air and Waste, Division of Air and Climate Programs
Massachusetts Dept. of Environmental Protection
One Winter Street, 7th Floor
Boston, MA 02108

Dear Mr. Wert:

The USDA Forest Service completed our review of the "Draft for Consultation with Federal Land Managers Massachusetts Regional Haze Progress Report," dated January 24, 2017. We appreciate the opportunity to review and comment on this report. I concur with the Massachusetts Department of Environmental Protection that Massachusetts' Regional Haze State Implementation Plan (SIP) is sufficient to enable states that have Class I areas affected by Massachusetts' emissions to meet the reasonable progress goals for 2018 based on the observed visibility improvements. I am pleased to learn that sulfur dioxide emissions from Massachusetts electric generating units in 2015 is already less than the 2018 projections listed in the SIP.

If you have any questions, please contact Air Quality Specialist Ralph Perron at (802) 222-1444. We look forward to our continued close cooperation toward the national goal of no "man-made" visibility impairment to the Class I areas in our region by 2064.

Sincerely,

THOMAS G. WAGNER
Forest Supervisor

cc: Judi Henry, Charles E. Sams, Bret A. Anderson, Ralph Perron, Stacy Lemieux, John Sinclair, Anne McWilliams

United States Department of the Interior

NATIONAL PARK SERVICE
Air Resources Division
P.O. Box 25287
Denver, CO 80225-0287

TRANSMITTED VIA ELECTRONIC MAIL - NO HARDCOPY TO FOLLOW

N3615 (2350)

March 16, 2017

Mark Wert
Bureau of Air and Waste
Division of Air and Climate Programs
Massachusetts Department of Environmental Protection
One Winter Street, 7th floor, Boston, MA 02108

Dear Mr. Wert:

Thank you for the opportunity to review and comment on Massachusetts' draft Regional Haze Progress Report. We believe that Massachusetts Department of Environmental Protection (Mass DEP) has met most of the requirements for the regional haze periodic progress report as outlined in 40 CFR 51.308(g) and (h). No Class I areas are located in Massachusetts. Visibility at Class I areas in the MANE-VU states for the period 2010-2014 is better than the 2018 visibility goals set by these states. Mass DEP has discussed the emissions controls implemented in Massachusetts and demonstrated that emissions reported in the 2014 National Emissions Inventory were lower than the projected 2018 emissions that were used by the MANE-VU Class I states to set 2018 reasonable progress goals. Our one suggested addition to the report is to discuss the aerosol composition of the IMPROVE monitoring data on the haziest and clearest days at MANE-VU Class I areas to establish which pollutants are the predominant contributors to haze and which emission reductions would be most effective to improve visibility. With this addition, we would agree that Massachusetts is meeting its commitment to the MANE-VU states and that substantive revision of the current regional haze state implementation plan is not necessary at this time.

We appreciate the opportunity to work closely with Massachusetts to improve visibility in Class I national parks and wilderness areas. If you have questions, please contact me at patricia_f_brewer@nps.gov or 303-969-2153.

Sincerely,

Pat Brewer

Pat Brewer

Appendix C

Acronyms

BART	Best Available Retrofit Technology
CAA	Clean Air Act
CO	Carbon Monoxide
EGU	Electricity Generating Unit
EPA	Environmental Protection Agency
FLM	Federal Land Manager
GHG	Green House Gases
HC	Hydrocarbon
IM	Enhanced Motor Vehicle Inspection and Maintenance
IMPROVE	Interagency Monitoring of Protected Visual Environments
LEV	Low Emissions Vehicle
MANE-VU	Mid-Atlantic/Northeast Visibility Union
MARAMA	Mid-Atlantic Regional Air Management Association
MassDEP	Massachusetts Department of Environmental Protection
NAAQS	National Ambient Air Quality Standards
NESCAUM	Northeast States for Coordinated Air Use Management
NO_x	Nitrogen oxides
NSPS	New Source Performance Standards
OBD	Onboard Diagnostics
OTC	Ozone Transport Commission
$PM_{2.5}$	Particulate matter of diameter of 2.5 micrometers of less
RPG	Reasonable Progress Goal
SIP	State Implementation Plan
SO_2	Sulfur dioxide
URP	Uniform Rate of Progress
VIEWS	Visibility Information Exchange Web System
ZEV	Zero Emissions Vehicle