Mid-Atlantic/Northeast Visibility Union

MANE-VU

2006 **Interim Report**

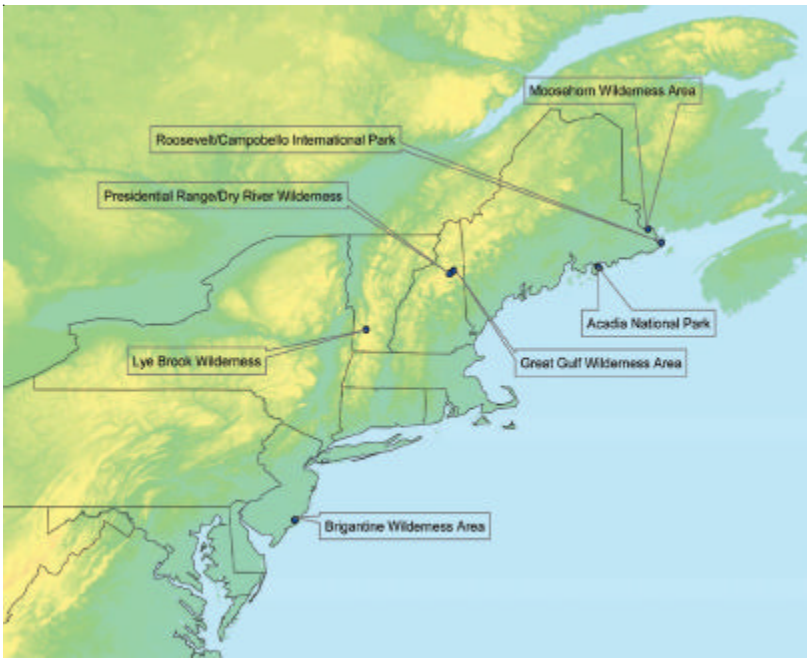
May 2006

About MANE-VU

The Mid-Atlantic/ Northeast Visibility union (MANE-VU) was formed by the Mid-Atlantic and Northeastern states, tribes, and federal agencies to coordinate regional haze planning activities for the region. MANE-VU was formed to encourage a coordinated approach to meeting the requirements of EPA's regional haze rules and reducing visibility impairment in major national parks and wilderness areas in the Northeast and Mid-Atlantic.

MANE-VU provides technical assessments and assistance to its members, evaluates linkages to other regional air pollution issues, provides a forum for discussion, and encourages coordinated actions. MANE-VU also facilitates coordination with other regions.

MANE-VU is governed by a Board of state and tribal Commissioners/Secretaries and air program directors. It has two committees composed of agency personnel: a Technical Support Committee to assess the nature of regional haze, identify the sources that contribute to regional haze, and help states develop coordinated programs, and a Communications Committee to develop outreach messages and approaches.



Class I Areas in the MANE-VU Region

Members

Connecticut
Regina McCarthy, Commissioner
Department of Environmental Protection
Anne Gobin, Bureau Chief
Bureau of Air Management

Delaware
John Hughes, Secretary
Delaware Department of Natural Resources
and Environmental Control
Ali Mirzakhalili, Program Administrator
Division of Air & Waste Management

District of Columbia
Marie Sansome, Senior Deputy Director
Environmental Health Administration
Donald Wambsgans, Director
Air Quality Division

Maine
David P. Littell, Commissioner
Maine Department of Environmental Protection
James Brooks, Director
Bureau of Air Quality Control

Maryland
Kendl Philbrick, Secretary
Maryland Department of the Environment
George S. Aburn Jr., Director
Air & Radiation Management Administration

Massachusetts
Robert W. Golledge Jr., Commissioner
Massachusetts Department of Environmental Protection
Barbara A. Kwetz, Director
Division of Air Quality Control

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Michael Nolin, Commissioner
New Hampshire Department of Environmental Services
Robert R. Scott, Director
Air Resources Division

New Jersey
Lisa P. Jackson, Commissioner
New Jersey Department of Environmental Protection
Chris Salmi, Assistant Director
Division of Air Quality

New York
Denise Sheehan, Commissioner
New York State Department of Environmental Conservation
David Shaw, Assistant Director
Division of Air Resources

Pennsylvania
Kathleen A. McGinty, Secretary
Pennsylvania Department of Environmental Protection
Joyce E. Epps, Director
Bureau of Air Quality

Penobscot Indian Nation
John Banks, Director
Department of Natural Resources
Bill Thompson, Air Quality Program Manager

Rhode Island
W. Michael Sullivan, Director
Rhode Island Department of Environmental Management
Stephen Majkut, Chief
Office of Air Resources

St. Regis Mohawk Tribe
Kenneth Jock, Director
St. Regis Mohawk Tribe, Environment Division
Angela Benedict-Dunn, Air Quality Program Manager

Vermont
Jeffrey Wennberg, Commissioner
Vermont Dept. of Environmental Conservation
Richard A. Valentinetti, Director
Air Pollution Control Division

US Environmental Protection Agency
Marcia Spink, Associate Director
Office of Air Programs, Region III

National Park Service
Christine Shaver, Chief
Air Resources Division

US Fish and Wildlife Service
Sandra V. Silva, Branch Chief
Air Quality Branch

US Forest Service
Donna Lamb,
National Air Quality Program Manager

Moosehorn Wilderness Area, ME

This 2006 Interim Report

provides information about the latest activities of the Mid-Atlantic/Northeast Visibility Union (MANE-VU). It summarizes information prepared by MANE-VU members and by staff from the Ozone Transport Commission (OTC), the Northeast States for Coordinated Air Use Management (NESCAUM), the Mid-Atlantic Regional Air Management Association (MARAMA), and various contractors.

Contents

Message from the Executive Director

Looking back on the work we have accomplished since MANE-VU was formed in 2001, I am most pleased by the cooperative spirit that has guided our efforts. As you read these pages, you will get a closer look at the results of our technical work and the challenges that we are facing in the next two years. In partnership with eleven states, the District of Columbia, two tribes, and four federal agencies, we have learned much that will help us fulfill our commitment to improve visibility in MANE-VU's Class I areas.

I hope that this report will stimulate your interest in learning more about our work in the future. Inside the back cover you will find information about our website, e-mail contact list, and newsletter to help you stay in touch with MANE-VU activities. We welcome your participation.

This report is intended to build a common understanding, serve as a reference, and support the forthcoming consultation process. As MANE-VU states prepare to determine quantitative goals for visibility improvements and to adopt the control measures needed to achieve those goals, consultation will be an important part of our work. States will consult with nearby states whose emissions affect MANE-VU's air quality, with the federal agencies responsible for management of our Class I areas, and with the U.S. Environmental Protection Agency. We will also continue to seek input from affected emission sources and the public as these consultations occur.

This report explains what we know about current visibility in MANE-VU Class I areas, what we know about the causes of regional haze, requirements the states must meet under EPA's Regional Haze rules, and our schedule for preparing plans to improve visibility.

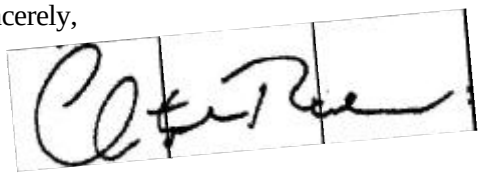
Much of the work in developing the information presented here has been accomplished by my colleagues at the Mid-Atlantic Regional Air Management Association (MARAMA) and the Northeast States for Coordinated Air Use Management (NESCAUM). The collaboration between MARAMA, NESCAUM and OTC/MANE-VU staff has enabled this region to accomplish much more than any of us could have done alone.

I want to recognize Director John Banks of the Penobscot Nation, outgoing Chair of MANE-VU. We appreciate his efforts to maintain tribal participation.

I also want to thank Secretary Katie McGinty of Pennsylvania for her work as Vice Chair and wish her success during her term as MANE-VU Chair.

I look forward to the challenges that lie ahead and welcome your active participation and suggestions as we work to restore visibility to all our Class I areas.

Sincerely,



Christopher Recchia

Executive Director

Ozone Transport Commission and MANE-VU

Diminishing Views

Haze Blurs the Sky

Why do over 280 million people visit national parks and wilderness areas every year? What is the inherent value of landscape features? How does air pollution affect the beauty of landscapes that viewers perceive? While complete answers to these questions are complex, there are simple explanations. People appreciate the visual resources of national parks and value the ability to observe the colors and geographic features of landscapes, while air pollution blurs the views of scenic vistas and city skylines and takes away from the perceived experience of viewers.

Haze is composed of tiny particles and certain gases in the atmosphere that scatter and absorb sunlight, thus limiting the distance that one can see and obscuring color and clarity. Some haze-forming pollutants, such as dust and soot, are primary pollutants emitted directly to the atmosphere. Other pollutants, such as gaseous sulfur dioxide (SO_2) and nitrogen oxides (NO_x) are secondary pollutants that form fine particles, such as sulfates and nitrates, in the atmosphere.

Presidential Range/Dry River, NH

There are numerous natural and human-generated sources of haze-forming pollutants. Natural sources include windblown dust, soot from wildfires, sea salt particles, and organic compounds emitted by plants. Human–generated sources include a variety of stationary sources such as electric generating units, industries and wood combustion, as well as mobile sources, such as automobiles, trucks, buses, and off-road vehicles.

Haze-forming pollutants have other negative consequences on the environment and human health and welfare. Nitrate and sulfate particles are the major components of acid rain, which damages ecosystems and erodes buildings. The deposition of nitrate and ammonium particles contributes to excess nutrients entering waterways, which also harms ecosystems. Human health impacts from particle pollution include irritation of the eyes, nose, and throat, coughing, phlegm, chest tightness, and shortness of breath. While children, older adults, and people with heart or respiratory problems are the most sensitive to elevated particle pollution levels, even healthy people are affected. Regional haze and unhealthy levels of particle pollution are caused by the same pollutants.

Clearing the Haze

National Goals and Regional Coordination

The Clean Air Act established the national goal to preserve, protect, and enhance visibility in national parks and wilderness areas of great scenic importance. Specifically, Section 169A of the Clean Air Act requires the prevention of any future, and the remedying of any existing, visibility impairment that results from man-made air pollution in the 156 major national parks and wilderness areas designated as federal Class I areas.

In 1999, the U.S. Environmental Protection Agency (EPA) issued the Regional Haze Rule, which set specific requirements to assure reasonable progress towards achieving natural visibility conditions at Class I areas by 2064. The Rule addresses the combined visibility effects of pollutants emitted over a wide geographic region. Thus, even states without Class I areas must participate in reduction efforts. In 2001, the EPA designated five Regional Planning Organizations (RPOs) to promote regional cooperation.

The Mid-Atlantic/Northeast Visibility Union (MANE-VU), one of the RPOs, was formed in 2001. The primary purpose of MANE-VU is to facilitate a coordinated approach to meeting the requirements of EPA's regional haze rules and improving visibility in national parks and wilderness areas in the Mid-Atlantic and Northeast regions. MANE-VU also facilitates coordination with other regions.

MANE-VU members include Connecticut, Delaware, the District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, the Penobscot Indian Nation, Rhode Island, the St. Regis Mohawk Tribe, and Vermont. The U.S. Environmental Protection Agency, the National Park Service, the U.S. Fish and Wildlife Service, and the U.S. Forest Service also participate in MANE-VU as non-voting members.

The Regional Haze Rule mandates that states develop State Implementation Plans (SIPs) that establish goals and emissions reduction strategies for improving visibility in Class I areas. Tribes may also adopt Tribal Implementation Plans (TIPs) to address regional haze. The seven Class I areas in the MANE-VU region include the Moosehorn Wilderness Area in Maine, Roosevelt/Campobello International Park in Maine, Acadia National Park in Maine, the Great Gulf Wilderness Area in New Hampshire, the Presidential Range/Dry River Wilderness in New Hampshire, the Lye Brook Wilderness in Vermont, and the Brigantine Wilderness in New Jersey. MANE-VU assists states and tribes in considering long-term strategies for each of the Class I areas and preparing SIPs/TIPs that meet the requirements of the Regional Haze Rule.

Roosevelt Campobello Int. Park, ME

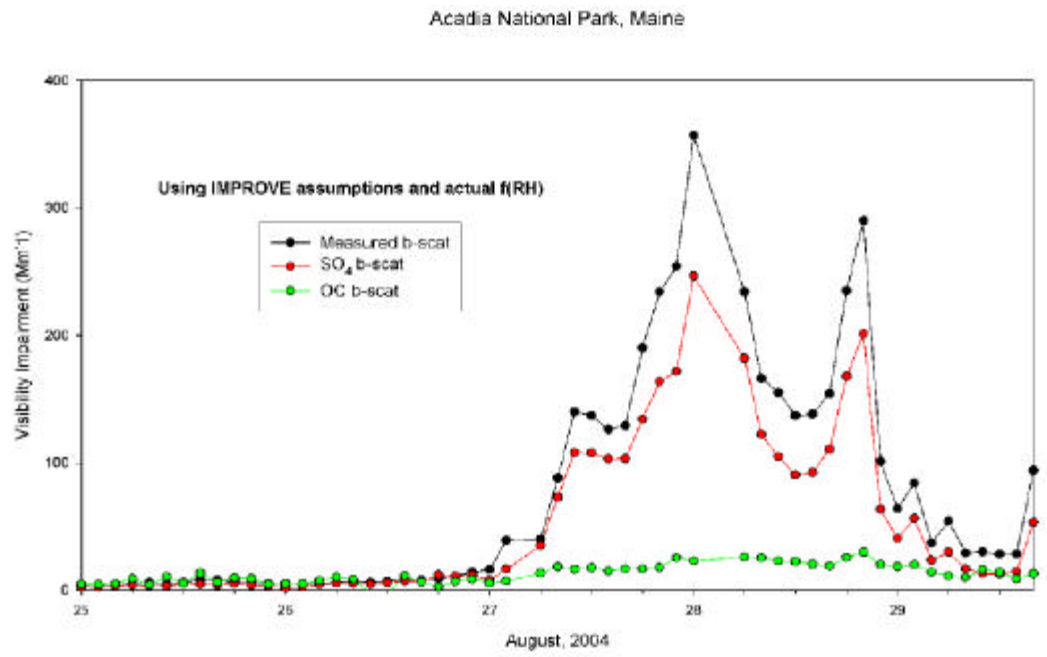
Monitoring Basics: IMPROVE

The Interagency Monitoring of Protected Visual Environments (IMPROVE) network currently provides the core data for the Regional Haze program. The IMPROVE program is a joint effort by state and federal agencies to track visibility and related pollutants at Class I areas. Each Class I area must have an IMPROVE monitor designated to represent progress in achieving national Regional Haze reduction goals.

Additional data is critical for a better understanding of the complex issues associated with the sulfate and organic carbon portion of fine aerosols, as well as for improving our comprehension of trade-offs between sulfate and nitrate control relevant to competing particle or ozone formation pathways.

Monitoring the Air: RAIN

Since haze in Class I areas is due to pollution transported from a broad region, a wide-reaching monitoring network located upwind can help states understand and reduce haze. To accomplish this, a network of three rural monitoring sites was deployed in 2004 to supplement IMPROVE data planning efforts in MANE-VU. The Rural Aerosol Intensive Network (RAIN) is coordinated by NESCAUM, and a cooperative effort of MANE-VU members, U.S. EPA, and the National Park Service. RAIN covers the region from western Maryland through northwest Connecticut to Acadia National Park, Maine.



Visibility Impairment: Measured & Estimated from Sulfate and Organic Carbon Aerosol

RAIN monitors gather particle mass, composition, and optical property measurements every 1-2 hours to provide enhanced insight into regional aerosol generation and source characterization, factors that drive short-term visibility, and aerosol model performance and evaluation.

An initial analysis of RAIN data that shows how these data fit into a long-term observing program to track and improve our understanding of visibility issues has recently been released as Technical Memorandum #8, *Analysis of Preliminary Data from the Regional Aerosol Intensive Network*, available on the MANE-VU website under Publications/Reports and Technical Materials.

Sulfate drives the visibility impairment in MANE-VU, in part because of its enhanced light scattering from water uptake at relative humidities above about 50 percent. An example from Acadia National Park, Maine shows how dominant sulfate is relative to the next most important component of $PM_{2.5}$, organic carbon aerosol (OC). A classic stagnation/transport event occurred in late August of 2004 over the Northeast U.S. The graph shows the estimated light scattering for 2-hour measurements for OC and sulfate (adjusted for relative humidity), along with the actual light scattering (an indicator of visual range) for a five-day period before and during this event.

While the scattering from OC aerosol increased during this event, it did so only a relatively modest amount; the scattering from sulfate increased by a very large amount. The mean estimated scattering from OC and sulfate during the 2 clean days before the event (August 25-26) is 5 and 6 inverse megameters respectively (a higher number here means decreased visual range). For the peak 2-hour period during the event (August 27-28), the estimated scattering was 30 and 247 for OC and sulfate respectively. Thus, the contribution of OC to scattering increased by a factor of 6, versus 41 for sulfate, from the clean day period to the maximum 2-hour event period.

Acadia, Clear Day: Hazecam

Seeing is Believing: CAMNET

The CAMNET Hazecam network of real-time visibility cameras in the MANE-VU region continues to provide high-quality real-time and archival images of urban and rural scenes from Western Maryland to Northern New England: http://hazecam.net.

Currently 11 sites are operating. The most recent addition was the Frostburg, Maryland camera, part of the RAIN measurements at this western Maryland site. These pictures document the actual visibility conditions every 15-minutes, and are used both for public education and for research purposes.

Photos of Acadia (Right) are examples of the effect of severe regional haze; CAMNET photos from a clear and hazy day are shown.

Acadia, Hazy Day: Hazecam

Emissions that Reduce Visibility

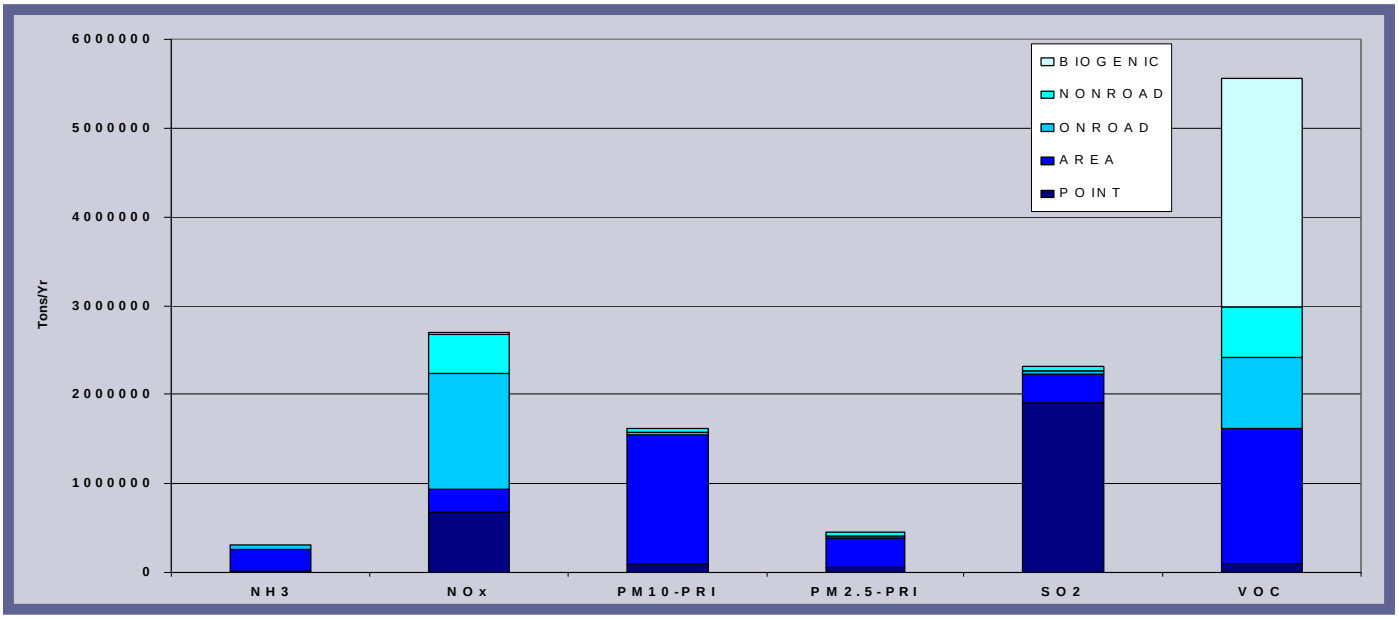
The emissions most important to forming regional haze in MANE-VU are sulfur dioxide (SO_2), nitrogen oxide (NO_x), ammonia (NH_3), direct emissions of fine particles ($PM_{2.5}$), and volatile organic compounds (VOC). Emissions sources are grouped in broad categories, point, area, on-road and off-road.

As shown in the chart below, each pollutant comes from characteristic sources. Sulfur dioxide comes predominantly from point sources such as large coal-fired boilers. NO_x is emitted by various fuel burning sources. VOCs come from biogenic (natural) sources as well as from human activities, primarily mobile and area sources. Ammonia comes mainly from animal waste and fertilized soils. Primary particle emissions come mostly from soils. Particle emissions are both $PM_{2.5}$ and PM_{10} (fine and coarse).

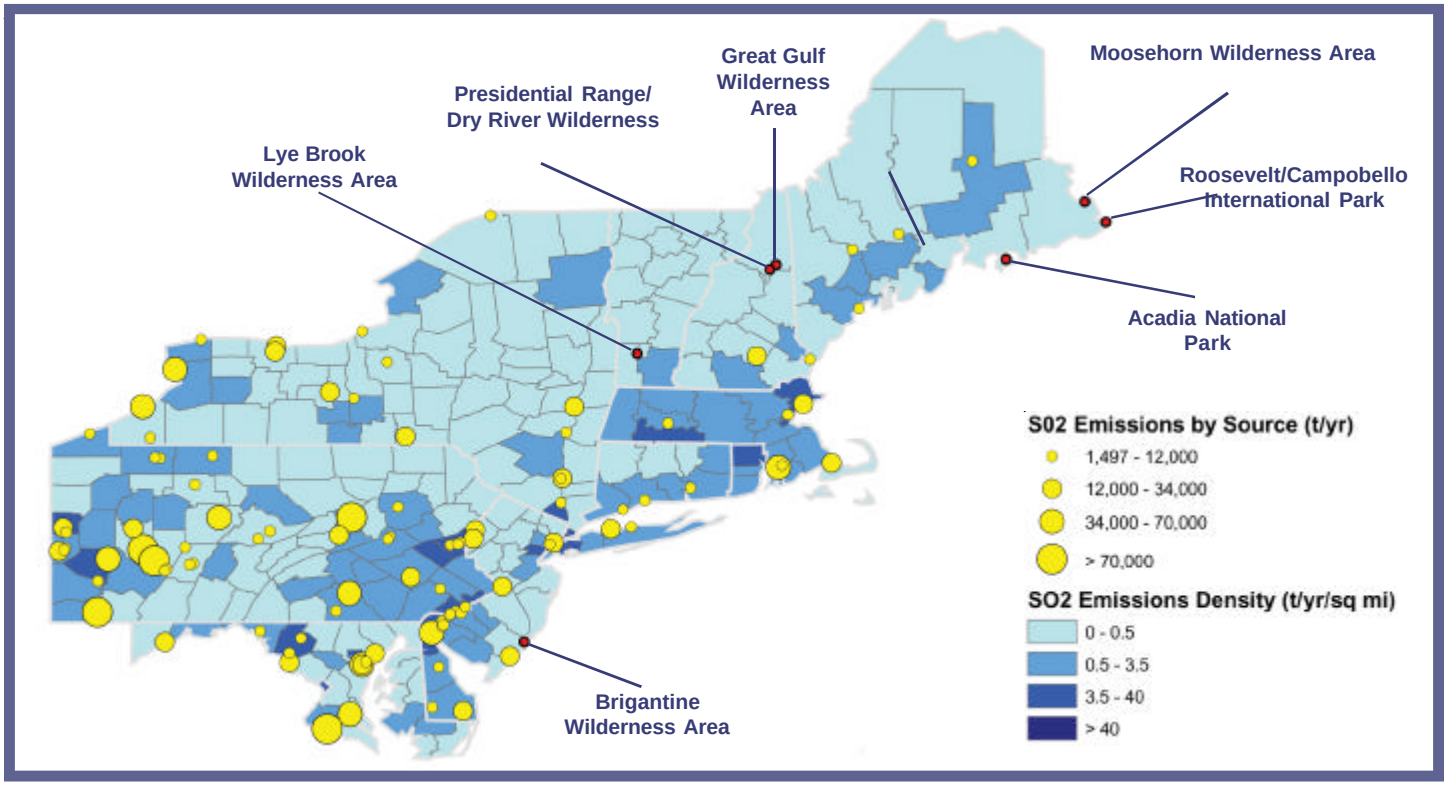
Primary pollutants are compounds that come directly from their sources. Particles such as soil and soot are primary pollutants. Most of the fine particles in the air are secondary pollutants, which are not emitted directly, but are either formed or modified in the atmosphere. Sulfate, nitrate and most organic compounds are secondary particulate pollutants. They are the products of chemical reactions in the atmosphere that transform gaseous SO_2, NO_x, and VOCs into particles.

Sulfur dioxide is relatively short-lived in the lower atmosphere, generally turning into sulfate or depositing to the ground within a day. Sulfur dioxide molecules gradually turn into sulfate, which winds transport over the entire eastern United States.

For this reason, emissions upwind of the region also play a significant role in forming haze that affects MANE-VU Class I areas. Airborne measurements taken in the western part of the region consistently show high levels of air pollution being transported into the region, particularly during pollution episodes.



This chart summarizes 2002 emissions for each state by source category by pollutant for the MANE-VU region.



Key Inventory Findings

Sulfur (SO_2)

- Emissions from coal fired electric generating units and large boilers dominate the MANE-VU inventory of sulfur dioxide emissions. Larger states and states with more coal-fired units have greater emissions.
- On an annual basis, point sources are responsible for most of the SO_2 emissions in the region. The map above highlights the largest sources in the region and shows the density of other emissions.

Nitrogen Oxides (NO_x)

- All combustion processes discharge NO_x emissions. Most large point sources are subject to recent emissions control requirements, so mobile sources (on-and off-road) will dominate the remaining inventory.

Ammonia (NH_3)

- Ammonia emissions are dominated by area sources. States with large animal feeding operations have higher total emissions. Motor vehicles with catalytic converters also discharge ammonia.

Direct Particulate Matter ($PM_{2.5}$ and PM_{10})

- Primary fine particle emissions are dominated by road dust. In some states, major point sources also make significant contributions. Fire emissions can be substantial on an episodic basis but do not have much influence on the annual summary.

Volatile Organic Compounds (VOCs)

- Biogenic (natural) sources of VOCs emit nearly as much VOC as comes from human activities.
- On-road vehicles and residential fuel burning are the largest VOC emission sources due to human activity in the region.

Contribution Assessment

Regional haze State Implementation Plans (SIPs) due in December 2007 must include a contribution assessment and pollution apportionment analysis as part of the long-term strategy. To meet these obligations and to better understand the causes of visibility impairment within its Class I areas, MANE-VU adopted a weight-of-evidence approach that relies on several independent contribution assessment methods.

What's the Data Show?

MANE-VU's preliminary findings draw from work that has produced a conceptual model of regional haze in which sulfate emerges as the most important single constituent of haze-forming fine particle pollution and the principle cause of visibility impairment across the region.

Sulfate alone accounts for one-half to two-thirds of total fine particle mass on the 20 percent haziest days at MANE-VU Class I sites. Even on the 20 percent clearest days, sulfate generally accounts for the largest fraction (40 percent or more) of total fine particle mass in the region. Sulfate has an even larger effect when considering the visibility impacts of different particle constituents.

While substantial visibility impairment is common across the region, it is most severe in the southern and western portions of MANE-VU which are closest to large power plant sources of sulfur dioxide (SO_2) emissions located in the Ohio River and Tennessee Valleys. Summertime visibility is driven almost exclusively by the presence or absence of regional sulfate, whereas wintertime visibility depends on a combination of regional and local influences coupled with local meteorological conditions (inversions) which can lead to the concentrated build-up of emissions from local sources.

Available monitoring data provide strong evidence that regional SO_2 reductions have yielded, and will continue to yield, reductions in ambient secondary sulfate levels with subsequent reductions in regional haze and associated light extinction. They indicate that reductions in anthropogenic primary particle emissions will also result in visibility improvements, but that these will not have a zone of influence as large as those of the secondary aerosols.

Analytical and Assessment Tools

Models:

Eulerian (grid-based, e.g. REMSAD)

Lagrangian (air parcel-based, e.g. CALPUFF)

Data Analysis Techniques:

Source Apportionment or Receptor Modeling

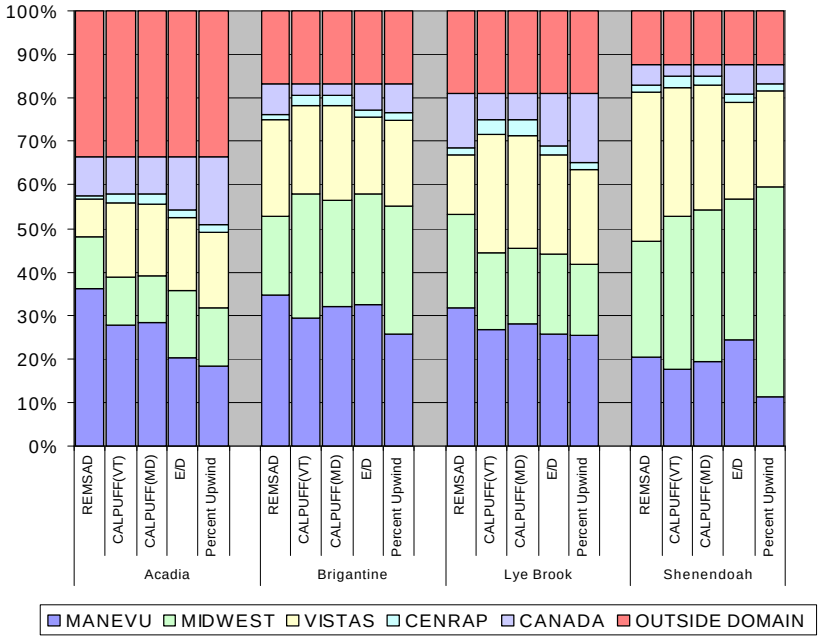
Back Trajectory Analysis
This includes calculation of percent time spent upwind or percent upwind.

Monitoring & Inventory Data Analysis
This includes emissions divided by distance or E/D.

There is substantial consistency across a variety of analysis methods. Taken together, these findings create a strong weight-of-evidence case for the preliminary identification of the most significant contributors to visibility impairment in the MANE-VU Class I areas.

Haze Contributors

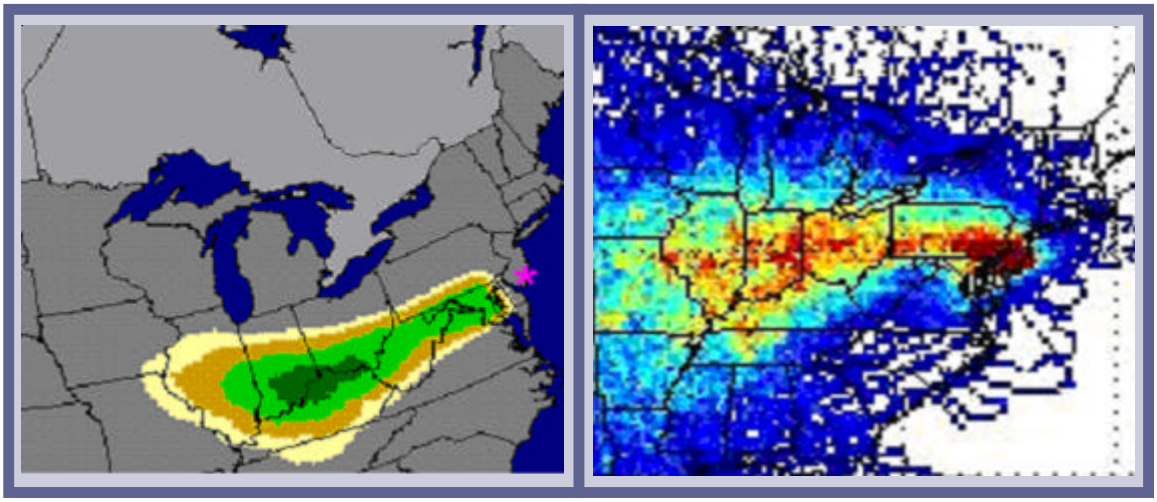
Estimates obtained from the assessment tools listed in the box (page 12) indicate that MANE-VU states account for about 25-30 percent of the sulfate in the Acadia, Brigantine, and Lye Brook Class I areas. The Midwest Regional Planning Organization (MWRPO) and the Visibility Improvement State and Tribal Association of the Southeast (VISTAS) states each account for about 10-15 percent of the total sulfate contribution at Acadia and about 25 percent each at Brigantine and Lye Brook. The Central Regional Air Planning Association (CENRAP) states, Canada, and an "out of domain" contribution add the remainder. Although variation exists across estimates of contribution for different sites and using different techniques, the overall pattern is generally consistent.



Estimated RPO contributions to sulfate concentrations at Class I areas using different assessment techniques

Shenandoah National Park, Virginia, which is a VISTAS Class I area, has a somewhat reversed order of relative contributions. At Shenandoah, VISTAS, and MWRPO states account for roughly 30 percent of overall sulfate each, with MANE-VU states contributing roughly 15-20 percent, and CENRAP states, Canada and "out of domain" accounting for the remainder.

The meteorological transport regime most common during high sulfate observations (shown on the right below) directly connects the most likely source region and the receptor site, reinforcing the large quantitative contributions of source states determined for the Brigantine receptor (shown on the left below). The use of receptor models and source apportionment models to reinforce the findings from emissions-based, or source-based models, lends strength to the weight-of-evidence approach adopted by MANE-VU.



The map on the left shows the geographic region associated with "coal combustion/secondary sulfate" sources affecting Brigantine, as calculated using source apportionment. The map on the right shows the results of back trajectory analysis used to identify the region associated with sulfate transport on the highest recorded sulfate days at Brigantine.

BART

What is BART?

The Clean Air Act and EPA's Regional Haze Rule require states to determine the most stringent technologically feasible system of controls that can reasonably be installed at each facility eligible for BART. Criteria that determine whether a specific control technology is deemed reasonable include: cost of the controls, other control technology in use at the source, energy and other non-air quality environmental impacts, remaining useful life of the source, as well as the degree of visibility improvement anticipated to result from installation of the controls.

BART is designed to ensure appropriate control of larger old emission sources built before adoption of New Source Performance Standards and requirements for Prevention of Significant Deterioration at Class I areas. BART applies to facilities built between 1962 and 1977 that have the potential to emit more than 250 tons a year of visibility-impairing pollution. Those facilities fall into 26 categories, including utility and industrial boilers as well as large industrial plants such as pulp mills, refineries and smelters.

Who is Subject to BART?

Applicability is limited to those sources which:

1. Are in one of 26 specific source categories as identified in the Clean Air Act;
2. Have units that were in existence on August 7, 1977, but had not been in operation for more than fifteen years as of that date (prior to August 7, 1962); and
3. Have a potential to emit (PTE) 250 tons per year (TPY) or more of any single visibility impairing pollutant from units that satisfy criterion #2. These pollutants include SO_2, NO_X, VOCs, PM_{10} and ammonia.

The MANE-VU BART Workgroup has recommended that any source wanting to limit emissions to below 250 tons/year in order to be exempt from BART must have a permit cap in place by December 2006, one year before BART SIPs are due to EPA.

MANE-VU BART Resources

List of BART-Eligible Sources in the MANE-VU Region: Interim Report

Assessment of Control Technology Options for BART-Eligible Sources

BART Resource Guide

Does the Facility Cause or Contribute to Visibility Impairment?

Once a facility is found to be "eligible" for the BART program states must determine if that facility causes haze or contributes to the formation of haze at any Class I area. EPA's 2005 rule outlines three options to determine if a source reasonably causes or contributes to regional haze in any Class I area. These options include: individual source assessment, cumulative assessment of all BART-eligible sources, and assessment based on model plants.

In 2005 the MANE-VU Board reaffirmed their commitment to developing strong control measures (including BART) to reduce regional haze. Given the potential emission reductions due to BART controls at BART sources, the Board determined that all BART-eligible sources in MANE-VU would be considered subject to BART.

Are New Controls Appropriate?

Once a facility has been identified as being BART-eligible and found to cause or contribute to haze in a Class I area, each state must determine the most stringent technologically feasible system of controls for that facility. This determination takes into consideration five factors:

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

States have flexibility in weighing the importance of each of the factors.

When must enforceable BART requirements be included in SIPs?

The Clean Air Act and EPA rules require states to make BART emission limitations part of their State Implementation Plans (SIPs). Regional Haze SIPs are to due to EPA December 17, 2007. As with any SIP revision, states must provide an opportunity for public comment on the BART determinations. Federal Land Mangers must be given an opportunity for face-to-face consultation 60 days before public hearings.

MANE-VU Actions

MANE-VU states have identified BART-eligible sources.

The MANE-VU Board agreed that all BART-eligible sources in MANE-VU would be deemed subject to BART.

The MANE-VU BART work group recommended that all permit modifications to allow sources to opt out of BART be finalized by December 17, 2006; thus, time is short.

The BART work group recommended that the remaining useful life of a source be considered as follows:

- Facility Controlled by 2013, or have a
- Federally enforceable permit limitation or retirement date.

Next Steps

- Adopt enforceable permit conditions that limit emissions from each BART source to below 250 tons/year by the end of 2006
- Draft conditions and schedules that establish BART requirements for eligible sources
- Schedule face-to-face consultation with federal land managers
- Complete BART SIPs and submit them to the appropriate EPA Region office by December 17, 2007

Reasonable Progress Goals

The Regional Haze Rule requires states to establish goals to ensure reasonable progress towards achieving natural visibility conditions at all Class I areas by 2064. MANE-VU states with Class I areas include Maine, New Hampshire, Vermont, and New Jersey. These states must consult with other state, local, and tribal authorities, federal land managers, and stakeholders in developing the goals for their areas.

In the 2007 State Implementation Plans (SIP), reasonable progress goals must improve visibility for the most impaired days and ensure no degradation in visibility for the least impaired days by 2018.

The first step in determining reasonable progress goals is determining the baseline values from which the goals will be measured. Following EPA guidance MANE-VU established two baseline values for each Class I area. The baseline values averaged the 2000-2004 IMPROVE monitoring data (in deciviews) for the 20 percent best and worst visibility days.

The next step is determining the linear rate of improvement from the baseline to natural visibility conditions. MANE-VU established the linear rate of improvement for each Class I area in the region using the calculated baseline values and estimates of natural conditions.

Then, the source categories and key pollutant species that contribute significantly to haze on the "best" and "worst" visibility days must be identified for each Class I area. MANE-VU has coordinated efforts to develop base year and future year emissions inventories, analyze emissions and ambient air quality data, identify potential source regions affecting Class I areas, and run model simulations of current and future air quality conditions.

Determining Baseline and Natural Haze Conditions

The difference between natural and baseline conditions defines the amount of improvement that the SIPs must accomplish by 2064. Natural and baseline conditions must be estimated for the 20 percent most and least impaired visibility days. MANE-VU developed a technical memorandum that describes methods for calculating baseline and natural conditions and provides estimates for each. This memorandum was reviewed by MANE-VU members and stakeholders. MANE-VU's Board approved the memorandum in 2004 with the direction that staff would review new scientific developments that may indicate a need to modify the calculations.

Key Updates

- The IMPROVE Steering Committee recently approved revised calculation methods that utilize more scientific information.
- These revised methods will have less impact on the eastern states than on western states, with the greatest impacts in the east affecting coastal sites.

Next Steps

- MANE-VU will review revised calculations.
- MANE-VU will consult with other regional planning organizations.
- Class I states will consult with federal land managers in person.

Control measures and associated emission reductions that are anticipated from existing rules and available control measures beyond current and expected controls must then be considered. Finally, control measures for each major source category must be evaluated in light of the following factors: the cost of compliance, the time necessary for compliance, the energy and non-air quality environmental impacts of compliance, and the remaining useful life of existing sources that contribute to visibility impairment. Based on these evaluations, states with Class I areas will set reasonable progress goals after considering comments from state, local and tribal authorities, federal land managers and stakeholders.

Long-Term Strategies

MANE-VU staff will assist states in reviewing the reasonable progress goals for MANE-VU Class I areas and for nearby Class I areas where emissions from the MANE-VU Region may reasonably be anticipated to cause or contribute to visibility impairment. Each state is required to develop long-term (10-15 year) strategies for meeting the reasonable progress goals for each Class I area by 2018. State SIPs must identify all anthropogenic sources of visibility improvement considered by the state and include enforceable emissions limitations, compliance schedules, and all the control measures that are necessary to achieve the reasonable progress goals.

Implications for Strategies

Findings from the Contribution Assessment (pp. 12-13) suggest that an effective emissions management approach would rely heavily on broad-based regional SO_2 control efforts in the eastern United States aimed at reducing summertime fine particulate matter ($PM_{2.5}$) concentrations. MANE-VU is investigating additional measures to reduce in-region emissions of SO_2 and organic carbon (OC), which is typically the next most important contributor to overall fine particle mass throughout the region. Nearby SO_2 reductions can help reduce wintertime PM concentrations, while OC reductions can help reduce total PM concentrations year-round. For areas with high wintertime PM levels, strategies aimed at reducing ambient levels of nitrogen oxides (NO_x) may also be effective.

While sulfate is the most important particle constituent for designing near-term control strategies, reductions in other local and distant pollutant emissions are important. Additional measures will be necessary in the long term to address public health impacts of ambient fine particle concentrations and to achieve long-term regional haze goals to restore pristine visibility conditions year-round in the nation's Class I wilderness areas. This is especially true during winter months, when planners need to give particular consideration to reducing urban and mobile sources of NO_x and OC as well as sources of SO_2.

MANE-VU Actions

- MANE-VU states are adopting control measures as part of ozone and PM SIPs that will benefit visibility in the region.
- MANE-VU is assessing reasonable additional measures.
- MANE-VU must also depend on controls outside of the region for visibility improvement at its Class I areas.

Next Steps

- MANE-VU members will review modeling results, uniform rate of progress estimates, and potential controls.

MANE-VU SIP Development

MANE-VU has been working to prepare various required SIP elements. Its SIP Template organizes the requirements and identifies information needed to complete SIPs. The major SIP elements are baseline and natural conditions, reasonable progress goals, BART, and long term strategies for visibility improvement

Additional Required SIP elements include

- An ambient monitoring program sufficient to asses progress in improving visibility,
- An inventory of emissions contributing to visibility impairment,
- Measures to mitigate the impacts of construction activities, and
- Consideration of smoke management plans.

MANE-VU Actions to Address these Requirements

- Continued participation in the IMPROVE program, operated RAIN monitors and enhanced CAMNET.
- Completed the baseline 2002 emissions inventory for the region and developed a system for sharing the data with other regions and the public.
- Drafted technical support documents on Construction Mitigation Measures and Smoke Management and requested public comments on the technical support documents.
- Drafted an assessment of sources contributing to haze in the region, which is also available for public comment.

Next Steps

- Complete development of technical support documents.
- Refine the SIP Template to meet state needs.

The Power of Partnership

Staff support is provided by the Mid-Atlantic Regional Air Management Association (MARAMA), the Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC).

Without the expert, dedicated staff from these organizations along with state representatives, the strides made by MANE-VU to address regional haze would not have been possible.

Keep in Touch with MANE-VU

Sign up for the Newsletter

In 2005, MANE-VU launched a bi-annual newsletter. Distributed electronically, this publication provides a snapshot into MANE-VU projects, covers issues of interest to the regional haze community, and announces opportunities to comment on workproducts.

Join the Stakeholder Database

In 2003, MANE-VU began compiling a list of groups and individuals interested in its work. It is used to distribute the newsletter, send out notices of comment opportunities, advertise meetings, and for other events as needed. The list has been updated approximately three times per year.

Learn More ...

MANE-VU has developed various materials to help educate stakeholders about the organization and the Regional Haze planning process.

Fact Sheets: About MANE-VU, About Regional Haze, Health Effects of Regional Haze

Regional Haze Resource Guide for Journalists

About MANE-VU Brochure

Annual Updates of the SIP Planning Timeline

Bi-Annual Newsletters (2005 and 2006)

In addition to collateral materials, MANE-VU hosts special issue briefings when needed and notifies interested parties of upcoming events and meeting and comment opportunities.

MANE-VU on the Web

www.mane-vu.org

MANE-VU has established a website which provides basic information about the organization and serves as a portal for stakeholders to access and comment on draft workproducts.

To receive the newsletter or to update database information, or for any other requests contact Susan Stephenson (MARAMA), sstephenson@marama.org.

Mid-Atlantic/Northeast Visibility Union

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