

VERMONT REGIONAL HAZE PROGRESS REPORT
FOR THE
SECOND PLANNING PERIOD



Lye Brook Wilderness

January 07, 2025

Vermont Department of Environmental Conservation

Mid-Atlantic/Northeast Visibility Union

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Attachment A:

MANEVU Technical Support Committee, Mid-Atlantic/Northeast U.S.
Visibility Data, 2nd Regional Haze SIP Metrics, August 13, 2024

ACRONYMS AND ABBREVIATIONS

| | |
|-------------------|---|
| AMPD | Air Markets Program Database |
| CAA | Clean Air Act |
| EGU | Electric Generating Unit |
| EPA | U.S. Environmental Protection Agency |
| F&W | U.S. Fish and Wildlife |
| FED | Federal Land Manager Environmental Database |
| FLM | Federal Land Manager |
| FR | Federal Register |
| FS | U.S. Forest Service |
| IMPROVE | Interagency Monitoring of Protected Visual Environments |
| MANEVU | Mid-Atlantic/Northeast Visibility Union |
| NAAQS | National Ambient Air Quality Standard |
| NEI | National Emissions Inventory |
| NH ₃ | Ammonia |
| NO _x | Nitrogen Oxides |
| NPS | National Park Service |
| PM | Particulate Matter |
| PM ₁₀ | Particulate Matter < 10 microns |
| PM _{2.5} | Particulate Matter < 2.5 microns |
| RHR | Regional Haze Rule |
| RPG | Reasonable Progress Goal |
| RPO | Regional Planning Organization |
| SIP | State Implementation Plan |
| SO ₂ | Sulfur Dioxide |
| VOC | Volatile Organic Compounds |

INTRODUCTION

Section 169A of the Clean Air Act (CAA) "declares as a national goal the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory class I Federal areas which impairment results from manmade air pollution." Mandatory class I Federal areas (referenced hereinafter as Class I areas) consist of National Parks greater than 6,000 acres, wilderness areas & national memorial parks greater than 5,000 acres, and international parks, all of which were in existence as of August 7, 1977. Visibility was found to be an important value at 156 of these areas.

The CAA directed the U.S. Environmental Protection Agency (EPA) to promulgate regulations aimed at meeting the goals of Section 169A. To this end, EPA originally finalized the Regional Haze Rule (RHR) in 1999. The RHR was amended and revised in 2005 and 2017 and is codified under 40 CFR 51.300-309. The overarching goal of the RHR is to achieve natural visibility conditions at Class I areas by 2064. The RHR requires states to submit two types of regional haze planning documents: regional haze state implementation plans (SIPs), each of which covers a 10-year planning period, and progress reports, which are typically submitted at the mid-point of each planning period (although noting that regional haze SIPs themselves must include the required information such that they also serve as progress reports; the mid-course progress reports, such as this one, are their own stand-alone documents).

This document is intended to fulfill the requirements of paragraphs 51.308(g), (h), and (i) of the RHR and to serve as a progress report for the second regional haze planning period, which covers the period from 2018 to 2028. In this progress report, Vermont affirms that its regional haze SIP for the second planning period is adequate for making reasonable progress towards the RHR goal of achieving natural visibility conditions at Class I areas by 2064.

Vermont has consulted with the Federal Land Manager (FLM) on the contents of this progress report and has made it available for public review prior to this submittal to EPA. However, per revisions made to the RHR in 2017 ([82 FR 3078](#)), this progress report is not being submitted as a formal SIP revision.

Vermont is a member of the Mid-Atlantic/Northeast Visibility Union (MANEVU). MANEVU's voting membership includes 11 states, the District of Columbia, and two tribal nations: Penobscot Indian Nation and the St. Regis Mohawk Tribe. Additional MANEVU members include EPA, the U.S. Fish and Wildlife Service (F&W), the U.S. Forest Service (FS), and the U.S. National Park Service (NPS). There are seven Class I areas within the MANEVU region. The MANEVU Class I areas are listed below along with the state/province in which they are located. The names in parentheses indicate the larger area in which the Class I area is embedded.

- Acadia National Park, ME
- Moosehorn Wilderness Area, ME (Moosehorn National Wildlife Refuge)

- Roosevelt/Campobello International Park, New Brunswick Canada
- Great Gulf Wilderness Area, NH (White Mountain National Forest)
- Presidential Range - Dry River Wilderness Area, NH (White Mountain National Forest)
- Brigantine Wilderness Area, NJ (E.B. Forsythe National Wildlife Refuge)
- Lye Brook Wilderness, VT (Green Mountain National Forest)

A map of the MANEVU region, including the Class I areas within, is provided in Figure 1.

MANEVU provides technical assistance, facilitates discussion, and encourages coordinated action among its member agencies. It also fosters communication with other regional planning organizations (RPOs) that are engaged in planning activities related to regional haze. These RPOs are shown in Figure 2.

Figure 1: MANEVU Region and MANEVU Class I Areas

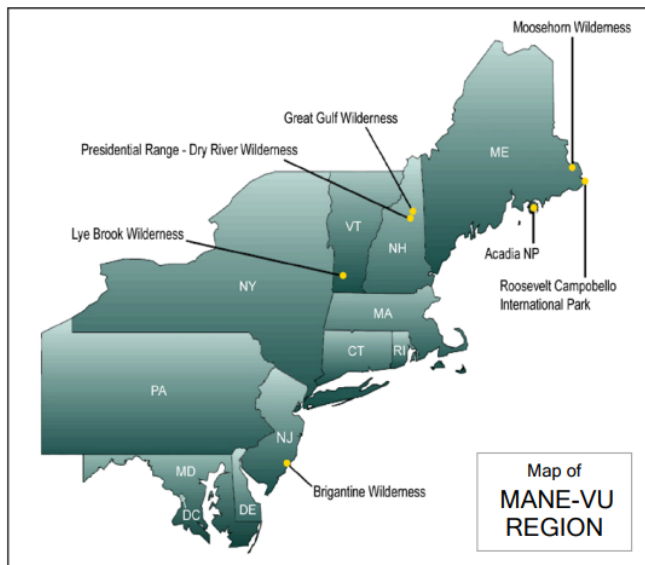
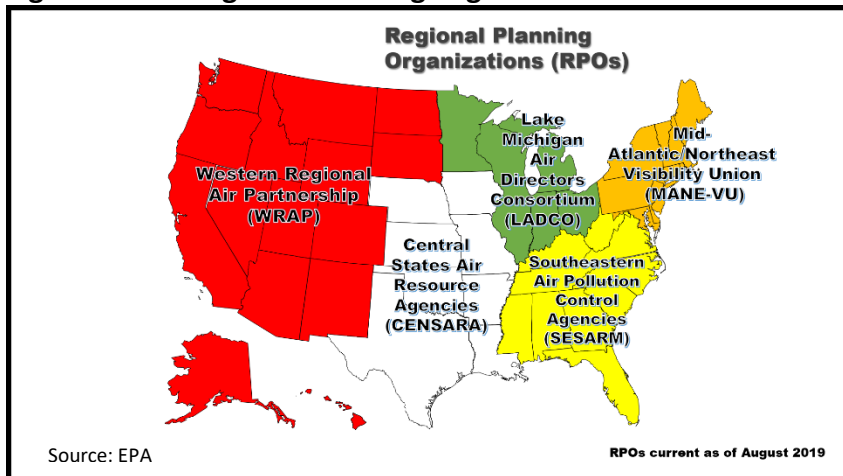


Figure 2: U.S. Regional Planning Organizations



The remainder of this document is organized to follow the structure of the progress report requirements of the RHR, as shown in Table 1 below.

Table 1: Organization of Progress Report

| 40 CFR 51.308 | Report Section | Description |
|--------------------------|---------------------------|---|
| (g)(1) | 1 | Implementation status of measures for achieving Reasonable Progress Goals (RPGs) at Class I areas within and outside the state |
| (g)(2) | 2 | Overview of the emissions reductions achieved with the measures described in Section 2 |
| (g)(3) | 3 | Summary of visibility conditions changes at Class I areas in the state and the MANEVU region |
| (g)(4) | 4 | Change in emissions since the time of the second planning period regional haze SIPs |
| (g)(5) | 5 | Evaluation of any significant changes in emissions since the time of the second planning period regional haze SIPs |
| (g)(6) | 6 | Assessment that Vermont's current plan elements and strategies are sufficient for [state], and states with Class I areas affected by [state]'s emissions, to meet the RPGs that were established in the second planning period regional haze SIPs |
| (g)(7) | Not Applicable | Review of visibility monitoring strategy for the first regional haze planning period |
| (g)(8) | Not Applicable | Assessment of the most recent periodic assessment of Vermont's smoke management program |
| (h) | 7 | Affirmation that Vermont's current plan is adequate to ensure reasonable progress and that no revision to the plan is needed at this time |
| (i) | 8 | A description of the consultation with the Federal Land Manager and the public comment process |

1. STATUS OF IMPLEMENTED MEASURES

51.308(g)(1) requires "A description of the status of implementation of all measures included in the implementation plan for achieving reasonable progress goals for mandatory Class I Federal areas both within and outside the state." In its regional haze SIP for the second planning period, Vermont evaluated each of the MANE-VU "Asks" and determined that Vermont already employs year-round NO_x RACT, has no point sources that impact Class I areas, has fully implemented an ultra-low sulfur fuel oil standard, and has no large Electrical Generating Units. Ask 5 (peaking turbine controls) was achieved by performing a four-factor analysis. Due to low hours of operation, low annual emissions when operated, the expected limited lifespan of the

units, the possible non-air quality environmental effects of waste products from controls, as well as the cost per ton of emissions reduced, Vermont decided that installation of emission controls was not reasonable for the second regional haze planning period.

In addition to meeting the MANE-VU "Asks", Vermont considers its mobile source emission reduction strategies (see Section 5.7 of the SIP) as the most viable way to reduce NO_x emissions in the state, especially those NO_x emissions impacting New Hampshire Class I areas. The effects of these mobile source strategies will start in the second implementation period, with more significant reduction occurring in the third implementation period and beyond.

These measures were adopted into Vermont's long-term strategy (LTS) as permanent and enforceable measures. These measures and their original implementation are described in detail in Section 5.8 of Vermont's regional haze SIP for the second planning period. All these enforceable measures remain fully implemented and there has been no change in implementation status since the time that Vermont's regional haze SIP and associated rulemaking were formally adopted. The current implementation of these measures is described below.

Low sulfur fuel oil standard

Vermont adopted new limitations on sulfur in fuel on September 28, 2011, which took place in two phases. The first phase began in 2014 and then the second phase took effect in 2018. See Section 5.7 of the SIP for more details.

Year-round operation of NO_x controls

Vermont adopted federal NO_x RACT which was submitted to EPA and ultimately approved by EPA on November 26, 2019. Vermont point source emissions of NO_x amounted to 2% of all NO_x emissions in the state before adoption of NO_x RACT. See Section 5.7 of the SIP for further details.

Mobile source controls

Vermont adopted in December 2022 amendments to the Low Emission Vehicle and Zero Emission Vehicle rules, which incorporate by reference the California motor vehicle emission standards regulations. Vermont also adopted the California Advanced Clean Cars II, Advanced Clean Trucks, Low NO_x Heavy-Duty Omnibus and the Phase 2 Greenhouse Gas rules.

2. EMISSIONS REDUCTIONS ACHIEVED

RHR paragraph 51.308(g)(2) requires "A summary of the emissions reductions achieved throughout the state through the implementation of the measures described in paragraph (g)(1) of this section." Therefore, this section of the progress report gives a description of some of the emissions reductions associated with the measures described above in Section 1.

Low sulfur fuel oil standard

Table 2-1 below compares past and recent sulfur dioxide (SO₂) emissions associated with the combustion of fuel oils in Vermont and the MANEVU region. The emissions data are taken from the 2017 and 2020 National Emissions Inventories (NEI) (<https://www.epa.gov/air-emissions-inventories/emissions-inventory-system-eis-gateway>).

The 2017 NEI represents the most recent data that was available at the time that the second planning period regional haze SIPs were being drafted. Many states and jurisdictions had not adopted low sulfur fuel oil standards at the time that the 2017 NEI was compiled. The 2020 NEI is reflective of all MANEVU states and jurisdictions having adopted the low sulfur fuel oil standards as was requested of all MANEVU jurisdictions in the MANEVU Intra-RPO "Ask" (<https://otcair.org/manevu/Upload/Publication/Formal%20Actions/MANE-VU%20Intra-Regional%20Ask%20Final%208-25-2017.pdf>).

Table 2-1: 2017 and 2020 Fuel Oil SO₂ Emissions in Vermont and the MANEVU Region (Tons)

| Sector | Vermont | | | MANEVU Total | | |
|--------------------------|---------------|---------------|---------------|--------------|--------------|--------------|
| | 2017 | 2020 | Reduction | 2017 | 2020 | Reduction |
| Electric Generation | 0 | 0 | 0 | 9395 | 6804 | 2591 |
| Industrial | 28.77 | 17.19 | 11.58 | 3769 | 2142 | 1627 |
| Commercial/Institutional | 105.78 | 75.21 | 30.57 | 3995 | 1847 | 2148 |
| Residential | 259.43 | 8.61 | 250.82 | 9805 | 215 | 9590 |
| Total | 393.98 | 101.01 | 292.97 | 26964 | 11008 | 15956 |

In general, SO₂ emissions from fuel oil combustion in Vermont and in the MANEVU region are lower for 2020 than for 2017. This is likely due in large part to the enforceable MANEVU-wide adoption of the low sulfur fuel standards, but economics, supply availability, and market forces likely also contribute to the differences.

3. VISIBILITY CONDITIONS AND CHANGES

Per RHR paragraph 51.308(g)(3), states with Class I areas must assess the visibility conditions and changes described in items i. through iii. below, expressed in terms of five-year averages of the annual haze index values, in deciviews, for the 20% Most Impaired and Clearest days. The applicable period to assess for current conditions is the most recent five-year period preceding the required date of the progress report for which data are available six months preceding the required date of the progress report. Based on this criterion, the most recent five-year period for this progress report submittal is [2018-2022].

- i. Current visibility conditions
- ii. The difference between current conditions and baseline conditions
- iii. The change in visibility impairment over the period since the period addressed in the most recent plan required under 51.308(f)

To satisfy items i. and ii., current conditions, baseline conditions, and the difference between the two are shown in Tables 3-1 and 3-2 for the 20% Most Impaired and the 20% Clearest days respectively. For item iii., Tables 3-3 and 3-4 repeat the current conditions and present the conditions that were most recent at the time that the second planning period regional haze SIPs were drafted (these are labeled as "Most Recent Plan"). All the haze indexes presented below are based on data that was measured and analyzed as part of the Interagency Monitoring of Protected Visual Environments (IMPROVE) program (<http://vista.cira.colostate.edu/IMPROVE/Default.htm>). The data was accessed via the Federal Land Manager Environmental Database (FED, <http://views.cira.colostate.edu/fed/>).

Table 3-1: Baseline and Current Conditions for MANEVU Class I Areas, 20% Most Impaired Days (in deciviews)

| Class I Area | State/Province | Baseline 2000-2004 | Current 2018-2022 | Reduction |
|---|----------------|--------------------|-------------------|-----------|
| Acadia National Park | ME | 22.01 | 13.84 | 8.17 |
| Moosehorn Wilderness Area | ME | 20.65 | 12.86 | 7.79 |
| Roosevelt Campobello Int'l Park | NB | | | |
| Great Gulf Wilderness Area | NH | 21.88 | 11.82 | 10.06 |
| Presidential Range - Dry River Wild. Area | NH | | | |
| Brigantine Wilderness Area | NJ | 27.43 | 16.91 | 10.52 |
| Lye Brook Wilderness Area | VT | 23.57 | 13.34 | 10.23 |

Table 3-2: Baseline and Current Conditions for MANEVU Class I Areas, 20% Clearest Days (in deciviews)

| Class I Area | State/Province | Baseline 2000-2004 | Current 2018-2022 | Reduction |
|---|----------------|--------------------|-------------------|-----------|
| Acadia National Park | ME | 8.78 | 6.20 | 2.58 |
| Moosehorn Wilderness Area | ME | 9.16 | 6.10 | 3.06 |
| Roosevelt Campobello Int'l Park | NB | | | |
| Great Gulf Wilderness Area | NH | 7.65 | 4.53 | 3.12 |
| Presidential Range - Dry River Wild. Area | NH | | | |
| Brigantine Wilderness Area | NJ | 14.33 | 9.97 | 4.36 |
| Lye Brook Wilderness Area | VT | 6.37 | 4.41 | 1.96 |

Table 3-3: Most Recent Plan and Current Conditions for MANEVU Class I Areas, 20% Most Impaired Days (in deciviews)

| Class I Area | State/Province | Most Recent Plan 2015-2019 | Current 2018-2022 | Reduction |
|---|----------------|----------------------------|-------------------|-----------|
| Acadia National Park | ME | 14.24 | 13.84 | 0.40 |
| Moosehorn Wilderness Area | ME | 12.99 | 12.86 | 0.13 |
| Roosevelt Campobello Int'l Park | NB | | | |
| Great Gulf Wilderness Area | NH | 12.33 | 11.82 | 0.51 |
| Presidential Range - Dry River Wild. Area | NH | | | |
| Brigantine Wilderness Area | NJ | 18.53 | 16.91 | 1.62 |
| Lye Brook Wilderness Area | VT | 14.06 | 13.34 | 0.72 |

Table 3-4: Most Recent Plan and Current Conditions for MANEVU Class I Areas, 20% Clearest Days (in deciviews)

| Class I Area | State/Province | Most Recent Plan 2015-2019 | Current 2018-2022 | Reduction |
|---|----------------|----------------------------|-------------------|-----------|
| Acadia National Park | ME | 6.36 | 6.20 | 0.16 |
| Moosehorn Wilderness Area | ME | 6.48 | 6.10 | 0.38 |
| Roosevelt Campobello Int'l Park | NB | | | |
| Great Gulf Wilderness Area | NH | 4.69 | 4.53 | 0.16 |
| Presidential Range - Dry River Wild. Area | NH | | | |
| Brigantine Wilderness Area | NJ | 10.81 | 9.97 | 0.84 |
| Lye Brook Wilderness Area | VT | 4.88 | 4.41 | 0.47 |

Lastly, Tables 3-5 and 3-6 reprint the current conditions and compare them with the modeled 2028 reasonable progress goals. Table 3-5 presents those for the 20% Most Impaired days and Table 3-6 addresses the 20% Clearest days.

Table 3-5: Modeled 2028 RPGs and Current Conditions for MANEVU Class I Areas, 20% Most Impaired Days (in deciviews)

| Class I Area | State/Province | RPG 2028 | Current 2018-2022 | Reduction |
|---|----------------|----------|-------------------|-----------|
| Acadia National Park | ME | 13.35 | 13.84 | -0.49 |
| Moosehorn Wilderness Area | ME | 13.12 | 12.86 | 0.26 |
| Roosevelt Campobello Int'l Park | NB | | | |
| Great Gulf Wilderness Area | NH | 12.00 | 11.82 | 0.18 |
| Presidential Range - Dry River Wild. Area | NH | | | |
| Brigantine Wilderness Area | NJ | 17.97 | 16.91 | 1.06 |
| Lye Brook Wilderness Area | VT | 13.68 | 13.34 | 0.34 |

Note:

Difference = Current minus RPG; therefore, negative differences indicate that current conditions are greater (i.e., worse) than the 2028 RPGs.

Table 3-6: Modeled 2028 RPGs and Current Conditions for MANEVU Class I Areas, 20% Clearest Days (in deciviews)

| Class I Area | State/Province | RPG 2028 | Current 2018-2022 | Difference |
|---|----------------|----------|-------------------|------------|
| Acadia National Park | ME | 6.33 | 6.20 | 0.13 |
| Moosehorn Wilderness Area | ME | 6.45 | 6.10 | 0.35 |
| Roosevelt Campobello Int'l Park | NB | | | |
| Great Gulf Wilderness Area | NH | 5.06 | 4.53 | 0.53 |
| Presidential Range - Dry River Wild. Area | NH | | | |
| Brigantine Wilderness Area | NJ | 10.47 | 9.97 | 0.5 |
| Lye Brook Wilderness Area | VT | 3.86 | 4.41 | -0.55 |

Note:

Difference = Current minus RPG; therefore, negative differences indicate that current conditions are greater (i.e., worse) than the 2028 RPGs.

For Vermont’s Class I area, Tables 3-1 and 3-2 show that current five-year haze indexes are lower than those from the time of baseline, meaning that visibility at Lye Brook has improved since the time of baseline for both the 20% Most Impaired and the 20% Clearest days. Similarly, Tables 3-3 and 3-4 show that current five-year haze indexes at Lye Brook are lower than those that were current at the time of the second planning period regional haze SIPs, meaning that there have been similar improvements in visibility since the time of the second planning period regional haze SIPs. In addition, Tables 3-1 and 3-2 show that current five-year haze indexes for all MANEVU Class I areas are lower than those from the time of baseline, meaning that visibility has improved since the time of baseline for both the 20% Most Impaired and the 20% Clearest days. Tables 3-3 and 3-4 show that current five-year haze indexes at all MANEVU Class I areas are lower than those that were current at the time of the second planning period regional haze SIPs, meaning that there have been similar improvements in visibility since the time of the second planning period regional haze SIPs. Finally, Tables 3-5 and 3-6 show that current five-year haze indexes are below the modeled 2028 RPGs at all MANEVU Class I areas, except for Lye Brook for the 20% clearest days (it should be noted that 2022 IMPROVE data for Lye Brook was not collected for a good portion of the year due to nearby construction at Mount Snow, impacting electricity).

In addition to the visibility improvements at MANEVU Class I areas, visibility has improved at the following Class I areas that are considered nearby to MANEVU:

- Dolly Sods and Otter Creek in WV
- James River Face and Shenandoah National Park in VA

Visibility metrics for these Class I areas, the MANEVU Class I areas, and the MANEVU and Nearby IMPROVE Protocol sites are shown in the MANEVU Technical Support Committee's 2023 Visibility Data Report which is provided as Attachment A.

4. CHANGE IN EMISSIONS

RHR paragraph 51.308(g)(4) requires an analysis tracking the change in emissions of pollutants contributing to visibility impairment from all sources in the state. The emissions changes should be identified by source type or activity. The emissions analysis should cover the time frame since the previous regional haze SIP planning period. Paragraph 51.308(g)(4) has two distinct requirements that revolve around two separate sets of emissions inventory data as described below:

- i. Emissions from all sources and activities: The primary source of this data is the National Emissions Inventory (NEI), which is compiled and released on a triennial basis by the EPA. The NEI is made up of emissions estimates submitted by state, local, and tribal air agencies supplemented with EPA's own estimates. For the 51.308(g)(4) requirement, the analysis must extend at least through the most recent NEI year for which data is available six months prior to the required date of the progress report. Information and data for the NEI can be found at <https://www.epa.gov/air-emissions-inventories/national-emissions-inventory-nei>.
- ii. Emissions from sources that report to a centralized EPA database: There are many individual emissions sources that are required to report their emissions directly to EPA because of their participation in an air quality program such as Cross-State Air Pollution Rule, the Acid Rain Program, and the Regional Greenhouse Gas Initiative, to name a few. Most of the sources that report in this manner are large stationary sources such as electric generating units (EGUs) and large industrial facilities. These data are readily obtainable through EPA's Air Markets Program Database (AMPD) at <https://ampd.epa.gov/ampd/>. For purposes of 51.308(g)(4), the analysis must extend through the most recent year available six months prior to the required date of the progress report.

The subsections below detail the change in emissions since the time of the second planning period regional haze SIPs for all emissions sources and AMPD emissions sources respectively. The following visibility impairing pollutants are covered in the summaries:

- Ammonia (NH₃)
- Nitrogen Oxides (NO_x)
- Particulate Matter < 10 microns (PM₁₀)
- Particulate Matter < 2.5 microns (PM_{2.5})
- Sulfur Dioxide (SO₂)
- Volatile Organic Compounds (VOC)

All Emissions Sources and Activities

As described above, the source of this data is EPA's NEI. The most recent NEI available six months prior to the due date of the second planning period progress reports (i.e., this

submittal) is the 2020 NEI. The figures below compare emissions estimates from the 2020 NEI with those from the 2017 NEI, which was the most recently available NEI at the time of the second planning period regional haze SIPs. To provide a broader trend, emissions estimates from prior NEIs are also shown. Emissions estimates are provided for Vermont as well as the other MANEVU states. The state-specific charts are broken down into the following emissions source categories:

- Point sources represent large sources of emissions located at a discrete geographic point. Examples include power plants, factories, industries, and large institutional facilities. Point sources typically hold a federal/state/tribal/local air permit and report their emissions to the state/tribal/local air agency and/or EPA directly. For NO_x and SO₂, the state-specific charts further divide point sources into those that report to AMPD and those that do not.
- Nonpoint sources (also called area sources) are those that are too widespread or numerous to be accounted for individually. There are many nonpoint subcategories, but a handful of examples include residential fuel combustion, consumer solvent use, commercial cooking, and agricultural tilling.
- Nonroad sources are equipment and vehicles that do not primarily travel on roadways. Examples include construction equipment, recreational vehicles, and lawn & garden equipment.
- Onroad sources are vehicles that primarily travel on roadways such as cars, trucks, buses, and motorcycles.

Ammonia

Ammonia emissions for Vermont and the MANEVU region are shown in Figures 4-1 and 4-2 below.

Figure 4-1: 2008 to 2020 Ammonia Emissions for Vermont (Tons)

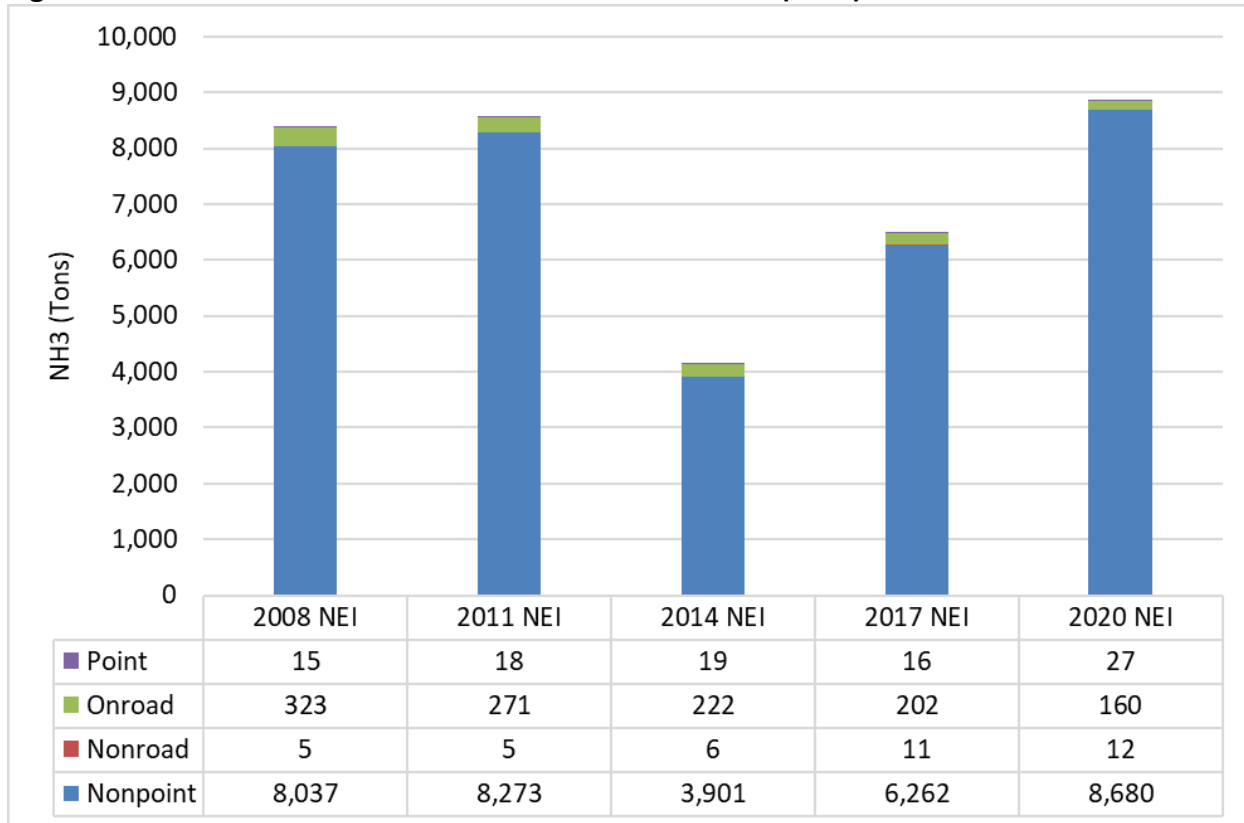
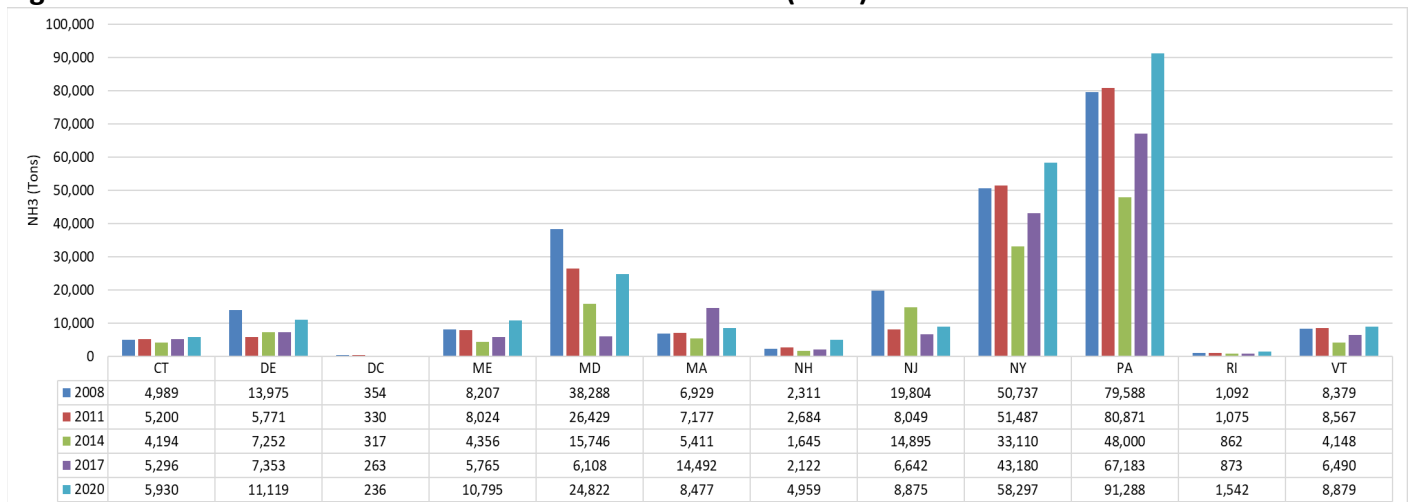


Figure 4-2: 2008 to 2020 Ammonia Emissions for MANEVU (Tons)



Ammonia emissions in Vermont are dominated by the nonpoint source category. Ammonia emissions have generally been steady, although there is some year-to-year variability. Some of this variability is due to change in emissions estimation methodologies for categories such as agricultural fertilizer application and animal feeding operations. Similar to Vermont, Figure 4-2 shows that ammonia emissions in other MANEUVU states do not have consistent trends with year-to-year variability. Due to the methodology changes no definite conclusions on emission trends can be determined at this time.

Nitrogen Oxides

Figures 4-3 and 4-4 below show NOx emissions in Vermont and the MANEUVU region respectively. Note that Figure 4-3 breaks point sources further down into AMPD and non-AMPD sources.

Figure 4-3: 2008 to 2020 NOx Emissions for Vermont (Tons)

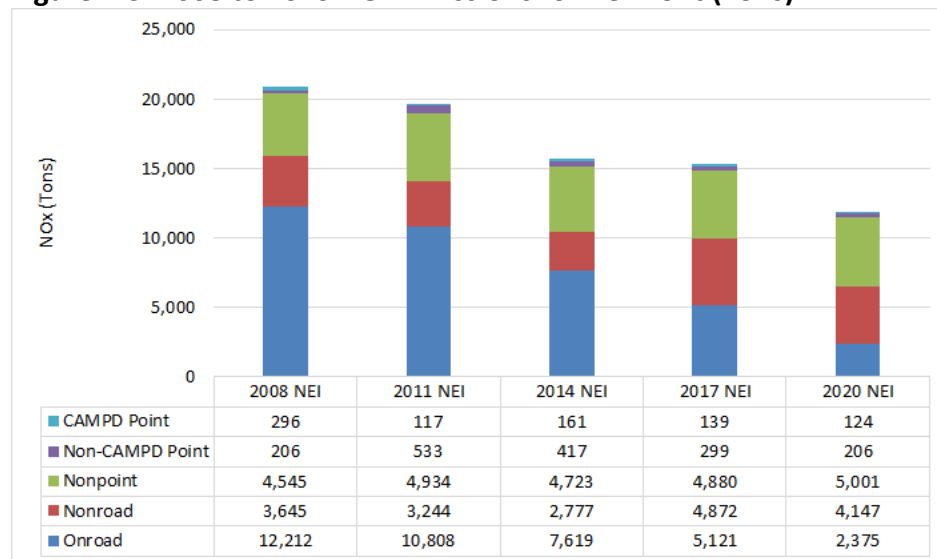
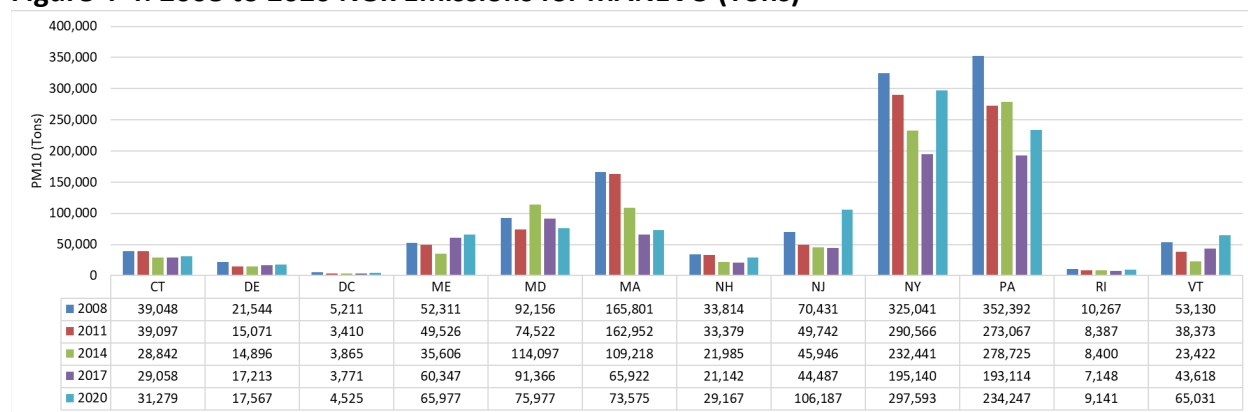


Figure 4-4: 2008 to 2020 NOx Emissions for MANEUVU (Tons)



NOx emissions in Vermont are primarily dominated by the non-point and non-road mobile categories. There has been a steep decline in onroad mobile NOx emissions due to Federal

control programs for diesel and gasoline vehicles. Onroad emissions decline as older, more polluting vehicles are retired and newer, cleaner vehicles are phased into the fleet. Some of the year-to-year variability in the NOx emission trends are due to updated models and methodologies for estimating nonpoint and onroad emissions.

Particulate Matter <10 Microns

PM10 emissions for Vermont and for the MANEVU region are shown in Figures 4-5 and 4-6 respectively.

Figure 4-5: 2008 to 2020 PM10 Emissions for Vermont (Tons)

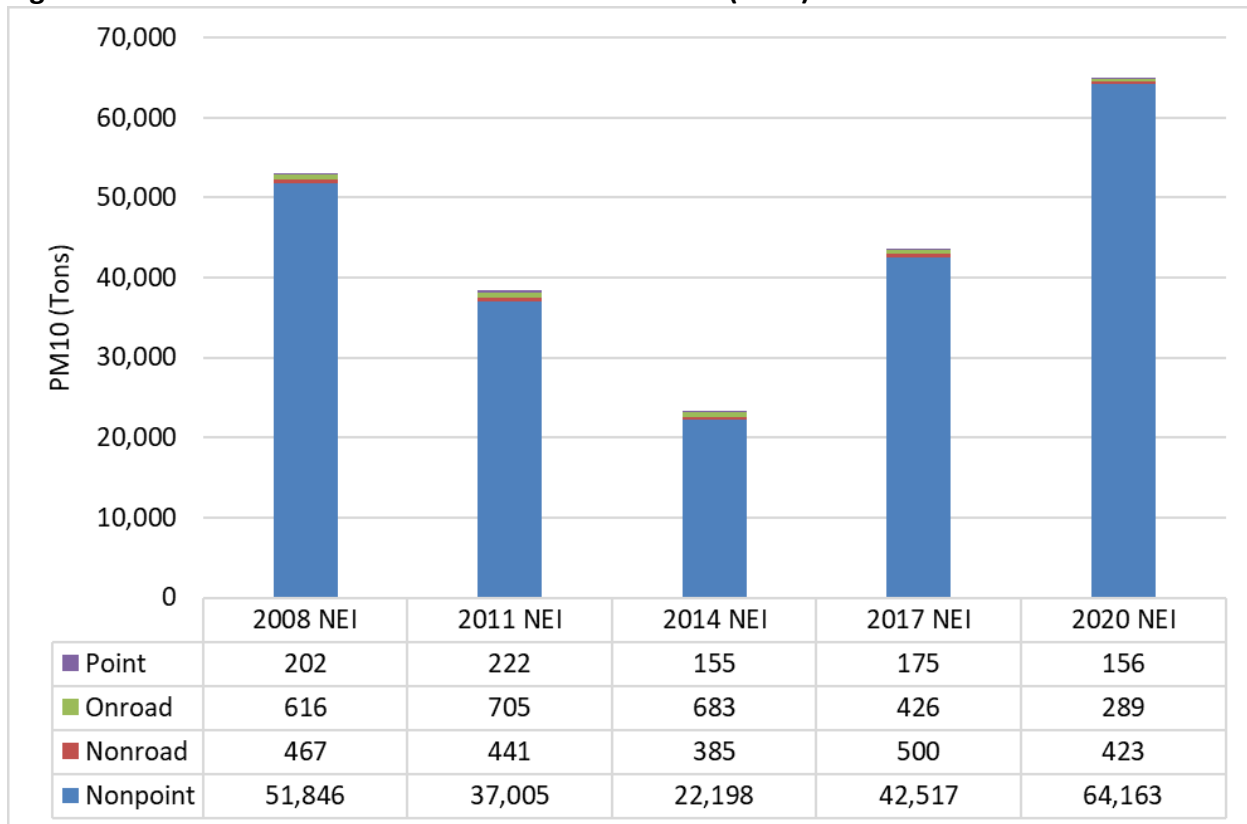
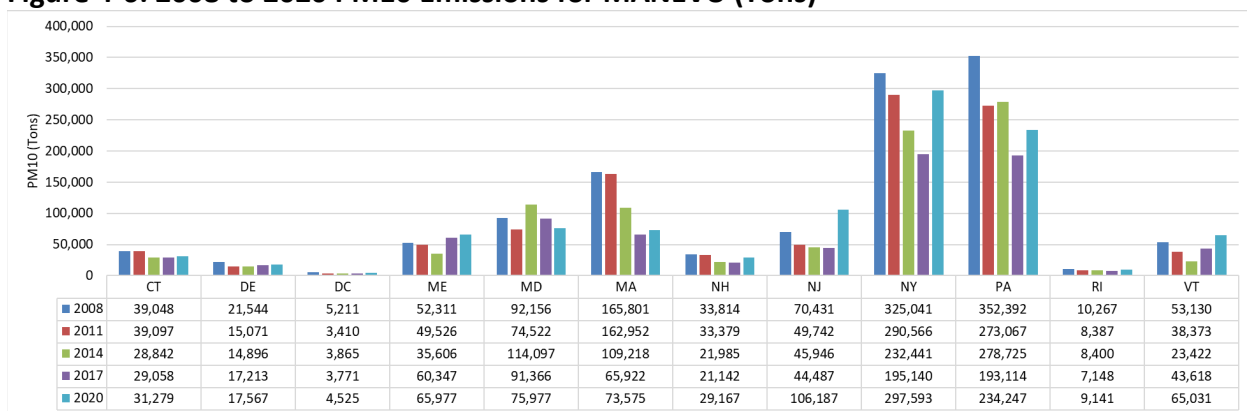


Figure 4-6: 2008 to 2020 PM10 Emissions for MANEVU (Tons)



PM10 emissions in Vermont are largely dominated by the nonpoint category. Specific nonpoint contributors to PM10 emissions include residential fuel combustion, especially wood; paved and unpaved road dust; agricultural tilling; and construction dust. Figure 4-6 shows that PM10 emissions have trended downward or remained steady in many MANEVU states. Some of this improvement is due to the particulate matter co-benefits of Vermont's and other MANEVU states' implementation of the low sulfur fuel rules described in Sections 1 and 2. However, methodology changes to the 2020 NEI resulted in increases in unpaved road dust and residential wood combustion, which Figure 4.5 reflects. Consequently, no definite conclusions on emissions trends can be determined at this time.

Particulate Matter <2.5 Microns

Figures 4-7 and 4-8 show PM2.5 emissions for Vermont and for MANE-VU respectively.

Figure 4-7: 2008 to 2020 PM2.5 Emissions for Vermont (Tons)

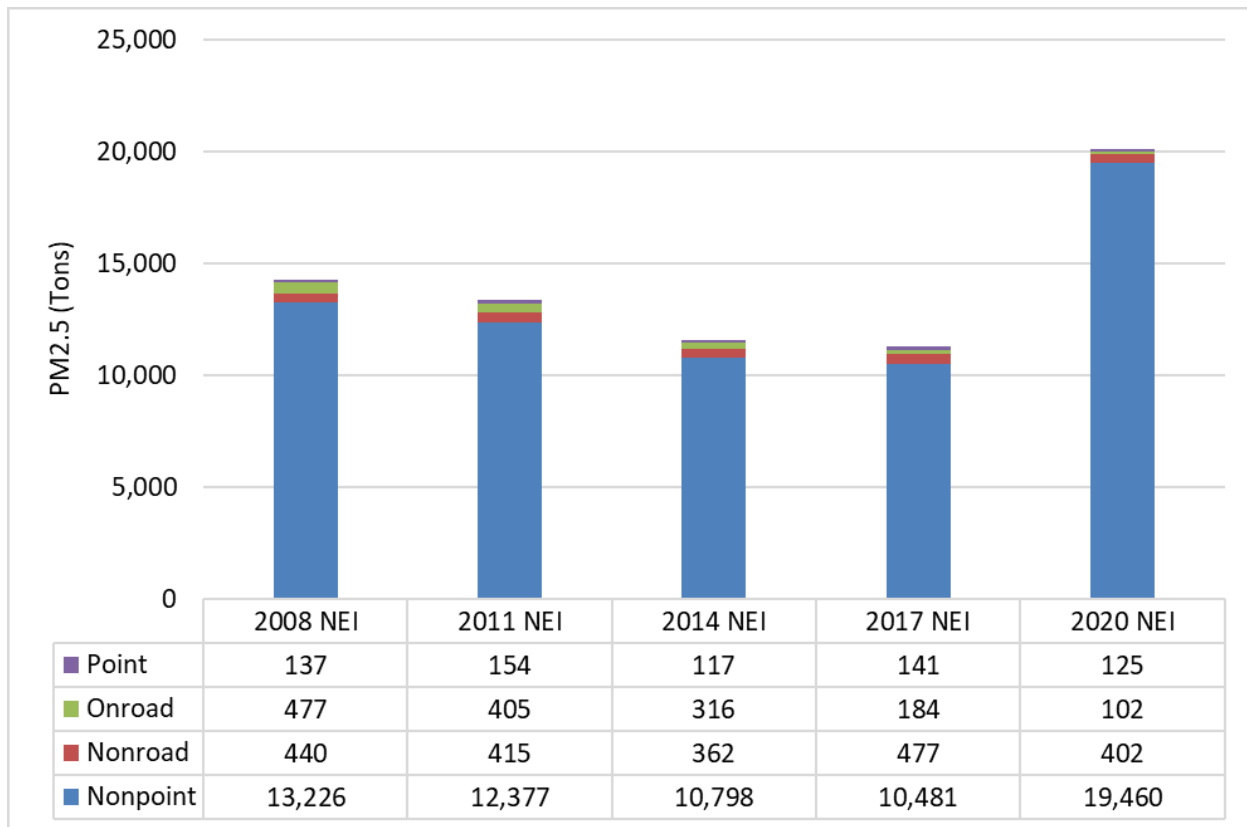
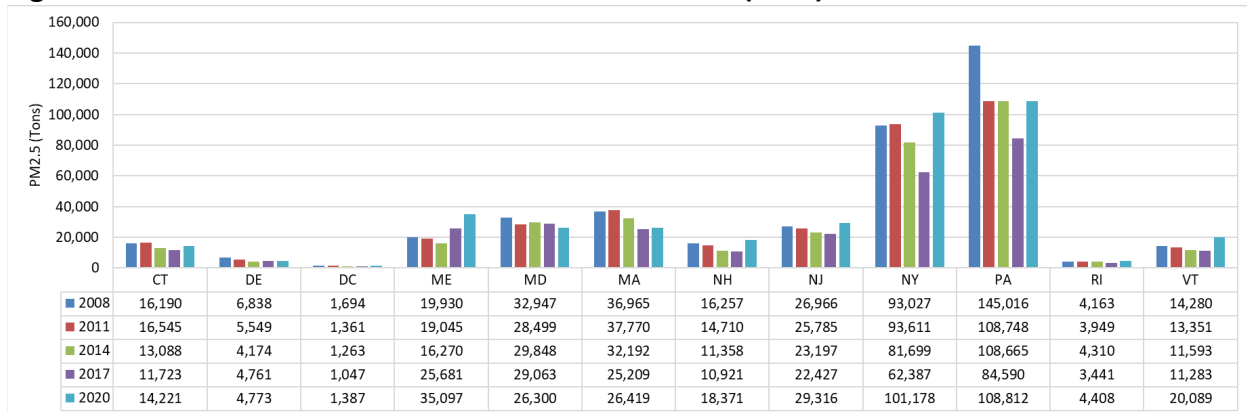


Figure 4-8: 2008 to 2020 PM2.5 Emissions for MANEVU (Tons)



The emissions patterns and trends for PM2.5 are largely similar to those described above for PM10. As with PM10, PM2.5 emissions are dominated by the nonpoint category. In general, PM2.5 emissions have remained steady for Vermont and also remained steady for other states in MANEVU. As with other pollutants, some of the variability is also due to changes in emissions estimation tools and methodologies. Increased emissions in the 2020 NEI reflect these methodology changes and no definite conclusions on emissions trends can be determined at this time.

Sulfur Dioxide

SO₂ emissions for Vermont and for MANEVU are shown in Figures 4-9 and 4-10. Similar to NO_x, point source SO₂ emissions are further broken down in Figure 4-9 into the AMPD and non-AMPD categories.

Figure 4-9: 2008 to 2020 SO₂ Emissions for Vermont (Tons)

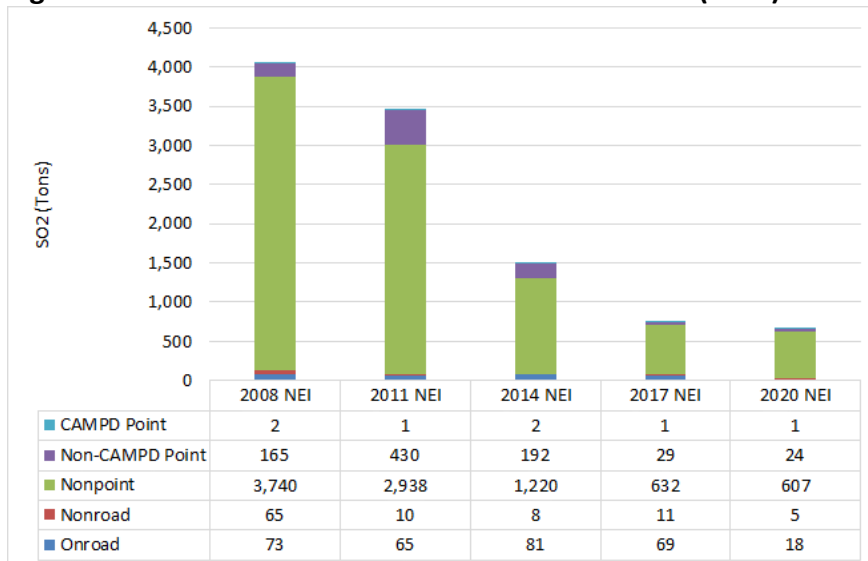
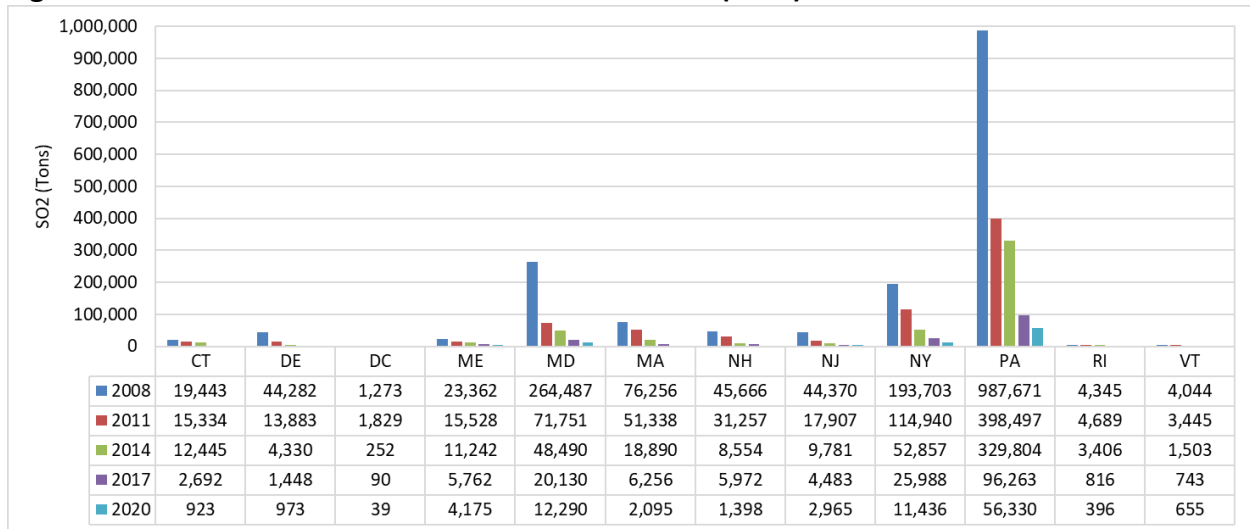


Figure 4-10: 2008 to 2020 SO₂ Emissions for MANEVU (Tons)



As shown in Figure 4-9, SO₂ emissions in Vermont have been historically dominated by the non-point source category. In general, nonroad and on-road sources are not major contributors to SO₂ emissions. The dramatic decrease in point source SO₂ emissions in Vermont is due to the requirements to use ultra-low sulfur fuel. It should also be noted that market forces and increased use of lower cost natural gas have also contributed to the decline in other states. As shown in Figure 4-10, all the MANEVU states have seen similar steep declines in SO₂ emissions.

Volatile Organic Compounds

Figures 4-11 and 4-12 show VOC emissions for Vermont and MANEVU respectively.

Figure 4-11: 2008 to 2020 VOC Emissions for Vermont (Tons)

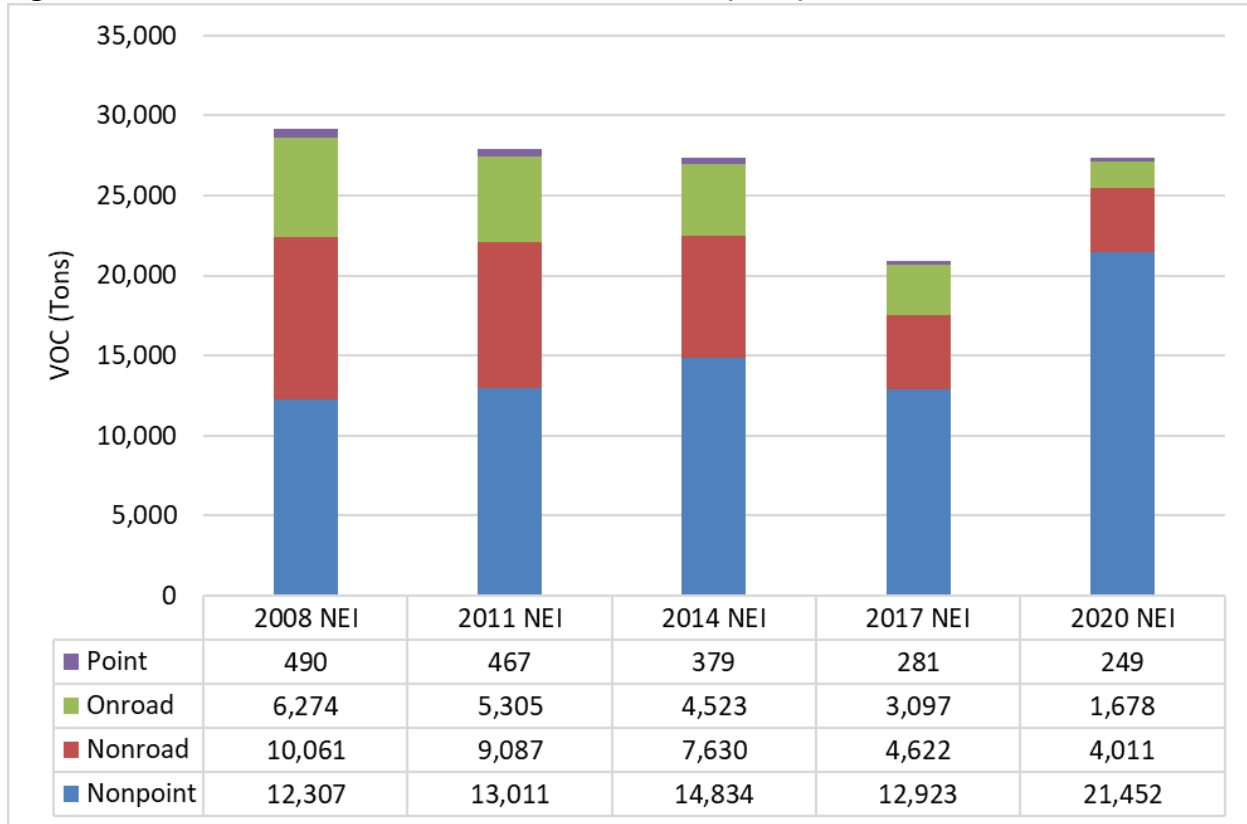
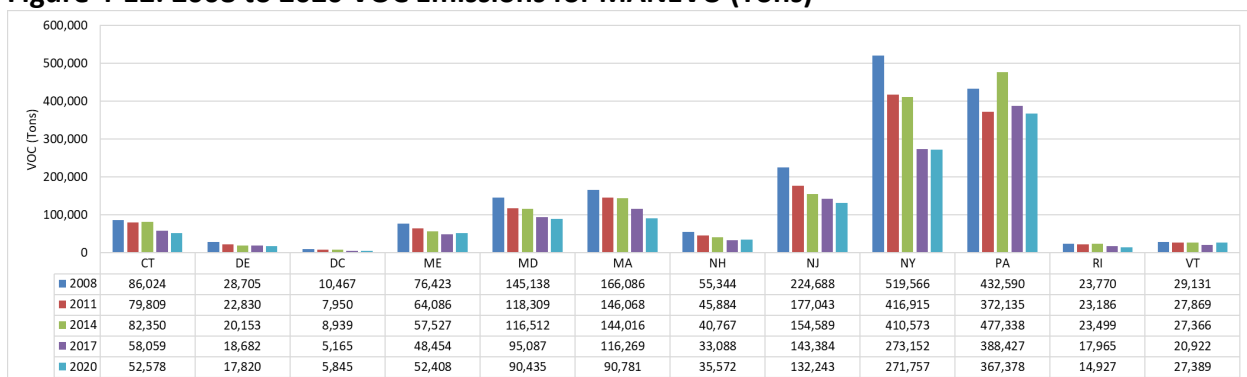


Figure 4-12: 2008 to 2020 VOC Emissions for MANEVU (Tons)



VOC emissions in Vermont are due to the nonpoint category, with nonroad and onroad categories also contributing. Point sources are generally not a major contributor to VOC emissions in MANEVU, and definitely not in Vermont. Figure 4-11 shows that there has been a steady state in Vermont VOC emissions between 2008 and 2020. Figure 4-12 shows that VOC emissions have modestly declined in most MANEVU states over the 2008 to 2020 period, with

some year-to-year variability. As with other pollutants, some of the variability is likely due to changes in emissions estimation methodologies.

Emissions from Sources that Report to a Centralized EPA Database

Figures 4-13 and 4-14 show NO_x and SO₂ emissions, respectively, in Vermont and the other MANEVU states for those sources that report to EPA's AMPD. As described earlier, sources that report to AMPD are those facilities that participate in an EPA air program and generally include EGUs and very large industrial facilities.

Figure 4-13: NO_x Emissions for AMPD Sources in Vermont and MANEVU (Tons)

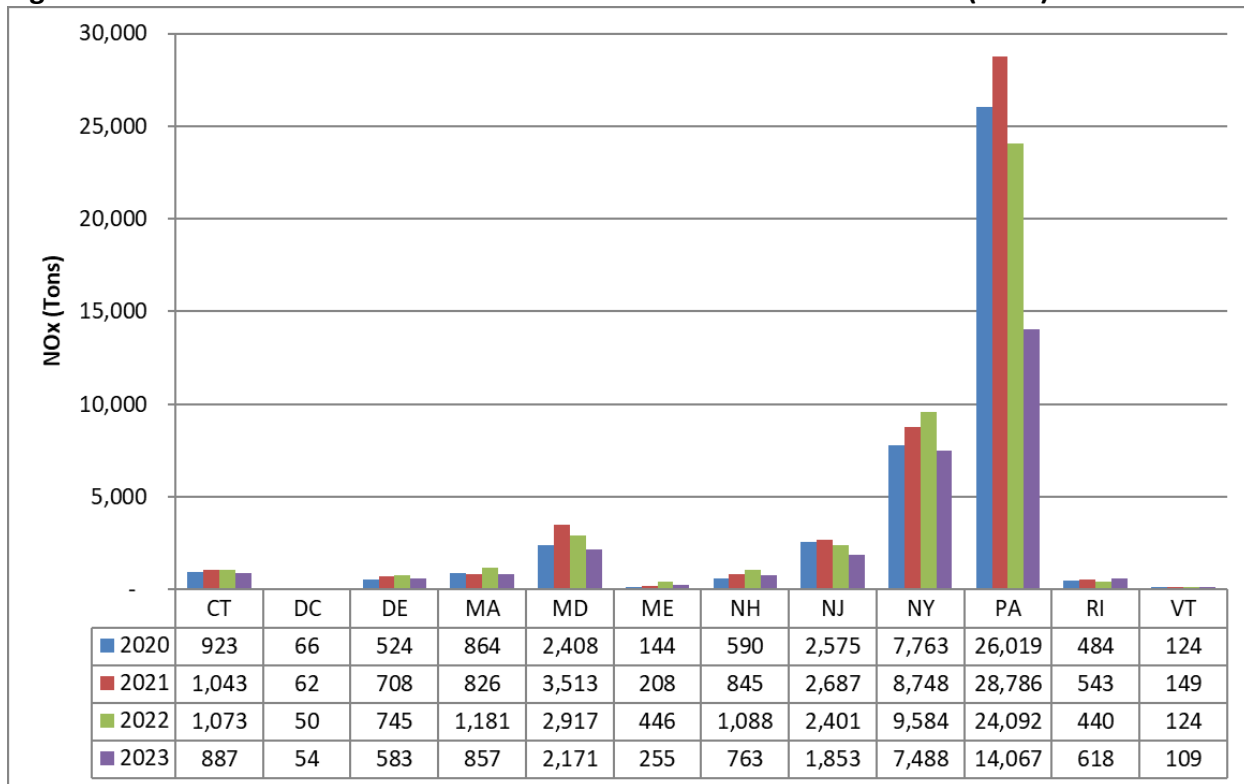
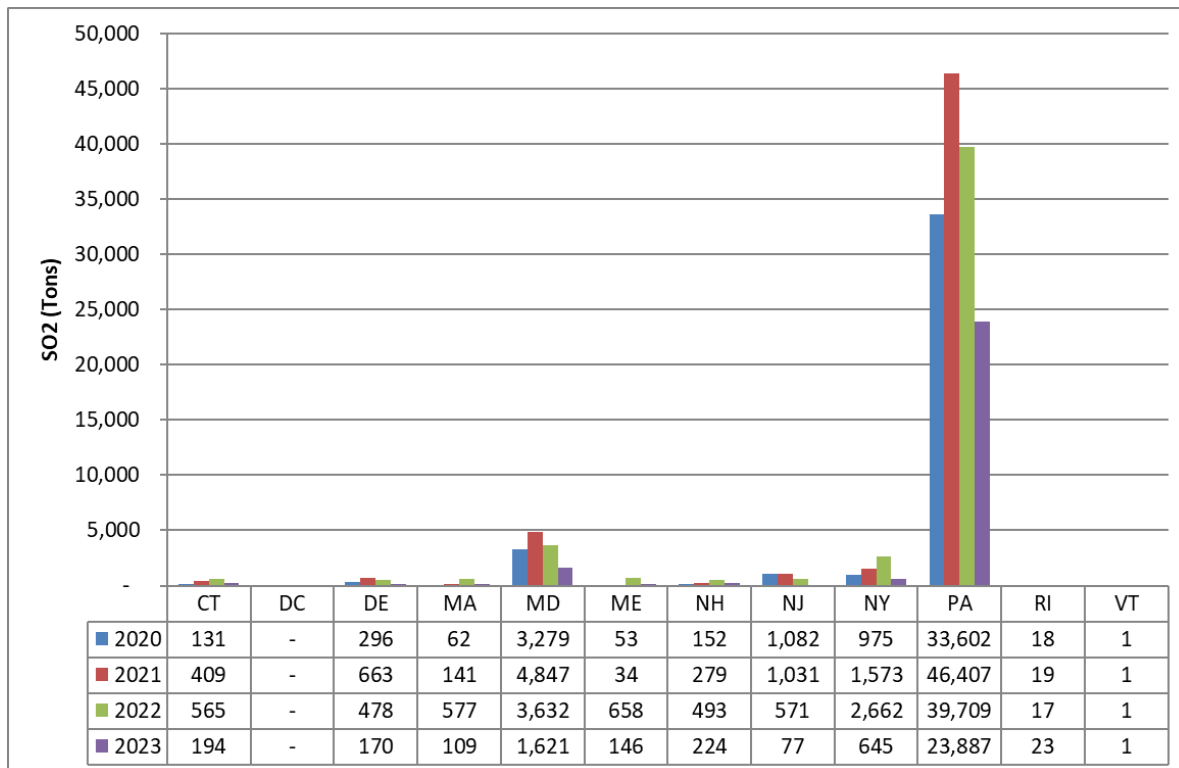


Figure 4-14: SO₂ Emissions for AMPD Sources in Vermont and MANEVU (Tons)

Figure 4-14: SO₂ Emissions for CAMPD Sources in Vermont and MANEVU



Figures 4-13 and 4-14 show Vermont emissions of NO_x and SO₂. Some of the declines in other states are due to market forces and the shift from coal to low-cost natural gas. Declines in NO_x and SO₂ emissions are evident for most other MANEVU states, with some year-to-year variability. Most of the declines in MANEVU are due to the enforceable measures that MANEVU states have adopted as part of their long-term strategies for making reasonable progress as well as the measures that states have adopted to maintain the ozone and SO₂ NAAQS.

5. ASSESSMENT OF SIGNIFICANT CHANGES IN EMISSIONS

RHR Paragraph 51.308(g)(5) requires an assessment of any significant changes in anthropogenic emissions within or outside the state since the period addressed in the most recent plan (in this case, the regional haze SIPs for the second planning period), including whether those changes were anticipated in the most recent plan and whether they have limited or impeded in reducing pollutant emissions and improving visibility.

An examination of Figures 4-1 through 4-14 in the section above show that emissions for the most significant visibility impairing pollutants have declined for almost every pollutant and for almost every state in MANEVU. Examination of the figures also shows that, although there is some year-to-year variability, there are no emissions increases in Vermont or in MANEVU that are unexpected or large enough that they would limit or impede visibility improvement. As

described in the pollutant-specific sections above, it is difficult to draw firm conclusions about ammonia, PM10 and PM2.5 emissions trends because of changes in estimation methodologies.

6. ASSESSMENT OF CURRENT IMPLEMENTATION PLAN ELEMENTS AND STRATEGIES

RHR paragraph 51.308(g)(6) requires an assessment of whether current plan elements and strategies are sufficient to enable the state, or states with Class I areas affected by emissions from the state, to meet all established RPGs for the period covered by the most recent plan. Vermont affirms that the elements and strategies in its regional haze SIP for the second planning period are sufficient to meet the criteria of 51.308(g)(6). Vermont makes this affirmation based on the following assessment of the information and data presented in this progress report:

- There has been no change in the implementation of the measures deemed necessary in Vermont's second planning period regional haze SIP for making reasonable progress at Lye Brook Wilderness Area or Class I areas in other states that may be affected by Vermont's emissions. Please see Section 1 above. In addition, there have been verifiable emissions reductions from these measures since the time of the second planning period regional haze SIP; please see Section 2.
- Current haze indexes for all the MANEVU Class I areas are generally lower than those for the time of the second planning period regional haze SIPs (ending in 2028), and significantly lower than baseline, for the 20% Most Impaired and 20% Clearest days. Please see Section 3. These trends are indicative that all MANEVU Class I areas are on track to meeting the RPGs established in the second planning period regional haze SIPs.
- Except for particulates and ammonia, emissions of visibility impairing pollutants have trended downward for Vermont and for other states in MANEVU. Because of estimation methodology changes, it is difficult to draw conclusions about ammonia and particulate emission trends. Please see Section 4.

7. DETERMINATION OF ADEQUACY OF THE EXISTING PLAN

RHR Paragraph 51.308(h) requires the state to take one of the following actions:

- The state may declare that no further revision of the existing plan is needed at this time. This is commonly referred to as a "negative declaration".
- If the plan is or may be inadequate to ensure reasonable progress due to emissions from another state, or states, which participated in a regional planning process, the state must notify EPA and the applicable state(s). The state must collaborate with the state(s) through the regional planning process to develop additional strategies for addressing the plan's deficiencies.

- If the plan is or may be inadequate to ensure reasonable progress due to emissions from another country, the state must notify the EPA and provide any available relevant information.
- If the plan is or may be inadequate to ensure reasonable progress due to emissions from within the state, then that state must revise its plan within one year to address the deficiencies.

Based on the information and data presented in this progress report, Vermont declares that no further revision of the existing plan is needed at this time.

8. FLM COORDINATION AND PUBLIC COMMENT

Per RHR paragraph 51.308(i), opportunity for FLM consultation on a progress report must be provided no less than 60 days prior to the public hearing or public comment opportunity on the progress report. The consultation must include the opportunity for the FLM to discuss their:

- Assessment of visibility impairment in the Class I area
- Recommendations on the development and implementation of strategies to address visibility impairment

As required for this periodic progress report, Vermont published a notice on [date] inviting public review and comment. This notice is provided as Attachment B. A summary of the comments received, and Vermont's responses is provided in Attachment C. Prior to the public comment period, Vermont consulted with the following Federal Land Managers: US Fish & Wildlife, the US Forest Service, and the National Park Service. Table 8-1 below provides a summary of the specific consultation activities that were held. Specific notes and minutes from the consultation activities shown in Table 8-1 are provided in Attachment D.

Table 8-1: Summary of Vermont's Consultation with the FLM

| Date | Summary of Activity |
|-----------|---|
| 11/7/2024 | Vermont shares draft Progress Report with FLMs, initiating 60 day review. |
| 1/7/2025 | No comments received by FLMs |
| 1/10/2025 | Vermont publishes notice inviting public comment on progress report. |
| 2/14/2025 | Vermont public notice ends. |
| XX/XX/XX | |

9. SUMMARY AND CONCLUSIONS

Vermont declares that no further revision of its second planning period regional haze SIP is required. The status of implemented measures, as described in Section 1, are such that Vermont's Class I area and Class I areas affected by Vermont's emissions will continue to make reasonable progress towards the ultimate RHR goal of natural visibility conditions by 2064. This

is evidenced by the improvements in visibility described in Section 3 and Attachment A and further evidenced by the emissions reductions outlined in Sections 4 and 5. Vermont assessed its current plan elements and strategies (Section 6), consulted with the FLMs, and made this progress report available for public review and comment (Section 8 and Attachments B through D). Based on this information, and the data provided throughout this document and its attachments, Vermont affirms that this progress report satisfies the requirements of the RHR, paragraphs 51.308(g), (h), and (i).