



INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

We Protect Hoosiers and Our Environment.

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September 29, 2008

Ms. Lynn Buhl
Regional Administrator
U.S. EPA, Region 5
77 West Jackson Blvd. R-19J
Chicago, IL 60604-3590

Re: Regional Haze State Implementation Plan
Submittal for Indiana

Dear Ms. Buhl,

This letter serves as Indiana's submittal to meet requirements of 40 CFR 51.308(b) regarding implementation plans to address Regional Haze. The Indiana Department of Environmental Management (IDEM) has prepared a draft Regional Haze State Implementation Plan (SIP) for the State of Indiana which is attached.

IDEM has worked closely with the Midwest Regional Planning Organization (MRPO), other regional planning organizations, Federal Land Managers (FLMs), United States Environmental Protection Agency (U.S. EPA), and other states to address the requirements of the Regional Haze rule. In this letter, IDEM will describe Indiana's current status on this project, including Best Available Retrofit Technology (BART), and the schedule for completing the remaining work.

At this time, IDEM has completed the following tasks related to the Regional Haze SIP project:

- Identification of BART-eligible units
- Modeling to determine sources subject to BART
- Developed and adopted BART rule, effective on February 22, 2008
- Initiated discussions with sources subject to BART for submittal of BART analysis to IDEM (due November 2008)
- Four of the five sources that IDEM determined to be subject to BART have submitted analyses indicating they are not subject to BART; IDEM is reviewing these analyses
- Participated in discussions and coordinated work with the MRPO on regional efforts and on visibility impacts on MRPO Class I areas
- Provided updated emission inventories and modeling for Indiana sources

- Consulted with the following other regional planning organizations and states:
 - Central Regional Air Planning Association (CENRAP) (complete),
 - Visibility Improvement State and Tribal Association of the Southeast (VISTAS) (complete),
 - Mid-Atlantic/Northeast Visibility Union (MANE-VU) (on-going)
 - Michigan and Minnesota (Complete)
- Determined that the Clean Air Interstate Rule (CAIR) satisfies BART requirements for NO_x and SO₂ for electric generating units that participate in CAIR
- Compiled information on Indiana's Prescribed Burning Guidance

Indiana's CAIR rule was effective February 25, 2007. However, with the vacatur of CAIR, the status of these units with regard to BART is uncertain. It is unclear at this time whether the vacatur will stand or what may happen at the Federal level, but IDEM is evaluating various alternatives to resolve this issue. The following schedule may be revised if it is necessary to address BART for EGUs for NO_x and SO₂.

IDEM plans to complete the remaining tasks described below and anticipates completion by the dates given:

- | | | |
|---|----------------|--|
| · | August 2008 | Send draft SIP to Federal Land Managers for their mandatory 60-day comment period |
| · | September 2008 | Initiate 30-day public comment period |
| · | October 2008 | Hold public hearing on SIP, incorporating responses to FLM comments |
| · | November 2008 | BART analyses due from sources |
| · | October 2009 | IDEM BART determinations complete |
| · | April 2011 | BART rulemaking complete establishing permanent, enforceable limits to be operational by February 2013 |

In addition, IDEM is committed to continue working with other regions and states on improving visibility in Class I areas, including the following:

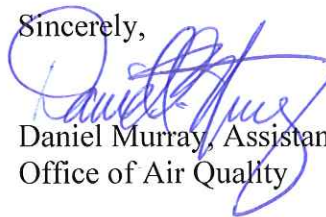
- Address any comments from the FLMs and public concerning Indiana's draft Regional Haze SIP
- Submit a SIP report 5 years from the initial SIP submittal to update and review the status of impacts to visibility in Class I areas
- Implement permanent, enforceable emission limits and associated requirements within 5 years of the effective date of Indiana's BART rule for affected sources (February 2013)
- If needed, implement permanent, enforceable emission limits and associated requirements for other Indiana sources that are demonstrated to be causing a significant impact on visibility in a Class I area within 5 years of approval of the Regional Haze SIP
- Submit a Regional Haze SIP revision by July 31, 2018

Ms. L. Buhl
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Indiana's draft Regional Haze SIP includes information on much of the work mentioned in this letter. IDEM will continue to work with U.S. EPA and all other affected agencies, states, and organizations to complete Indiana's Regional Haze SIP in accordance with the schedule outlined above.

If you have any questions regarding this submittal, please contact Ken Ritter, Chief, Technical Support and Modeling Section, Office of Air Quality at 317-233-5682.

Sincerely,



Daniel Murray, Assistant Commissioner
Office of Air Quality

DM/knr
Attachments

cc: John Mooney, U.S. EPA Region 5 (no enclosure)
John Summerhays, U.S. EPA Region 5 (w/enclosures)
Chuck Sams, U. S. Forest Service, Eastern Region (w/enclosures)
Tim Allen, U.S. Fish & Wildlife Service (w/enclosures)
Bruce Polkowsky, National Park Service (w/enclosures)
Ken Ritter, IDEM

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Preliminary
Indiana Regional Haze SIP

Developed By:
The Indiana Department of Environmental Management

September 29, 2008

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1.0 Introduction and Background

This document constitutes the State of Indiana Regional Haze State Implementation Plan (SIP). The federal Regional Haze Rule requires Indiana to submit a SIP to United States Environmental Protection Agency (U.S. EPA). Indiana does not have any Class 1 areas, however, Indiana sources have been determined to impact visibility in Class 1 areas in other states. The Clean Air Act requires Indiana to develop a strategy to mitigate visibility impairment in those areas. The strategy has been developed in consultation with the Midwest Regional Planning Organization (MRPO) and affected states using data and tools, including emissions inventories and modeling analyses taking into consideration factors such as existing pollution control programs, emissions reduction needs, compliance schedules, measures to mitigate the impact of construction activities, and smoke management techniques. This document describes Indiana's consultation process, technical analyses, and actions to be pursued to reduce visibility impairment in other Class 1 areas.

In amendments to the Clean Air Act in 1977, Congress added Section 169 (42 U.S.C. 7491) setting forth the following national visibility goal:

Congress hereby declares as a national goal the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class 1 Federal areas which impairment results from manmade air pollution.

When the Clean Air Act was amended in 1990, Congress added Section 169B (42 U.S.C. 7492), authorizing further research and regular assessments of the progress made so far. In 1993, the National Academy of Sciences concluded that "current scientific knowledge is adequate and control technologies are available for taking regulatory action to improve and protect visibility."¹

In addition to authorizing creation of visibility transport commissions and setting forth their duties, Section 169B(f) of the Clean Air Act mandated creation of the Grand Canyon Visibility Transport Commission (Commission) to make recommendations to U.S. EPA for the region affecting the visibility of Grand Canyon National Park. The Commission submitted its report to U.S. EPA in June 1996, following four years of research and policy development. That report, as well as the many research reports prepared by the Commission, contributed invaluable information to U.S. EPA in its development of the federal Regional Haze Rule.

U.S. EPA's Regional Haze Rule (Regional Haze Rule) was adopted July 1, 1999, and went into effect on August 30, 1999 (64 FR 35714). The Regional Haze Rule is aimed at achieving national visibility goals by 2064. This rulemaking addressed the combined visibility effects of various pollution sources over a wide geographic region. This wide reaching pollution net means that many states, even those without Class 1 areas, are required to participate in haze reduction efforts. U.S. EPA designated five Regional Planning Organizations (RPO) to assist with the coordination and cooperation needed to address the haze issue.

U.S. EPA's Regional Haze Rulemaking process was controversial. On May 24, 2002, the U.S. Court of Appeals, DC District Court, ruled on the challenge brought by the American Corn Growers Association against U.S. EPA's Regional Haze Rule of 1999. The Court remanded to

¹ *Protecting Visibility in National Parks and Wilderness Areas*, National Research Council. Washington, DC: 1993.

U.S. EPA the Best Available Retrofit Technology (BART) provisions of the rule, and denied industry's challenge to the haze rule goals of natural visibility and no degradation requirements. U.S. EPA issued revisions to the Regional Haze Rule pursuant to the remand.

Regional haze is caused by tiny particles that absorb and scatter sunlight, creating white and brown haze. The Regional Haze Rule requires States to submit SIPs to address regional haze visibility impairment in 156 federally protected parks and wilderness areas. These 156 scenic areas are called "mandatory Class 1 Federal areas" in the Clean Air Act but are generally referred to as "Class 1 areas." As required by the Clean Air Act, U.S. EPA included in the final Regional Haze Rule a requirement for BART for certain large stationary sources. The Regional Haze Rule uses the term "BART-eligible source" to describe these sources. Under the Clean Air Act, BART is required for any BART-eligible source that a state determines "emits any air pollutant which may reasonably be anticipated to cause or contribute to any impairment of visibility in any such area." Accordingly, for stationary sources meeting these criteria, states must address the BART requirement when they develop their regional haze SIPs.

Though States have some discretion on the use of the BART guidelines for most sources, Section 169A(b) of the Clean Air Act and 40 CFR 51.308(e)(1)(ii)(B) require that states follow the BART guidelines for fossil-fuel fired generating powerplants having a capacity in excess of 750 megawatts.

All Regional Haze SIPs are due three years after U.S. EPA designated PM_{2.5} attainment and nonattainment areas. 40 CFR 51.308(b) and (c) were effectively addressed by the FY 2004 Omnibus Appropriations Bill. The Appropriations Bill said that all Regional Haze SIPs would be due three years after the PM_{2.5} designation dates regardless of attainment status. The U.S. EPA approved PM_{2.5} designations for all areas of each state on December 17, 2004. All Regional Haze SIPs were therefore due December 17, 2007.

The Regional Haze Rule requires states to set reasonable progress goals toward meeting a national goal of natural visibility conditions in Class 1 areas by the year 2064. The first reasonable progress goals will be established for the planning period 2008 to 2018.

Even though Indiana has no Class 1 areas, U.S. EPA's Regional Haze Rule requires a state to address regional haze in each Class 1 area outside the state which may be affected by emissions from within the state. Indiana has participated in extensive technical analyses conducted by the MRPO to determine if any Class 1 areas have visibility impairment that may be caused by sources within the state.

This Regional Haze SIP will address the initial 10-year implementation period (i.e., reasonable progress by the year 2018). SIP requirements (pursuant to 40 CFR 51.308(d)) include establishing reasonable progress goals, determining baseline conditions, determining natural conditions, providing a long-term control strategy, providing a monitoring strategy (air quality and emissions), and establishing BART emissions limitations and associated compliance schedule.

Pursuant to the requirements of 51.308(a) and (b), Indiana submits this SIP to meet the requirements of U.S. EPA's Regional Haze Rule that was adopted to comply with requirements set forth in the Clean Air Act. Elements of this SIP address the core requirements pursuant to 40 CFR 51.308(d) and the BART components of 40 CFR 50.308(e). In addition, this SIP describes Indiana's consultation process, technical analyses, and actions to be pursued to reduce visibility impairment in Class 1 areas.

Indiana has developed this SIP in accordance with Indiana laws and rules and has the authority to implement the SIP in accordance with those laws and rules.

Indiana will provide public notice of the opportunity to comment on the SIP and of the public hearing that will be held regarding the SIP. Public comments will be addressed and summarized in the final version of the SIP.

2.0 Regional Planning

The MRPO was formed to facilitate regional planning to address the regional haze regulations adopted by U.S. EPA in 1999. The primary objective of the MRPO is to assess both visibility impairment due to regional haze in the mandatory Federal Class 1 areas located inside the borders of the five States of Illinois, Indiana, Michigan, Ohio, and Wisconsin, and assess the impact of emissions from the five states on visibility impairment due to regional haze in the mandatory Federal Class 1 areas located outside the borders of the five States. Members of the MRPO include the five states, tribes located within the five states, Federal Land Managers (U.S. National Park Service, U.S. Fish & Wildlife Service and U.S. Forest Service), and U.S. EPA. The Lake Michigan Air Directors Consortium (LADCO) has been designated as the agency to receive federal grant funds on behalf of the MRPO.

This SIP uses data analyses, modeling results and other technical support documents prepared for MRPO members. By coordinating with the MRPO and other Regional Planning Organizations (RPOs), Indiana has worked to ensure that its long term strategy provides sufficient reductions to mitigate impacts of sources from Indiana on affected Class 1 areas.

The other RPOs are Mid-Atlantic / Northeast Visibility Union (MANE-VU), Central Regional Air Planning Association (CENRAP), Visibility Improvement State and Tribal Association of the Southeast (VISTAS), and Western Regional Air Partnership (WRAP). Figure 1 shows a map of the regional planning organization boundaries.

Figure 1 Regional Planning Organizations



Indiana does not have any Class 1 areas. However, emissions from Indiana sources have been determined to impact Class 1 areas in other states. Appendix 1 contains a list of these Class 1 areas, and the analyses performed to assess the impact from Indiana that were compiled by the MRPO. The following areas are listed as possibly being impacted by Indiana sources:

Southeastern U.S. - Sipsey National Wilderness Area, AL; Mammoth Cave National Park, KY; Great Smoky Mountains National Park, NC and TN; James River Face National Wilderness Area, VA; Shenandoah National Park, VA; and Dolly Sods / Otter Creek National Wilderness Areas, WV (VISTAS)

Eastern U.S. - Acadia National Park, ME; Moosehorn National Wilderness Area, ME; Great Gulf National Wilderness Area, NH; Brigantine National Wilderness Area, NJ; and Lye Brook National Wilderness Area, VT (MANE-VU)

Northern U.S. - Isle Royale National Park, MI; Seney National Wildlife Refuge, MI; Boundary Waters Canoe Area National Wilderness Area, MN; and Voyageurs National Park, MN (MRPO and CENRAP)

South Central U.S. - Hercules-Glades National Wilderness Area, MO; Mingo National Wilderness Area, MO; Caney Creek National Wilderness Area, AR; and Upper Buffalo National Wilderness Area, AR (CENRAP)

Indiana has participated in meetings and conference calls with states within the MRPO and the RPOs outside the Midwest to discuss their assessments of visibility conditions, analyses of culpability, and possible measures that could be taken to meet visibility goals for 2018. The sections later in this document provide that information on a state-by-state basis. Table 1 shows the calls and meetings held with states and RPOs with Class 1 areas in which Indiana participated.

Table 1 Calls and Meetings Regarding Class 1 Areas

Date	Group
March 12, 2007	Northern States (Michigan and Minnesota) call
April 3, 2007	CENRAP call
April 17, 2007	Northern States meeting
April 25 - 26, 2007	Denver RPO - Federal Land Manager meeting
May 11, 2007	CENRAP call
May 17, 2007	Northern States call
June 7, 2007	CENRAP call
June 18, 2007	Northern States call
July 10 - 11, 2007	MANE-VU Science meeting (covered by MRPO)
July 19, 2007	MANE-VU call
July 30, 2007	Northern States call
August 6, 2007	MANE-VU meeting
August 23, 2007	Northern States call
February 7, 2008	Northern States call
June 25, 2008	Northern States call

Class I areas outside the areas listed above were not analyzed further, as there was no impact from Indiana sources shown. Further, no impacts from Indiana were noted in the WRAP states and no requests for controls were initiated by those states.

3.0 Indiana and Federal Land Manager Coordination

40 CFR 51.308(i) requires coordination between Indiana and the Federal Land Managers (FLMs). Opportunities have been provided by the MRPO for FLMs to review and comment on each of the technical documents developed by the MRPO and included in this SIP. Indiana has provided agency contacts to the FLMs as required. In development of this plan, the FLMs were consulted in accordance with the provisions of 40 CFR 51.308(i)(2).

During the consultation process, the FLMs were given the opportunity to address their:

- Assessment of the impairment of visibility in any Class 1 areas
- Recommendations on the development of reasonable progress goals
- Recommendations on the development and implementation of strategies to address visibility impairment.

Indiana has consulted directly with FLMs by email and phone, during periodic MRPO calls and meetings, at the FLM-RPO meeting in Denver on April 25 and 26, 2007, and during discussions

with other states and RPOs with Class 1 areas (for example, the MANE-VU meeting August 6, 2007 in Chicago).

Indiana will provide the FLMs an opportunity for review of the SIP, at least 60 days prior to holding the public hearing for the SIP.

Comments received from the FLMs on this plan will be summarized and responses will be included in the final version.

Indiana will continue to coordinate and consult with the FLMs during the development of future progress reports and plan revisions, as well as during the implementation of programs having the potential to contribute to visibility impairment in the Class 1 areas. The FLMs will be consulted during the development and review of implementation plan revisions and during the review of 5-year progress reports

4.0 Development of Reasonable Progress Goals

The following maps show the locations of Class 1 areas in the central, eastern, and northeastern portions of the U.S. Modeling indicated that Indiana sources had no measurable impact on Class I areas in the Western Regional Air Partnership (WRAP). Therefore, Class I areas in that region are not addressed in this SIP.

Figure 2 Map Showing Locations of South Central and Southeastern Class 1 Areas

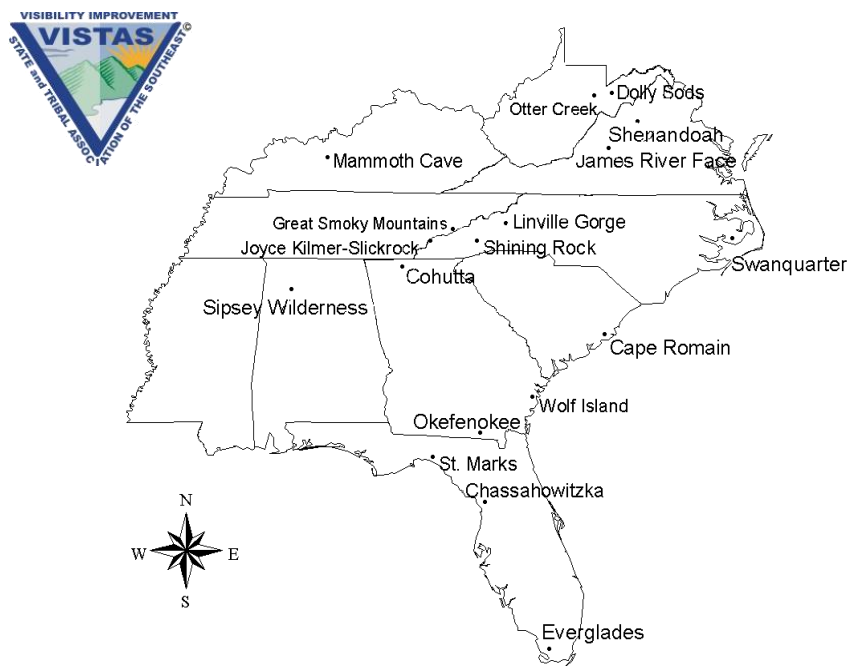


Figure 3 Map Showing Locations of Class 1 Areas in Northeastern U.S.

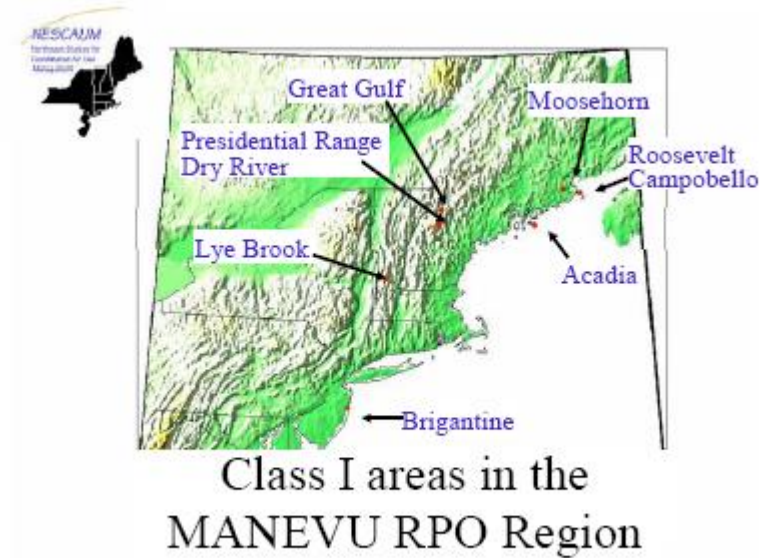


Figure 4 Map Showing Locations of Class 1 Areas in Northern U.S.



4.1 Assessment of Baseline (or Current) Conditions and Estimate of Natural Conditions (in Class 1 Areas)

The Regional Haze Rule requires states with Class 1 areas to establish reasonable progress goals, expressed in deciviews, for visibility improvement at each affected Class 1 area. The goals must provide for reasonable progress toward achieving natural visibility conditions, provide for

improvement in visibility for the most impaired days over the period of the implementation plan, and ensure no degradation in visibility for the least impaired days over the same period, (40 CFR 51.308(d)(1)).

4.2 Glidepaths to Natural Conditions in 2064

The states and RPOs with Class 1 areas performed their analyses to determine baseline conditions and natural conditions in 2064. The Regional Haze Rule directs states to graphically show what would be a "uniform rate of progress" toward natural conditions for each Class 1 area within their state as well as Class 1 areas outside the state which may be affected by emissions from sources within the state. The uniform rate of progress is also known as the "glidepath." The glidepath is a straight line drawn from the baseline level of visibility impairment for 2000 - 2004 to the level representing no manmade impairment in 2064.

Glidepaths were developed by the states and RPOs for their own Class 1 areas using their available information. The MRPO also developed glidepaths for the Class 1 areas impacted by states within the RPO. The glidepath is one of the indicators used in setting reasonable progress goals.

4.3 Letters Requesting Participation in Consultation Process from States with Class 1 Areas

As a result of the various analyses performed by the MRPO and other RPOs, Indiana was invited to participate in a number of consultations regarding contributions to Class 1 areas. These include Arkansas and Missouri, New Jersey, New Hampshire, and Vermont - each individually and together as part of the MANE-VU letter, Minnesota, and Michigan. Copies of these letters are found in Appendix 2.

5.0 Emissions Inventory

A great deal of technical information must be assembled to determine the causes of impaired visibility in the Class 1 areas. 40 CFR 51.308(d)(4)(v) requires a statewide emission inventory of pollutants that are reasonably anticipated to cause or contribute to visibility impairment in any mandatory Class 1 area. The pollutants inventoried by Indiana for this purpose include volatile organic compounds (VOCs), nitrogen oxides, fine particulate (PM_{2.5}), coarse particulate (PM₁₀), and sulfur dioxide (SO₂). An inventory was developed for the baseline year 2005. In addition, projections of future emissions have been made for 2009 and 2018. Indiana will update this inventory on a periodic basis, every three years. A summary of the inventory results follows; the complete emission inventory is included in Appendix 5.

5.1 Base Year Emissions

Through coordination with the MRPO and other states, a base year inventory was prepared for regional modeling analysis. The states reviewed methodologies and assisted in the preparation of key segments of the emissions inventory that was eventually submitted to the MRPO.

For on-road, nonroad, ammonia, and biogenic sources, the 2005 emissions were estimated by models. For the other sectors, point sources, area sources, and MAR (commercial marine, aircraft, and railroads), the 2005 emissions were prepared using data supplied by the MRPO States and, for non-MRPO states, data developed by other RPOs. In particular, for the non-MRPO states, a contractor (Alpine, with assistance from MACTEC) obtained the latest base (2002) and future year emission files (2009 and 2018) from the other RPOs. Specifically, the following versions of these emissions files were used here:

- MANE-VU: Version 3.1
- WRAP: Pre2002d
- CENRAP: Base F
- VISTAS: Base F

2005 emissions were then estimated by linearly interpolating between the 2002 and 2009 emissions.²

Further discussion of the development of the 2005 base year emissions is provided below.

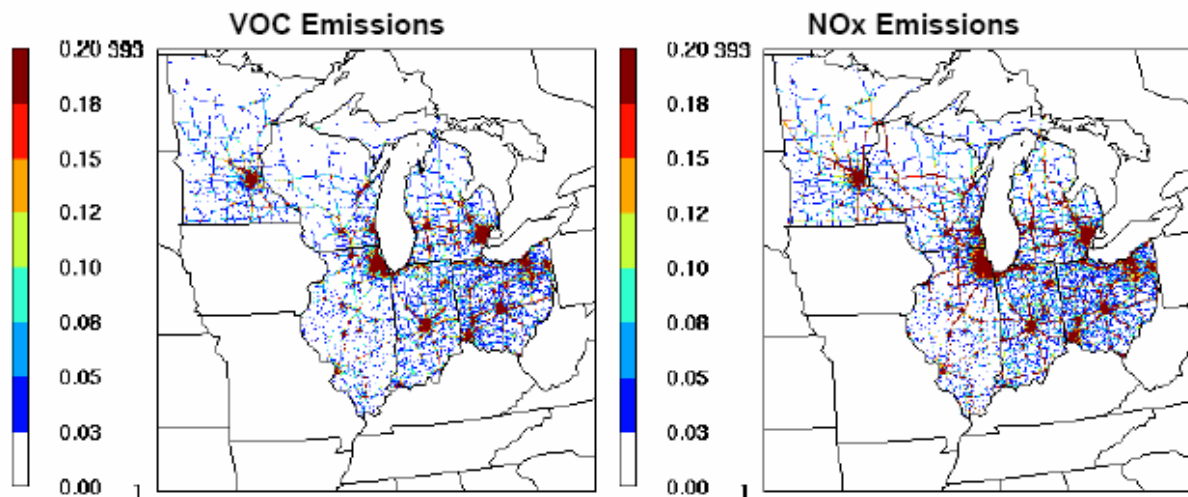
5.2 On-road Mobile

The CONSolidated Community Emissions Processing Tool (CONCEPT)³ was run by a contractor (Environ) using transportation data (e.g., VMT and vehicle speeds) supplied by the state and local planning agencies in the MRPO States and Minnesota for 24 networks. These data were first processed with T3 (Travel Demand Modeling [TDM] Transformation Tool) to provide input files for CONCEPT to calculate link specific, hourly emission estimates. CONCEPT was run with meteorological data for a July and January weekday, Saturday, and Sunday (July 15 – 17 and January 16 – 18). Spatial plots of emissions for July 15 are provided in the following figure.

² Emissions Inventory Assistance: 2005 Base Year Biogenic and Other (non-MRPO) State Emissions”, March 12, 2007

³ CONCEPT was developed as joint project between Alpine Geophysics, LLC and ENVIRON Corporation, with Midwest RPO and joint RPO funding, the CONCEPT model combines the best attributes of current emissions modeling systems into an open source model.

Figure 5 July 15, 2005 Motor Vehicle Emissions for VOC and NOx (Tons Per day)



For the non-MRPO states, CONCEPT was run by Environ using RPO-based HPMS county-level data (2002 and 2009) and MOBILE6 inputs (2002) compiled by another contractor for VISTAS. HPMS VMT for 2005 was generated by linearly interpolating between the 2002 and 2009 data. The 2002 MOBILE6 inputs were used for the 2005 modeling, with a few adjustments (e.g., fuel sulfur content was set to 30 ppm, as required by the Tier 2/low sulfur regulations).

5.3 Nonroad Mobile

NMIM2005⁴ was run by Grant Hetherington (Wisconsin Department of Natural Resources). The following are the NMIM2005 model runs prepared for the emissions inventory.

- Phase 1: Run NMIM2005 for the MRPO states plus Minnesota plus Iowa and Missouri agriculture with Pechan's modifications only⁵. The Pechan modifications that were not incorporated in the default NMIM2005 inputs and need to be incorporated are BSFC emission factor data, Michigan population data, Missouri seasonality data and revised countynrfile, countyyear, countyyearmonth, datasource and gasoline NCD tables that assimilate fuel changes and file references.
- Phase 2: Run NMIM2005 for the MRPO states plus Minnesota plus Iowa and Missouri agriculture with Pechan's modifications, revised 2005 MRPO gasoline parameters and a modified SCC table containing PM_{2.5} corrections for diesel equipment.
- Phase 3: Run NMIM2005 for the MRPO states plus Minnesota plus Iowa and Missouri agriculture with Pechan's modifications, revised 2005 MRPO gasoline parameters, a

⁴ The National Mobile Inventory Model (NMIM) is a free, desktop computer application developed by EPA to help develop estimates of current and future emission inventories for on-road motor vehicles and nonroad equipment. NMIM uses current versions of MOBILE6 and NONROAD to calculate emission inventories, based on multiple input scenarios entered into the system. NMIM is used to calculate national, state or county inventories.

⁵ "LADCO Nonroad Emissions Inventory Project – Development of Local Data for Construction and Agricultural Equipment", Final Report, September 10, 2004

modified SCC table containing PM_{2.5} corrections for diesel equipment and AIR's NONROAD.EXE. (Note: it is not clear if Phase 3 was used.)

Not all sectors of the nonroad inventory are calculated by NMIM2005 (i.e., commercial marine, aircraft, and railroads) and those were handled separately. Aircraft emissions were supplied by the states. Updated information for railroads and commercial marine was prepared by a contractor (Environ).⁶ For the non-MRPO states, Alpine developed appropriate emissions files based on data from the other RPOs, as noted above.

5.4 Area Sources

EMS was run by the MRPO using 2005 data supplied by the MRPO states and, for the non-MRPO states, using emission files supplied by Alpine based on data from the other RPOs to produce weekday, Saturday, and Sunday emissions for each month. Upon reviewing the data, further attention was given to two source categories, industrial adhesives and sealants and outdoor wood boilers, in order to provide updated emissions estimates. These activities are described below.

Industrial Adhesives and Sealants: The National Emissions Inventory shows this to be a large VOC emissions category in the MRPO States (i.e., 50,000 TPY) U.S. EPA subsequently determined that “(f)or the Region V states, we no longer believe that there are any activities in the Industrial Adhesives and Sealants category (SCC 2440020000) that have not been inventoried either in the point source Industrial Adhesives and Sealants category or under the Consumer and Commercial Adhesives and Sealants nonpoint category (SCC 2460600000 - all adhesives and sealants).” Consequently, this category was omitted from the 2005 regional emissions inventory.

Outdoor Wood Boilers: Over the past several years, the installation and operation of outdoor wood boilers for residential use has increased dramatically in many northern states. Relying on an emission estimation methodology prepared by Bart Sponseller (Wisconsin Department of Natural Resources), emissions were calculated by the other states for this category.

For the non-MRPO states, a contractor (Alpine, with assistance from MACTEC) estimated 2005 emissions by linearly interpolating between the 2002 and 2009 emissions developed by the other RPOs.

5.5 Point Sources – Electric Generating Units (EGUs)

EMS was run by the MRPO using 2005 data supplied by the MRPO states and, for the non-MRPO states, using emission files supplied by Alpine based on data from the other RPOs to produce weekday, Saturday, and Sunday emissions for each month.

The annual and summer season EGU emissions were temporalized for modeling purposes using profiles prepared by Scott Edick (Michigan Department of Environmental Quality) based on

⁶ “LADCO 2005 Locomotive Emissions”, Environ, February 2007, and “LADCO 2005 Commercial Marine Emissions”, Environ, March 2, 2007

CEM data for the period 2002 – 2005. Since the CEM data was the source of the emissions data, EGUs were removed from the general point source files provided by the states.

5.6 Point Sources – Non-EGU

EMS was run by the MRPO using 2005 data supplied by the MRPO states and, for the non-MRPO states, using emission files supplied by Alpine based on data from the other RPOs, to produce weekday, Saturday, and Sunday emissions for each month.

5.7 Other Improvements

Canadian Emissions: Previous modeling inventories for Canadian sources were flawed due to problems with emissions (e.g., MRPO inventories omitted ammonia emissions) or stack parameters (e.g., VISTAS inventories failed to include proper stack parameters, resulting in emissions getting dumped in the surface layer of the model). Scott Edick of the Michigan DEQ processed the 2005 Canadian National Pollutant Release Inventory (NPRI). Specifically, a subset of the NPRI data which is relevant to the air quality modeling was reformatted. Circle plots of point source emissions are presented in the following figures.

Figure 6 Base Year Emission Plots for Canada

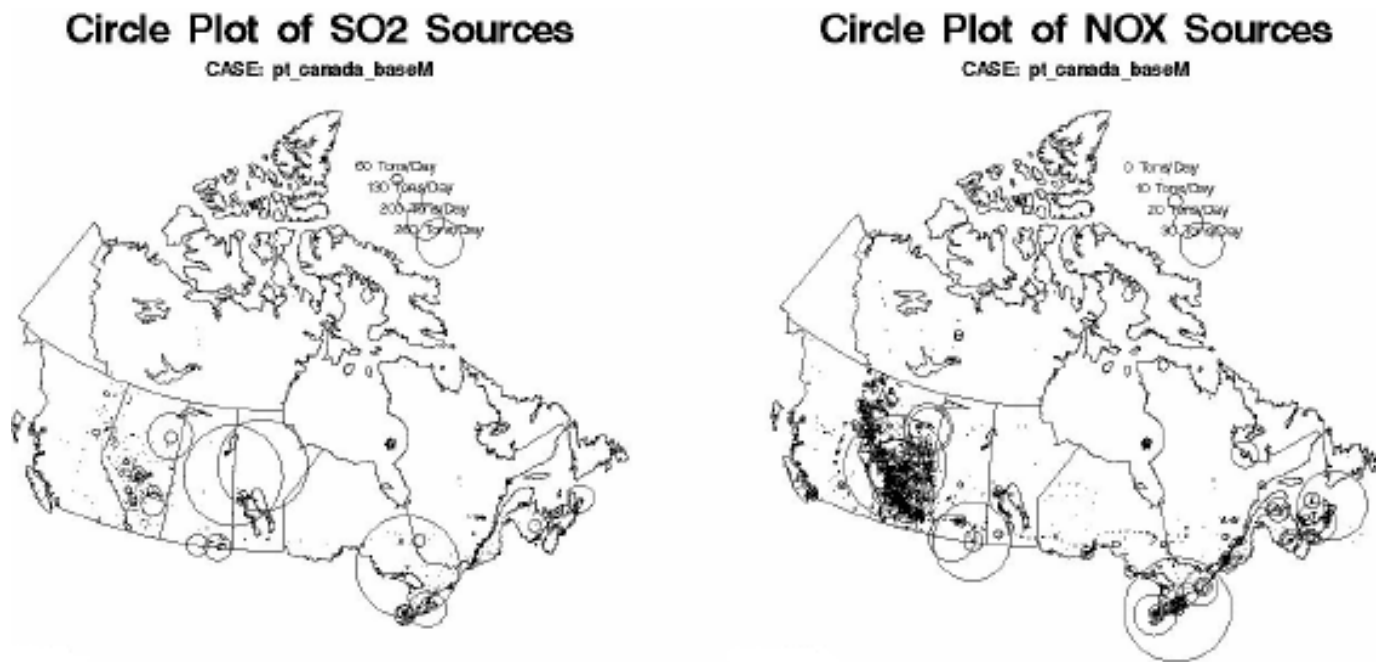
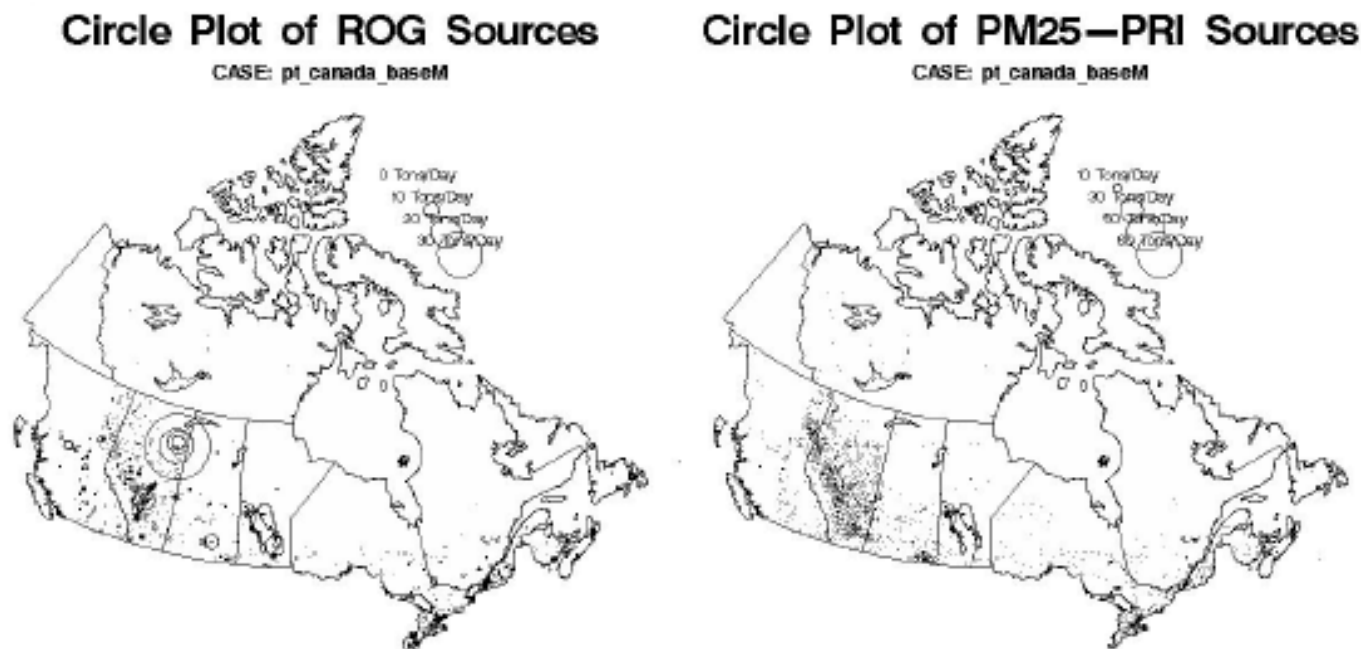


Figure 7 Base Year Emission Plots for Canada



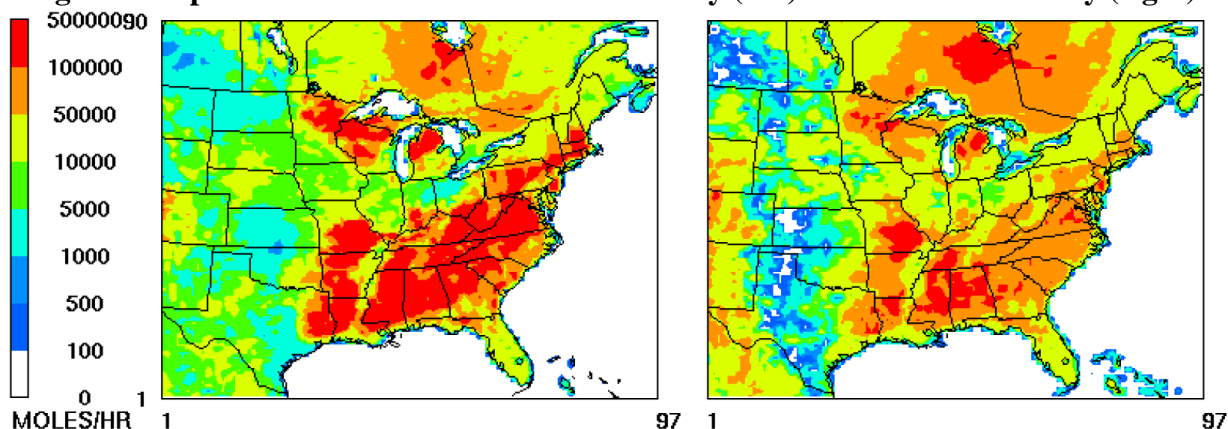
Biogenic Emissions: A contractor (Alpine) provided an updated version of the CONCEPT/MEGAN⁷ (Model of Emissions of Gases and Aerosols from Nature) biogenics model, which was used to produce base year biogenic emission estimates. Model improvements included: (a) reduced model run times, (b) improved ability to run successive days, and (c) enhanced meteorological input processing⁸.

As a result of the model improvements and more recent data sets, there is more regional isoprene using MEGAN compared to the BIOME estimates used for Base K (see Figure 8). Also, with the secondary organic aerosol updates to the CAMx air quality model, Base M includes emissions for monoterpenes and sesquiterpenes, which are precursors of secondary PM_{2.5} organic carbon mass.

⁷ See <http://bai.acd.ucar.edu/Megan/>

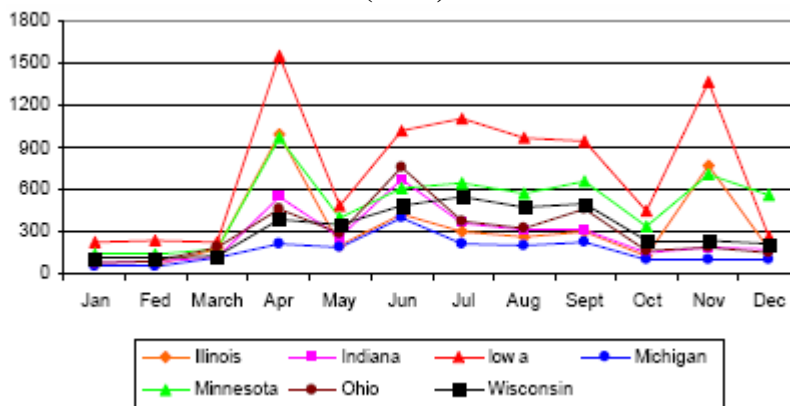
⁸ Subsequent to delivery of the updated CONCEPT/MEGAN model, it was found that more recent data sets and model formulations were available. Consequently, additional model improvements were undertaken. Compared to the initial updated model, the revised model reflects lower emissions for several organic aerosol species and NOx.

Figure 8 Isoprene Emissions for Current Inventory (left) v. Previous Inventory (right)



Ammonia Emissions: The CMU-based 2002 ammonia emissions were projected to 2005 using growth factors from the Round 4 emissions modeling. These emissions were then adjusted by applying temporal factors by month based on the process-based ammonia emissions model. A plot of the average daily emissions by state and month is provided in Figure 9.

Figure 9 Average Daily Tonnage of Ammonia Emissions for Midwest States by Month (2005)



5.8 Future Year Emissions

Emission inventories were developed for two future years: 2009 and 2018. For on-road, nonroad, and EGU sources, the future year emissions were estimated by models (i.e., CONCEPT, NMIM2005, and IPM, respectively) and then processed by the MRPO with EMS.

For other sectors (area, commercial marine, aircraft, and railroads, and non-EGU point sources) the future year emissions for the MRPO States were derived by applying growth and control factors to the base year inventory. These factors were developed by a contractor (E.H. Pechan).⁹ For the non-MRPO states, future year emission files were supplied by Alpine based on data from the other RPOs.

⁹ "Development of 2005 Base Year Growth and Control Factors for Lake Michigan Air Directors Consortium", Final Report, September 2007

Growth factors were based initially on EGAS (version 5.0), and were subsequently modified (for select, priority categories) by examining emissions activity data. The categories which show the largest resulting changes include:

Category	2005-2009	2005-2018
Industrial residual oil	-49.4%	-49.6%
Comm/consumer solvents	-10.5%	-15.6%
Architectural coatings	- 9.9%	- 9.3%
Auto refinishing	-12.9%	-38.9%
Ag – dairy cattle (NH ₃)	-10.2%	-39.0%
Outdoor wood boilers	+78.0%	+84.5%

Control factors were prepared for the following area, commercial marine, aircraft, railroad, and non-EGU point source existing (“on the books”) controls:

On-Highway Mobile Sources

- Tier II/low sulfur fuel
- Inspection/maintenance programs (nonattainment areas)
- Reformulated gasoline (nonattainment areas)

Off-Highway Mobile Sources

- Federal control programs incorporated into NONROAD model (e.g., nonroad diesel rule), plus the evaporative Large Spark Ignition and Recreational Vehicle standards
- Heavy-duty diesel (2007) engine standard/low sulfur fuel
- Federal railroad/locomotive standards
- Federal commercial marine vessel engine standards

Area Sources

- Consumer solvents
- AIM coatings
- Aerosol coatings
- Portable fuel containers
- Woodstoves
- Stage II Vapor Recovery

Point Sources - EGUs

- Title IV (Phases I and II)
- NO_x SIP Call
- Clean Air Interstate Rule
- Clean Air Mercury Rule

Other Point Sources

- VOC 2-, 4-, 7-, and 10-year MACT standards
- Combustion turbine MACT
- Industrial boiler/process heater/RICE MACT
- Consent decrees (refineries, ethanol plants, and ALCOA)¹⁰
- Other (Illinois and Ohio NO_x RACT¹¹, and BART in IN and WI)

¹⁰ E.H. Pechan’s original control file included control factors for three sources in Wayne County, MI. These control factors were not applied in the regional-scale modeling to avoid double-counting with the state’s local-scale analysis for PM_{2.5}

○ MACT¹²

Further discussion of the development of the future year emissions is provided below:

On-road: Similar to the base year modeling, CONCEPT was run using transportation data (e.g., VMT and vehicle speeds) supplied by the state and local planning agencies for 2009 and 2018. CONCEPT was only run with meteorological data for the July weekday. The emissions for Saturday and Sunday were derived by using scaling factors based on the 2005 emissions. The state-level emissions for the five MRPO States plus Minnesota are summarized in the following table¹³.

Table 2 Summary of On-road Emissions (Tons Per Day – July 15, 2005)

Year	State	CO	VOC	NOx	PM _{2.5}	SO ₂	NH ₃	Sum of VMT
2005	IL	3,684	342	748	13	10	36	344,087,820
	IN	3,385	282	541	9	11	26	245,537,232
	MI	4,210	352	722	12	14	35	340,834,026
	MN	2,569	219	381	6	8	18	170,024,600
	OH	6,113	680	934	16	19	37	360,521,069
	WI	2,206	175	458	8	9	20	189,123,964
	Total	22,168	2,049	3,783	65	70	171	1,650,128,710
2009	IL	2,824	268	528	10	4	39	372,132,591
	IN	2,840	235	402	7	3	26	249,817,026
	MI	3,172	269	501	9	4	37	356,347,011
	MN	2,257	206	308	5	2	22	204,443,018
	OH	4,619	424	694	12	5	40	387,428,127
	WI	1,673	119	322	6	2	21	197,729,965
	Total	17,385	1,522	2,754	49	20	184	1,767,897,738
2018	IL	2,085	152	201	6	4	43	413,887,887
	IN	2,217	138	173	4	3	30	288,042,232
	MI	2,434	164	204	6	4	41	388,128,432
	MN	1,800	123	137	4	2	25	237,022,214
	OH	3,362	243	274	7	4	43	421,694,093
	WI	1,256	68	139	4	2	22	218,277,168
	Total	13,153	888	1,128	31	18	204	1,967,052,026

For the non-MRPO states, CONCEPT was run by Environ using HPMS county-level data and MOBILE6 inputs compiled by another contractor for VISTAS. The emissions modeling for Iowa, Missouri, and Oklahoma was redone for 2009 to reflect the state-developed registration distribution data. (The initial modeling for 2009 used national default values for registration distribution assumed by VISTAS' contractor. CENRAP's contractor developed emissions inventories for 2002 and 2018 using the state developed data. For consistency, Environ's remodeling for these three states for 2009 also used the state-developed data.)

¹¹ WI believes that NOx RACT for their sources is already included in the 2005 basecase and EGU "will do" scenario, and IN provided NOx RACT information for inclusion as a non-EGU "may do" scenario.

¹² E.H. Pechan's original control file included EPA-default control factor information. Alternative control factors were developed by Wisconsin for a few MACT categories, and were also applied to the other four MRPO States.

¹³ For northeastern IL (CATS region), 2009 and 2018 emissions were increased by 9% and 8%, respectively, to reflect newer transportation modeling by CATS.

Off-road: Similar to the base year inventory, NMIM2005 was run by Grant Hetherington (Wisconsin Department of Natural Resources) to produce the future year inventories, with updated growth factors by E.H. Pechan.

Point Source - EGU: Future year emissions were based on U.S. EPA's IPM3.0 modeling. Three CAIR scenarios were addressed:

- 5a: U.S. EPA's IPM3.0 was assumed as the future year base for EGUs.
- 5b: U.S. EPA's IPM3.0, with several "will do" adjustments identified by the States. These adjustments should reflect a legally binding commitment (e.g., signed contract, consent decree, or operating permit).
- 5c: U.S. EPA's IPM3.0, with several "may do" adjustments identified by the States. These adjustments reflect less rigorous criteria, but should still be some type of public reality (e.g., BART determination or press announcement).

The following table summarizes the SO₂ and NO_x emissions for the three scenarios. The net effect is a small change (increase) in regional SO₂ and NO_x emissions.

Table 3 EGU Emissions for Base (5a), Will Do (5b), and May Do (5c) Scenarios

	2010 (Tons per Day)			2018 (Tons per Day)		
SO₂	5a	5b	5c	5a	5b	5c
IL	958	881	881	869	433	433
IN	1033	1318	1318	1036	1194	1194
MI	667	667	667	725	725	725
OH	1326	1410	1410	983	1127	1127
WI	460	460	421	435	499	235
Total	4444	4736	4697	4048	3978	3714
MN	162	148	148	187	167	157
NO_x	5a	5b	5c	5a	5b	5c
IL	275	247	247	224	195	195
IN	370	372	372	255	266	266
MI	242	242	242	243	243	243
OH	281	305	305	285	310	310
WI	165	164	155	176	172	145
Total	1333	1330	1321	1183	1186	1159
MN	116	142	142	132	157	125

Table 4 Emissions Summaries

	VOC			NOx			SO ₂			PM _{2.5}		
July	2005	2009	2018	2005	2009	2018	2005	2009	2018	2005	2009	2018
Nonroad												
IL	321	257	213	333	275	155	33	5	0	30	24	14
IN	195	160	128	191	158	89	19	3	0	17	13	7
MI	414	350	271	239	197	112	22	3	0	22	18	11
OH	356	294	238	304	246	135	29	5	0	27	22	13
WI	238	203	157	157	129	77	15	2	0	14	12	7
5-StateTotal	1,524	1,264	1,007	1,224	1,005	568	118	18	2	110	89	52
Commercial marine, aircraft, and railroad												
IL	11	10	6	246	228	165	22	19	17	7	6	4
IN	5	5	3	93	87	65	8	7	6	2	2	2
MI	7	7	7	87	82	65	21	14	8	3	3	2
OH	7	7	5	134	126	94	14	12	10	4	4	2
WI	4	4	3	58	54	41	8	6	5	2	2	1
5-StateTotal	34	33	24	618	577	430	73	58	46	18	17	11
Other Area												
IL	675	594	582	48	48	49	11	16	16	40	64	69
IN	391	358	384	56	58	59	32	32	32	2	2	2
MI	652	562	549	49	50	51	29	29	28	111	114	120
OH	604	506	487	93	108	108	6	15	14	19	35	34
WI	315	290	293	37	37	37	17	13	13	11	12	12
5-StateTotal	2,637	2,310	2,295	283	301	304	95	105	103	183	227	237
On-Road												
IL	341	268	151	748	528	201	9	4	3	13	10	6
IN	282	235	138	541	402	173	11	3	2	9	7	2
MI	351	269	163	722	501	204	14	4	3	12	9	3
OH	680	424	242	934	693	274	18	4	4	16	12	4
WI	175	119	68	457	322	138	9	2	2	8	6	2
5-StateTotal	1,829	1,315	762	3,402	2,446	990	61	17	14	58	44	17
EGU												
IL	7	6	7	305	275	224	1,158	958	869	13	34	77
IN	6	6	6	393	370	255	2,614	1,033	1,036	16	73	74
MI	6	4	4	393	242	243	1,251	667	725	15	25	29
OH	4	5	6	408	280	285	3,405	1,326	983	28	94	80
WI	5	2	3	213	165	177	545	460	435	-	22	25
5-StateTotal	28	23	26	1,712	1,332	1,184	8,973	4,444	4,048	72	248	285
Non-EGU												
IL	221	218	258	330	218	235	423	335	346	16	17	19
IN	130	137	167	179	175	178	218	216	180	35	36	44
MI	116	119	140	240	242	271	158	148	163	20	21	25
OH	84	87	104	175	166	178	289	288	293	27	28	33
WI	84	87	106	97	93	81	156	152	85	-	0	0
5-StateTotal	635	648	775	1,021	894	943	1,244	1,139	1,067	98	102	121
Total												
IL	1,576	1,353	1,217	2,010	1,572	1,029	1,656	1,337	1,251	119	155	189
IN	1,009	901	826	1,453	1,250	819	2,902	1,294	1,256	81	133	131
MI	1,546	1,311	1,134	1,730	1,314	946	1,495	865	927	183	190	190
OH	1,735	1,323	1,082	2,048	1,619	1,074	3,761	1,650	1,304	121	195	166

	VOC			NO _x			SO ₂			PM _{2.5}		
July	2005	2009	2018	2005	2009	2018	2005	2009	2018	2005	2009	2018
WI	821	705	630	1,019	800	551	750	635	540	35	54	47
5-StateTotal	6,687	5,593	4,889	8,260	6,555	4,419	10,564	5,781	5,280	539	727	723

6.0 Modeling Assessment

40 CFR Part 51, Appendix W provides modeling guidelines for conducting regional-scale modeling to simulate pollutants impairing visibility. The U.S. EPA recommends the use of one of three models and the MRPO chose the Comprehensive Air Quality Model with extensions (CAMx)).

The air quality analysis conducted by the MRPO includes weight of evidence approaches which rely on extensive data analysis and modeling. Given uncertainties in emissions inventories and modeling, these data analyses are a necessary part of the overall technical support.

Modeling includes base year analyses for 2005 to evaluate model performance and strategy analyses to assess candidate control strategies. The analyses were conducted in accordance with the U.S. EPA's modeling guidelines (i.e., "Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM_{2.5}, and Regional Haze", EPA-454/B-07-002, April 2007). The regional haze modeling covers the full calendar year of 2005 for the eastern U.S. and uses 36 kilometer meteorology and modeling domains using CAMx.

The Clean Air Act sets as a national goal, "the prevention of any future, and the remedying of any existing, impairment of visibility in Class 1 areas which impairment results from manmade air pollution"¹⁴ for regional haze. In the 5-state MRPO region, there are two Class 1 areas: Isle Royale National Park, MI and Seney National Wildlife Refuge, MI. The U.S. EPA visibility rules (64 FR 35714, July 1, 1999) require reasonable progress toward achieving "natural conditions" by the year 2064. Table 5 lists the areas that were modeled.

Table 5 Class 1 Areas Modeled by the MRPO

Class 1 Area	Identifier	State
Acadia National Park	ACAD1	Maine
Boundary Waters Canoe Area National Wilderness Area	BOWA1	Minnesota
Brigantine National Wilderness Area	BRIG1	New Jersey
Caney Creek National Wilderness Area	CACR1	Arkansas
Dolly Sods National Wilderness Area	DOSO1	West Virginia
Hercules-Glades National Wilderness Area	HEGL1	Missouri
Isle Royale National Park	ISLE1	Michigan
James River Face National Wilderness Area	JARI1	Virginia
Lye Brook National Wilderness Area	LYBR1	Vermont
Mammoth Cave National Park	MACA1	Kentucky
Mingo National Wilderness Area	MING1	Missouri
Seney National Wilderness Area	SENE1	Michigan
Shenandoah National Park	SHEN1	Virginia

¹⁴ Section 169A of the Clean Air Act

Class 1 Area	Identifier	State
Upper Buffalo National Wilderness Area	UPBU1	Arkansas
Voyageurs National Park	VOYA2	Minnesota

The primary source of modeling used in this document is from "Regional Air Quality Analyses for Ozone, PM_{2.5} and Regional Haze: Technical Support Document", April 25, 2008, States of Illinois, Indiana, Michigan, Ohio, and Wisconsin. This document is available at the MRPO website, http://www.ladco.org/References/TSD_Version_IV_April_25_2008_FINAL.pdf (MRPO TSD).

6.1 Regional Haze/Visibility

The components of the visibility equation match up very closely to the prominent chemical forms of PM_{2.5}: nitrate ion, sulfate ion, ammonium ion, organic carbon, elemental carbon, and soil (U.S. EPA, 2007). Since these modeling applications will support PM_{2.5}/Haze rules, model performance will be most rigorous for each of these PM_{2.5} species and coarse mass.

One of the problems related to PM model performance evaluation involves matching inconsistent monitor methodologies and model specie definition. Additionally, speciated measurements rarely add up to measurements of total fine mass. This unexplained fraction is usually attributed to the retention of water on the weighed samples (Timin, 2002). Other problems with comparing speciation samples and Federal Reference Method (FRM) measurements include volatilization of nitrate and positive and negative organic carbon artifacts (Timin, 2002).

Organic material is typically estimated from organic carbon using a factor of 1.4, which is based on the assumption that carbon accounts for 70% of the organic mass. Recent literature recommends a factor of 1.6 ± 0.2 for urban aerosol and 2.1 ± 0.2 for non-urban areas that see more aged aerosols (Turpin and Lim, 2001; "Interagency Monitoring of Protected Visual Environments (IMPROVE)", 2006). These factors are applied to observation data based on land use type before being compared to model output. These factors may also be used to reduce modeled estimates of organic material to organic carbon.

Performance metrics used to describe model performance for PM_{2.5} species include mean bias, gross error, fractional bias, and fractional error (U.S. EPA, 2007). The bias and error metrics are used to describe performance in terms of the measured concentration units ($\mu\text{g}/\text{m}^3$). Even though the distribution of PM_{2.5} is log-normal, the data is not transformed for this analysis. The model attainment tests outlined by U.S. EPA for the PM_{2.5} National Ambient Air Quality Standards (NAAQS) and Regional Haze Rule require relative response factors to be applied to actual concentrations and not transformed concentrations. No minimum value is used to eliminate data points for the purposes of this analysis.

6.2 Attainment Tests for Regional Haze/Visibility

Visibility may be estimated by two similar methods that relate light extinction to ambient PM_{2.5} concentrations (FLAG, 2000; U.S. EPA, 2007). Visibility will be estimated using the new equation recommended by the IMPROVE steering committee (IMPROVE, 2006). The new and old equations produce very similar estimates of light extinction in the upper Midwest. The new equation will be emphasized for the SIP modeling demonstration due to its more up-to-date science.

The equation shown below relates PM_{2.5} specie concentrations to light extinction. Additional factors of relative humidity adjustment factor (fRH) are included that change the light scattering of sulfate and nitrate based on climatologically averaged relative humidity.

$$\beta_{\text{ext}} = 2.2 * \text{fSRH} * [\text{small sulfate}] + 2.4 * \text{fS(RH)} * [\text{small nitrate}] + 4.8 * \text{fLRH} * [\text{large sulfate}] + 5.1 * \text{fL(RH)} * [\text{large nitrate}] + 2.8 * [\text{small OCM}] + 6.1 * [\text{large OCM}] + 10 * \text{EC} + 1 * \text{SOIL} + 0.6 * \text{CM} + 1.7 * \text{fSS(RH)} * \text{SS} + \beta_{\text{rayleigh}}$$

β_{ext} - Estimated extinction coefficient (Mm⁻¹)

Sulfate - Sulfate associated with ammonium (SO₄*1.375)

Nitrate - Nitrate associated with ammonium (NO₃*1.29)

OCM - Organic carbon Mass

EC - Elemental carbon

SOIL - Inorganic primary PM_{2.5} (soil, crustal, other)

CM - Coarse fraction particulate matter

SS - Sea salt

β_{rayleigh} Light scattering due to Rayleigh scattering (site specific)

fRH - Relative humidity adjustment factor

The apportionment of sulfate, nitrate, and organic carbon mass into small and large size fractions is shown below using 'X' as a placeholder for these species.

$$\text{Large X} = ([\text{Total X}] / [20 \text{ ug/m}^3]) * [\text{Total X}], \text{ where } [\text{Total X}] < 20 \text{ ug/m}^3$$

$$\text{Large X} = [\text{Total X}], \text{ where } [\text{Total X}] \geq 20 \text{ ug/m}^3$$

$$\text{Small X} = [\text{Total X}] - [\text{Large X}]$$

The fRH values are long-term averages that are site and month specific (U.S. EPA, 2003a; U.S. EPA 2003b; FLAG, 2000). The light scattering due to Rayleigh is site specific (IMPROVE, 2006). The NO₂ component to the light extinction equation is not included since it is not measured at Class 1 areas in the upper Midwest. The visibility equation is expressed as an extinction coefficient (β_{ext}) and is converted to deciviews using the equation below.

$$\text{Deciview} = 10 \ln(\beta_{\text{ext}} / \beta_{\text{rayleigh}})$$

The reasonable progress test to determine the relationship between current and future year visibility is expressed in deciview units. The changes in deciviews between the current and future year strategy is the reasonable progress test and is shown below.

$$\text{Change in Deciview} = 10 \ln[(\beta_{\text{ext}})_{\text{future}} / (\beta_{\text{ext}})_{\text{base}}]$$

- or -

$$\text{Change in Deciview} = \text{Deciview}_{\text{base}} - \text{Deciview}_{\text{future}}$$

Visibility will be estimated for key Class 1 areas in the Midwest for the base year and various future year scenarios. The changes in visibility between the baseline and future year will be assessed using procedures in U.S. EPA's modeling guidance document (U.S. EPA, 2007).

1. The visibility in deciviews will be ranked from high to low at each Class 1 area for the calendar years 2000-2004 using the monthly and site specific fRH values and the more recent IMPROVE light extinction equation.
2. The mean deciviews for the 20% days with the best and the 20% days with the worst visibility are estimated for each Class 1 area for each year of the 2000-2004 baseline period.

3. The mean observed extinction coefficient for the days during the modeling period (2005) with the 20% best and 20% worst visibility will be calculated.
4. The mean predicted extinction coefficient for the corresponding 20% best and 20% worst days of the modeling period of the base case and future year strategy will be calculated using monthly site specific fRH values.
5. The relative response factor for the 20% best and 20% worst group of days for each site for each of the particulate matter species in the light extinction equation is estimated.
6. The relative response factors are multiplied by daily measured PM data during the 2000-2004 baseline to estimate future daily values of these species.
7. These future daily PM estimates are used to estimate light extinction for each of the previously identified 20% best and 20% worst days of monitored data. Light extinction is converted to deciviews and the mean value for the best and worst days for each year of the baseline period is estimated.
8. The 5 mean deciview values for the worst and best days (one from each of the 5 years) are averaged together for a mean value for the best and worst days.
9. The future year mean deciview values in step 8 are compared to the observed values from step 2. The differences are compared to established goals for reasonable progress to determine if reasonable progress is demonstrated.

6.3 Regional Haze Modeling Results

For regional haze, the calculation of future year conditions assumed: (a) baseline concentrations based on 2000-2004 IMPROVE data, with updated (substituted) data for Mingo, Boundary Waters, Voyageurs, Isle Royale, and Seney (see “Impact of Missing Data on Worst Days at Midwest Northern Class 1 Areas”, March 12, 2007 (revised 6/19/07)), (b) use of the new IMPROVE light extinction equation, and (c) use of U.S. EPA default values for natural conditions, based on the new IMPROVE light extinction equation.

Pursuant to U.S. EPA’s Regional Haze Rule, states must consider several factors in establishing reasonable progress goals for their Class 1 areas, including the uniform rate of visibility improvement. The uniform rate of visibility improvement values for the 2018 planning year were derived (for the 20% worst visibility days) based on a straight line between the baseline concentration value (plotted in the year 2004, end year of the 5-year baseline period) and the 1 natural condition value (plotted in the year 2064, the date for achieving natural conditions). Plots of these “glidepaths” for Class 1 areas in the eastern U.S. showing the worst 20% days and best 20% days are presented in Figure 10. A tabular summary of measured baseline and modeled future year deciview values for these Class 1 areas are provided in Tables 6 and 7. This information was taken from the MRPO Technical Support Document (TSD). Data for Smoky Mountains and Sipsey were not included in that report. Caney Creek was not plotted in the MRPO TSD. These are addressed individually in later portions of this section.

The haze results show that several Class 1 areas in the eastern U.S. are expected to be greater than the uniform rate of visibility improvement values (in 2018), including those in northern Michigan and several in the northeastern U.S. Many other Class 1 areas in the eastern U.S. are expected to be less than the uniform rate of visibility improvement values (in 2018).

Figure 10 Visibility Modeling Results for Class 1 Areas in Eastern U.S.

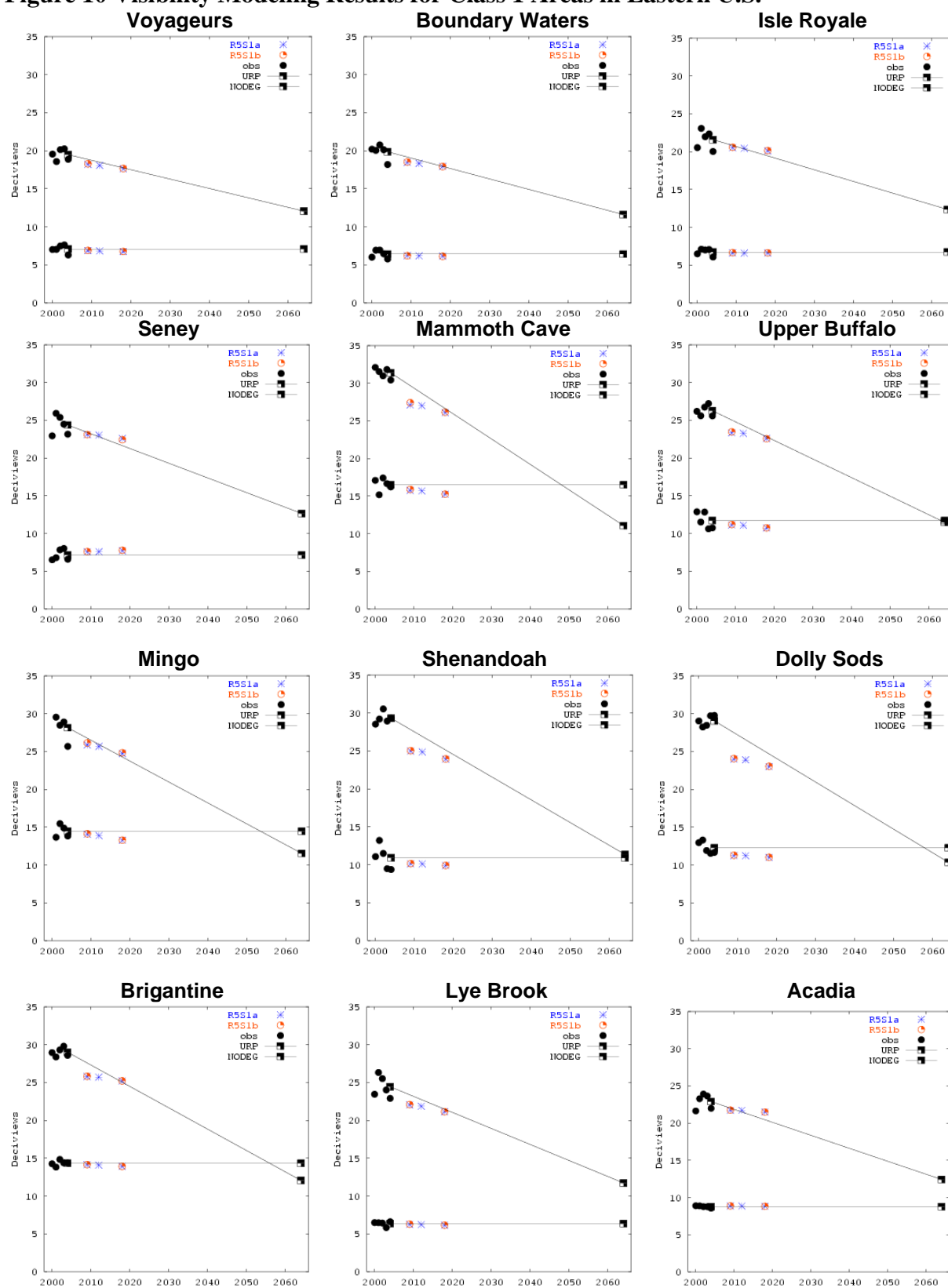


Table 6 Visibility Modeling Results (Deciviews) for Class 1 Areas in Eastern U.S. (Worst 20%)

Site	2000-2004 Baseline	2018 URP	2009 OTB	2009 OTB+Will Do	2012 OTB	2018 OTB	2018 OTB+Will Do
Boundary Waters	19.86	17.94	18.45	18.51	18.33	17.94	17.92
Voyageurs	19.48	17.75	18.2	18.28	18.07	17.63	17.66
Seney	24.38	21.64	23.1	23.1	23.04	22.59	22.42
Isle Royale 1	21.59	19.43	20.52	20.58	20.43	20.09	20.13
Isle Royale 9	21.59	19.43	20.33	20.37	20.22	19.84	19.82
Hercules-Glades	26.75	23.13	24.72	24.82	24.69	24.22	24.17
Mingo	28.15	24.27	25.88	26.13	25.68	24.74	24.83
Caney Creek	26.36	22.91	23.39	23.55	23.29	22.44	22.4
Upper Buffalo	26.27	22.82	23.34	23.47	23.27	22.59	22.55
Mammoth Cave	31.37	26.64	27.11	27.41	27.01	26.1	26.15
Dolly Sods	29.05	24.69	24	24.06	23.9	23	23.04
Shenandoah	29.31	25.12	24.99	25.04	24.87	23.92	23.95
James River Face	29.12	24.91	25.17	25.25	25.01	24.06	24.12
Brigantine	29.01	25.05	25.79	25.83	25.72	25.21	25.22
Lye Brook	24.45	21.48	22.04	22.08	21.86	21.14	21.14
Acadia	22.89	20.45	21.72	21.75	21.72	21.49	21.49

Table 7 Visibility Modeling Results (Deciviews) for Class 1 Areas in Eastern U.S. (Best 20%)

Site	2000-2004 Baseline	2018 URP	2009 OTB	2009 OTB+Will Do	2012 OTB	2018 OTB	2018 OTB+Will Do
Boundary Waters	6.42	6.42	6.21	6.2	6.19	6.14	6.12
Voyageurs	7.09	7.09	6.86	6.89	6.83	6.75	6.76
Seney	7.14	7.14	7.57	7.59	7.58	7.71	7.78
Isle Royale 1	6.75	6.75	6.62	6.64	6.59	6.6	6.62
Isle Royale 9	6.75	6.75	6.56	6.57	6.55	6.52	6.5
Hercules-Glades	12.84	12.84	12.51	12.56	12.32	11.66	11.64
Mingo	14.46	14.46	14.07	14.13	13.89	13.28	13.29
Caney Creek	11.24	11.24	10.88	10.95	10.85	10.52	10.52
Upper Buffalo	11.71	11.71	11.13	11.19	11.08	10.73	10.74
Mammoth Cave	16.51	16.51	15.76	15.88	15.69	15.25	15.25
Dolly Sods	12.28	12.28	11.25	11.29	11.23	11	11.01
Shenandoah	10.93	10.93	10.13	10.16	10.11	9.91	9.91
James River Face	14.21	14.21	13.38	13.43	13.38	13.14	13.14
Brigantine	14.33	14.33	14.15	14.16	14.08	13.92	13.92
Lye Brook	6.37	6.37	6.25	6.28	6.23	6.14	6.15
Acadia	8.78	8.78	8.86	8.88	8.86	8.82	8.82

URP - uniform rate of progress

OTB - on-the-books controls

OTB+Will Do - on-the-books controls plus adjustments for controls from states commitments

7.0 Reasonable Progress Goals

7.1 Background

IDEM assessed each of the Class 1 areas identified in the MRPO report as being impacted by Indiana sources. Information provided by the MRPO, technical documents from the other RPOs, and letters received from other states indicating their decisions regarding reasonable further progress goals were used to make these assessments.

In determining reasonable progress for regional haze, Section 169 of the Clean Air Act and U.S. EPA's visibility rule requires states to consider five factors:

- Costs of compliance
- Time necessary for compliance
- Energy and non-air quality environmental impacts of compliance
- Remaining useful life of any existing source subject to such requirements
- Uniform rate of visibility improvement (needed to attain natural visibility conditions by 2064)

Since Indiana has no Class 1 areas, the states with Class 1 areas took the lead in establishing reasonable progress goals. Indiana participated in the discussions and provided information to assist in setting the goals. The states developing the plans addressed the four factors and developed the uniform rate of progress glidepaths.

In the following sections, these analyses are summarized. A detailed analysis of each area is included in the appendices. In the previous section, MRPO modeling was used to identify areas possibly impacted by Indiana sources. In Sections 7.3 through 7.7, VISTAS modeling results are used to provide additional evidence regarding progress in achieving visibility improvements.

7.2 Voyageurs National Park and Boundary Waters Canoe Area National Wilderness Area

Indiana sources have shown an impact on these Class 1 areas through modeling studies. Minnesota has determined that several other states are significant contributors to visibility impairment in these areas at this time and is working with them as they develop their reasonable progress goals.

The cover letter from the Minnesota Pollution Control Agency contains their reasonable progress analysis and can be found in Appendix 3. Indiana has participated in the consultation calls and the MRPO modeling process used by Minnesota to reach their conclusions.

As can be seen in the map on page 6 of the Minnesota letter in Appendix 3, Indiana is barely in the Areas of Influence that impact their Class 1 areas. Minnesota has developed a long term strategy sufficient to meet their 2018 reasonable progress goals, and has not requested additional assistance from Indiana.

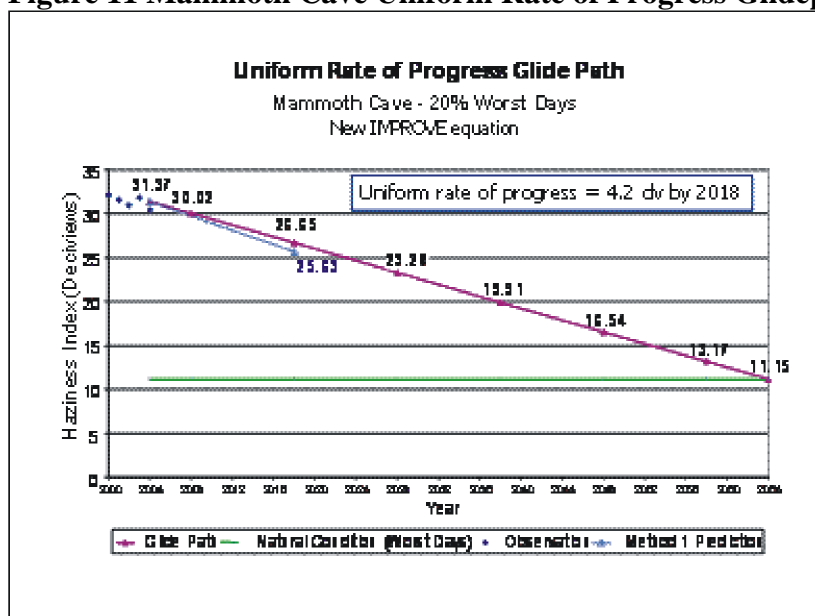
Indiana concurs that this is the best approach for addressing visibility impairment at Voyageurs and Boundary Waters Class 1 areas at this time. Therefore, no further analysis for this SIP is necessary.

7.3 Mammoth Cave National Park

Indiana sources have shown an impact on this Class 1 area through modeling studies. However, since sources in Kentucky and Indiana must comply with CAIR requirements, the Kentucky analysis has determined that these controls are sufficient to address visibility in this area. Further, VISTAS modeling has shown that Mammoth Cave is more than meeting its uniform rate of progress (glidepath) and has determined that no additional reductions are needed from Indiana at this time.

The cover letter from the Kentucky Department for Environmental Protection contains this information, Appendix 2, page 25. The results of the long term strategy developed by Kentucky and VISTAS provide anticipated visibility improvements below the glidepath, as can be seen in following figure.

Figure 11 Mammoth Cave Uniform Rate of Progress Glidepath



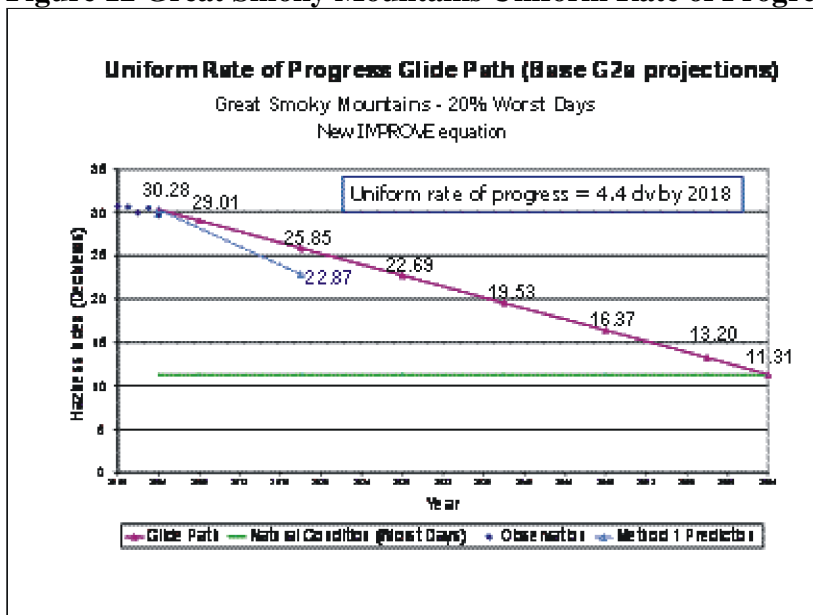
Analyses performed by the MRPO show similar results. Indiana concurs that this is the best approach for addressing visibility impairment at Mammoth Cave at this time. Therefore, no further analysis for this SIP is necessary.

7.4 Great Smoky Mountains National Park

In the MRPO summary of Class 1 areas impacted by sources from within the MRPO (Appendix 1), Indiana was determined to contribute to visibility impairment in this Class 1 area. Since that time, VISTAS has conducted several analyses to assist in developing reasonable progress goals.

The following figure shows that the long term strategy developed for this Class 1 area easily meets the glidepath through 2018.

Figure 12 Great Smoky Mountains Uniform Rate of Progress Glidepath

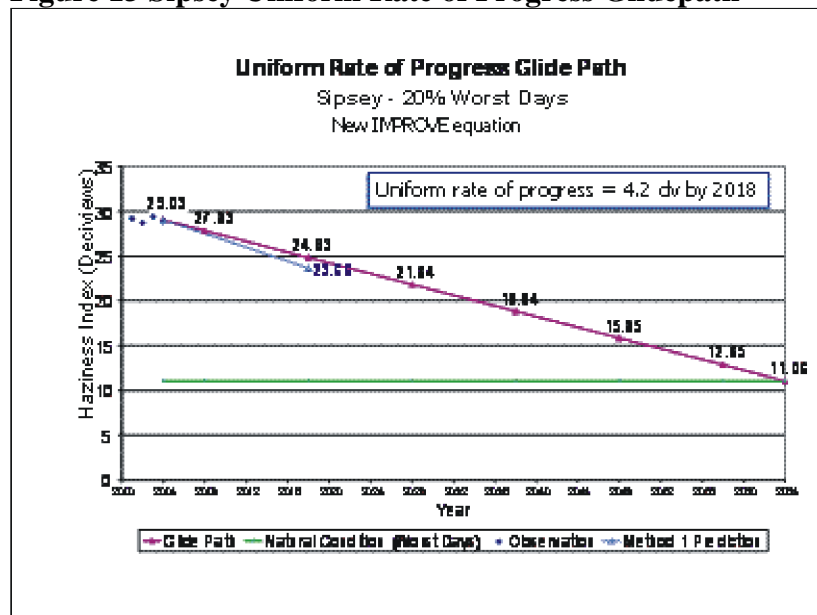


In the "Technical Analyses Supporting Regional Haze State Implementation Plan," June 8, 2007, North Carolina Department of Environment and Natural Resources stated that contributions from other RPOs are comparatively small and the greatest benefits would likely be from further EGU reductions within the VISTAS states. Indiana was not contacted by Tennessee or North Carolina regarding consultations for this area and believes that no further analysis for a long term control strategy is necessary at this time.

7.5 Sipsey National Wilderness Area

In the MRPO summary of Class 1 areas impacted by sources from within the MRPO (Appendix 1), Indiana was determined to contribute to visibility impairment in this Class 1 area. Since that time, VISTAS conducted several analyses to assist in developing reasonable progress goals. The following figure shows that the long term strategy for this Class 1 area meets the glidepath through 2018.

Figure 13 Sipsey Uniform Rate of Progress Glidepath



Indiana has not been contacted by Alabama regarding consultations for this area and believes that no further analysis for a long term control strategy is necessary at this time.

7.6 James River Face National Wilderness Area, Shenandoah National Park, Dolly Sods/Otter Creek National Wilderness Areas

In the MRPO summary of Class 1 areas impacted by sources from within the MRPO (Appendix 1), Indiana was determined to contribute to visibility impairment in these more distant Class 1 areas. Since that time, VISTAS has conducted several analyses to assist in developing reasonable progress goals. The results of the long term strategy developed by the states and VISTAS provide anticipated visibility improvements below the glidepath. Figures 14, 15, and 16 show the glidepaths for each of these areas.

Figure 14 James River Face Uniform Rate of Progress Glidepath

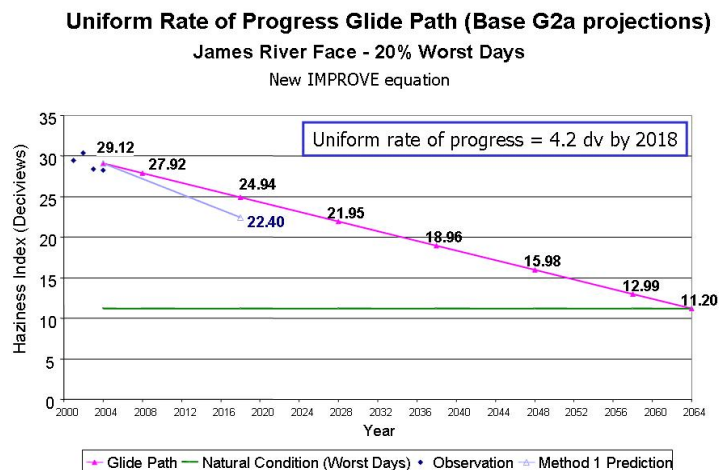


Figure 15 Shenandoah Uniform Rate of Progress Glidepath

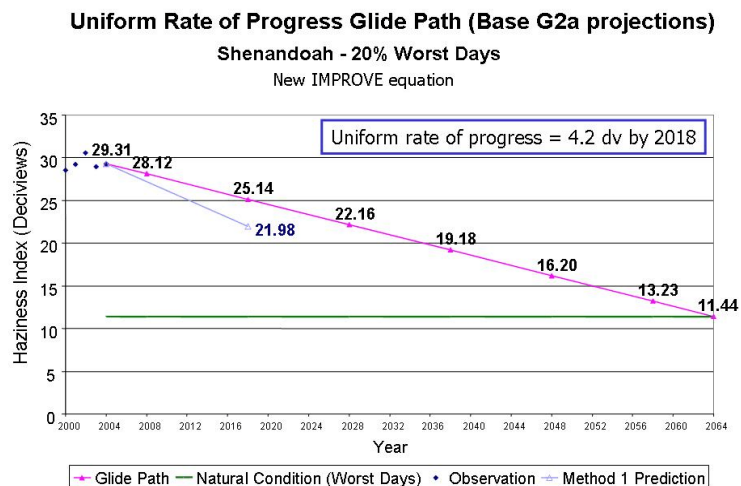
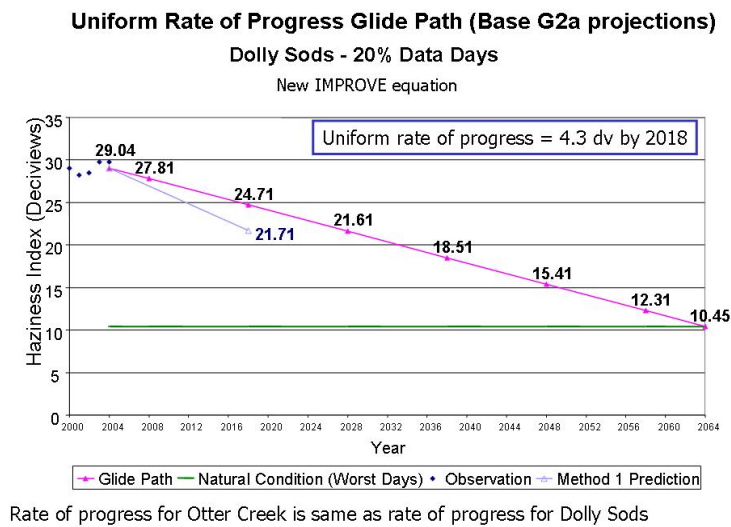


Figure 16 Dolly Sods Uniform Rate of Progress Glidepath



Neither Virginia nor West Virginia contacted IDEM to participate in consultations for these areas. The four factor analyses performed by the VISTAS states and resulting long term strategies indicate that controls closer to the Class 1 areas provide the most effective reductions at this time. Additionally, the long term strategies provide anticipated visibility improvements below the glidepaths. Indiana concurs with these conclusions.

7.7 Caney Creek and Upper Buffalo National Wilderness Areas, AR, and Hercules-Glades and Mingo National Wilderness Areas, MO

These areas were identified in early MRPO modeling and other analyses as being impacted by Indiana sources. Indiana was invited to participate in the consultation process for these areas, and attended the conference phone calls. Arkansas and Missouri recently notified IDEM that they consider the consultation process finished. They have developed long term strategies that meet Rate of Progress Goals by 2018. Further, Southwestern Indiana was included in the area of influence which impacts these areas (Appendix 3, page 52). The controls in existence in the 2002 inventory, those installed after 2002, and controls planned out to 2018, were analyzed. A large majority of these sources will be controlled by 2018, which will further aid in the progress toward their reasonable progress goals.

Figures 17 - 20 show glidepaths resulting from the long term strategies developed by the states. All the Class 1 areas are projected to meet their reasonable progress goals in 2018.

At this time, they have concluded that no reductions are necessary from Indiana. The letter providing this information is in Appendix 3, page 45.

Figure 17 Caney Uniform Rate of Progress Glidepath

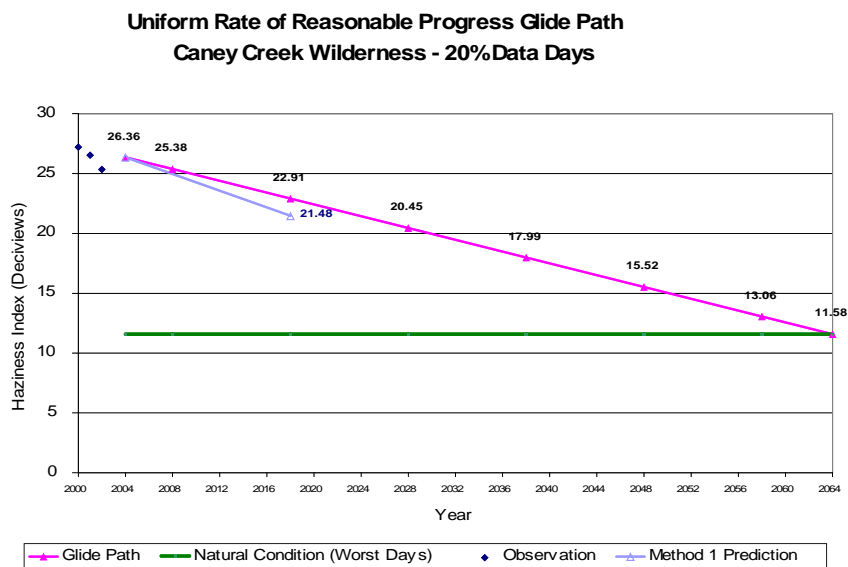


Figure 18 Upper Buffalo Uniform Rate of Progress Glidepath

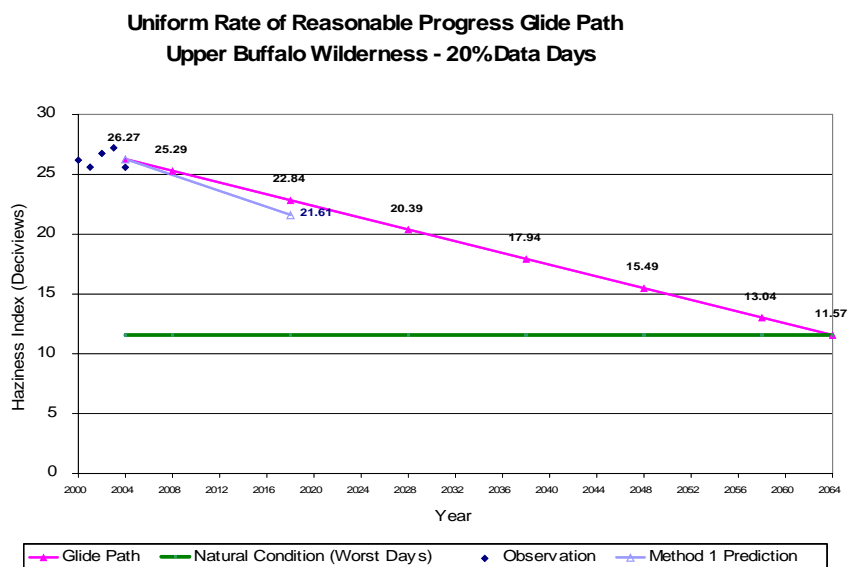


Figure 19 Hercules-Glades Uniform Rate of Progress Glidepath

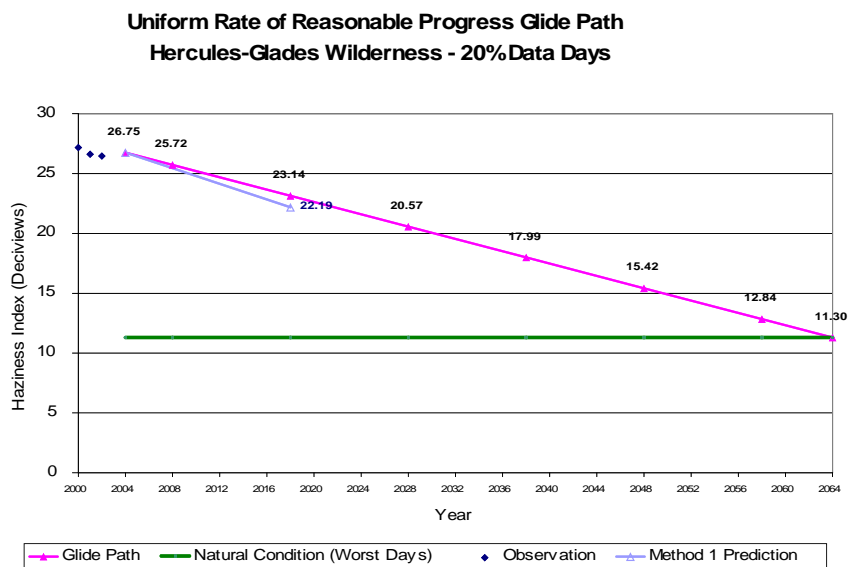
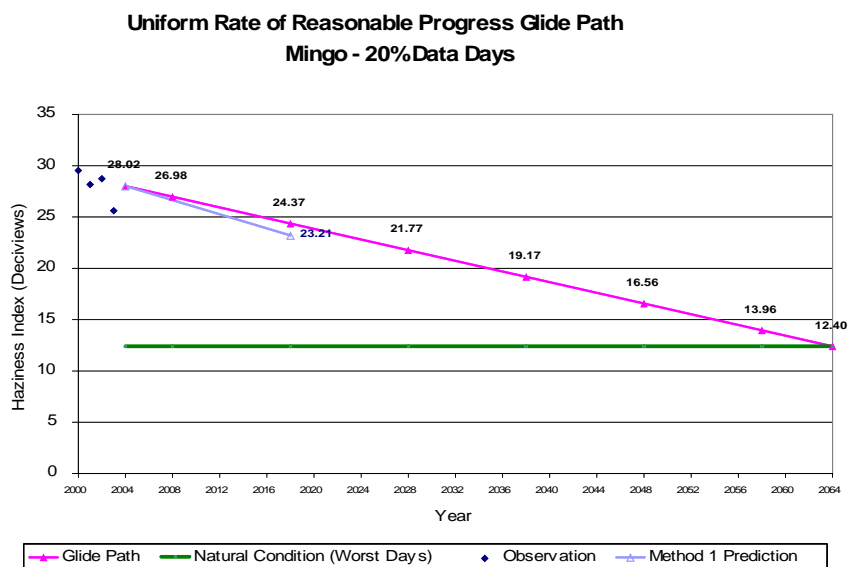


Figure 20 Mingo Uniform Rate of Progress Glidepath



7.8 Isle Royale National Park and Seney National Wilderness Area, MI

Indiana sources have shown an impact on these Class 1 areas through modeling studies. Indiana and the other Midwestern states participated extensively in the MRPO modeling and data analysis efforts for fine particulates, ozone, and haze in these areas. Michigan determined that existing and on-the-books controls (those controls scheduled in response to regulatory actions within this time period), combined with reductions necessary to meet the new 24-hour fine particulates standard and possibly the new ozone standard will be sufficient to meet their reasonable progress goals.

The letter from the Michigan Department of Air Quality (Appendix 3, page 56), which can be found in the appendices, contains their conclusions. Indiana concurs that this is the best approach for addressing visibility impairment at Isle Royale National Park and Seney National Wilderness Area Class 1 areas at this time. Therefore, no further analysis for this SIP is necessary. Indiana will continue to work with Michigan through the MRPO to evaluate the progress in the Class 1 areas.

7.9 Acadia National Park, ME; Moosehorn Wilderness Area, ME; Great Gulf Wilderness Area, NH; Brigantine National Wilderness Area, NJ; and Lye Brook National Wilderness Area, VT (MANE-VU)

Indiana sources have shown an impact on these Class 1 areas through the MRPO and MANE-VU modeling projects. Indiana, along with the other MRPO states, has participated in consultations with MANE-VU.

MANE-VU released “Assessment of Reasonable Progress for Regional Haze in MANE-VU Class 1 Areas - Methodology for Source Selection, Evaluation of Control Options, and Four Factor Analysis, July 2007” which supported requests of states outside that area to examine controls for specific types of sources. This assessment is a large document and is not included in this submittal. It is available online at the MANE-VU website, <http://www.manevu.org>, under “Consultations - Projects and Work Products.” The resulting request is referred to as the “MANE-VU Ask.”

MANE-VU Ask: In its “Statement of the Mid-Atlantic/Northeast Visibility Union (MANE-VU) Concerning a Request for a Course of Action by States Outside of MANE-VU Toward Assuring Reasonable Progress” (June 20, 2007), Appendix 3, pages 63 - 64, MANE-VU suggested that several control strategies should be pursued for adoption and implementation¹⁵, including:

- Application of Best Available Retrofit Technology
- 90% (or greater) reduction in SO₂ emissions from each of the EGU stacks on MANE-VU’s list of 167 stacks (located in 19 states), which reflect those stacks determined to be reasonably anticipated to cause or contribute to visibility impairment in the MANE-VU Class 1 areas
- 28% reduction in non-EGU (point, area, on-road, and off-road) SO₂ emissions relative to on-the-books, on-the-way 2018 projections
- Continued evaluation of other measures, including measures to reduce SO₂ and NO_x emissions from coal-burning facilities and promulgation of new source performance standards for wood combustion
- Further reduction in power plant SO₂ (and NO_x) emissions beyond the current Clean Air Interstate Rule program

Of the 167 stacks, 15 are from 9 sources in Indiana (Appendix 3, page 62). Most of these stacks have or will have post-combustion emission controls (i.e., scrubbers).

¹⁵ The June 20 statement was transmitted to the MRPO States in letters dated July 30 from Anna Garcia, acting Executive Director, MANE-VU.

The two sets of charts from MRPO "Round 5" modeling show the culpability of geographic areas to visibility conditions in two Class 1 areas in the northeast. The left charts are the best days, the right charts are the worst days.

Figure 21 Acadia Visibility Impact Modeling

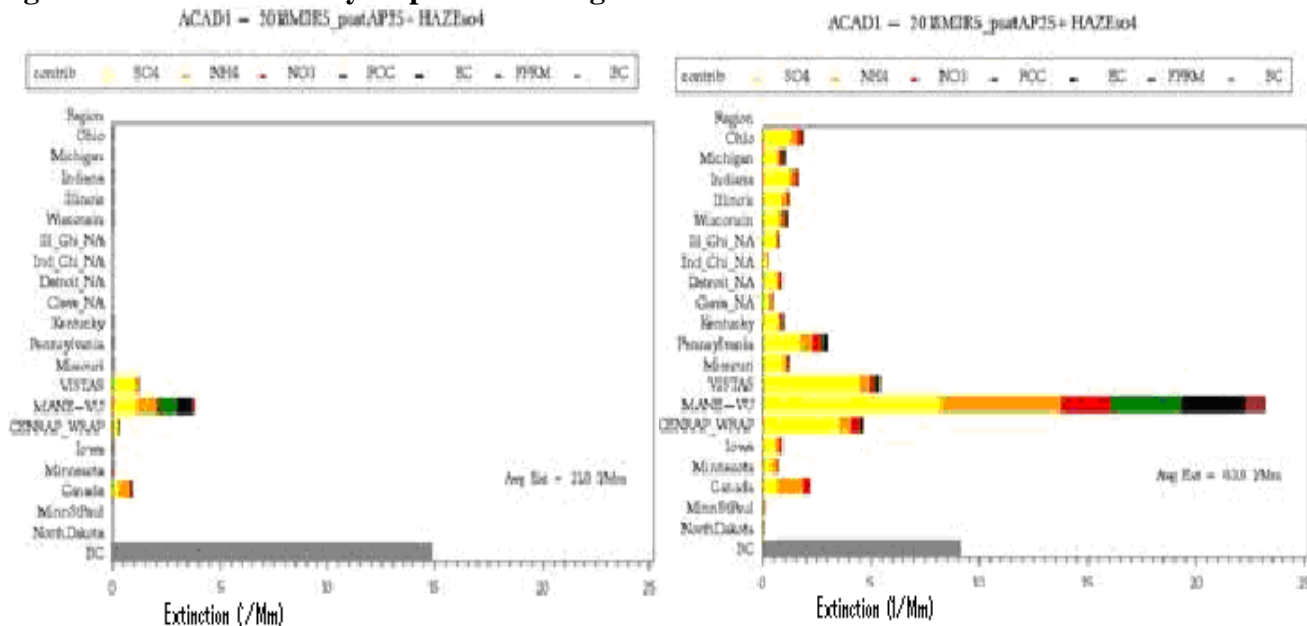
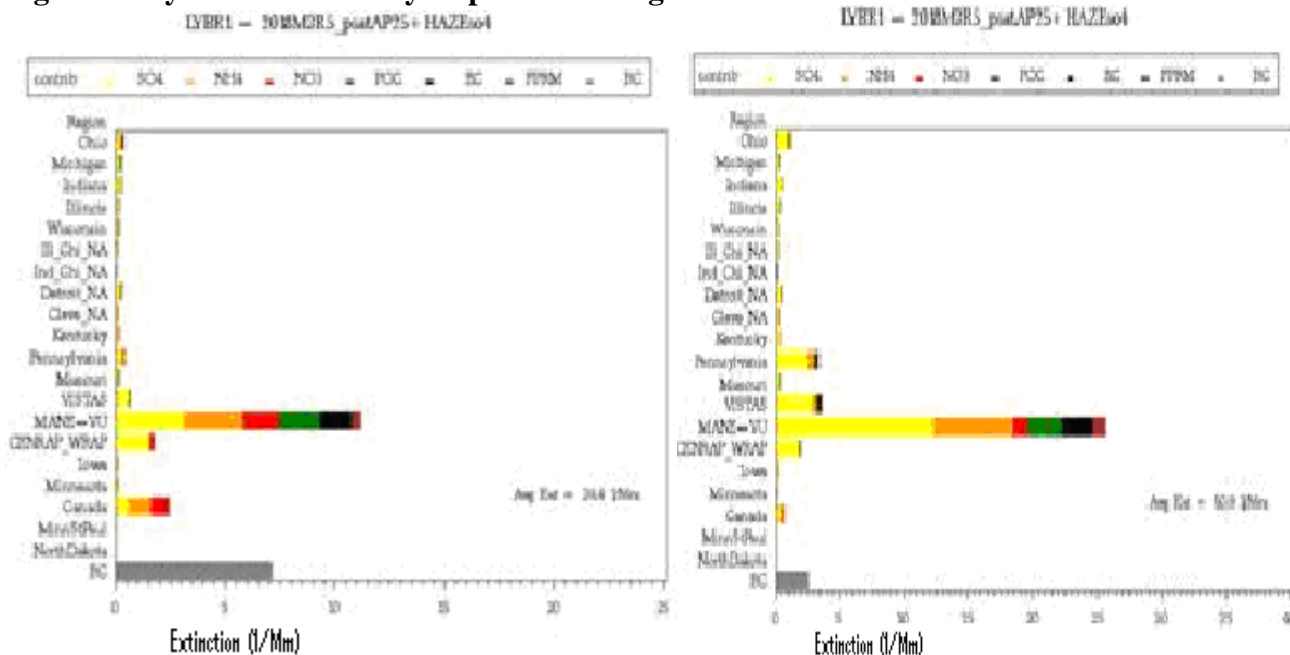


Figure 22 Lye Brook Visibility Impact Modeling



These charts demonstrate that Indiana sources have insignificant impacts on these areas.

The MRPO conducted modeling to evaluate the various levels of controls in place or planned between 2008 and 2018. From this "Round 5" modeling, Table 8 was produced for MANE-VU Class 1 areas.

Table 8 MRPO Round 5 Modeling Results (dV)

Best 20%	Baseline	2018	2009	2009	2012	2018	2018
Site	2000-2004	URP Value	Base	Will Do	Base	Base	Will Do
Brigantine	14.33	14.33	14.15	14.16	14.08	13.92	13.92
Lye Brook	6.37	6.37	6.25	6.28	6.23	6.14	6.15
Acadia	8.78	8.78	8.86	8.88	8.86	8.82	8.82
Worst 20%	Baseline	2018	2009	2009	2012	2018	2018
Site	2000-2004	URP Value	Base	Will Do	Base	Base	Will Do
Brigantine	29.01	25.05	25.79	25.83	25.72	25.21	25.22
Lye Brook	24.45	21.48	22.04	22.08	21.86	21.14	21.14
Acadia	22.89	20.45	21.72	21.75	21.72	21.49	21.49

However, in "Recent MANE-VU Projections of Visibility for 2018", MANE-VU Stakeholder Briefing, April 4, 2008, it is stated, "The Uniform Rate is achieved and exceeded at all MANE-VU Class I sites." This presentation is available on the MANE-VU website, www.nescaum.org/topics/regional-haze/regional-haze-documents.

These results show that for the northeastern Class 1 areas, controls already implemented and on-the-books may or may not result in achievement of reasonable progress goals. However, Indiana, along with the other MRPO states, has committed to continue consultation with MANE-VU. Specifically, Indiana has agreed to support additional work and discussion to accomplish the following:

- Establish a clear understanding of the MANE-VU "Ask" by agreeing on base emissions inventories and control assumptions;
- Draft language on a national "Ask" based on the multi-pollutant needs of the states, including potential controls for EGUs and Industrial, Commercial, and Institutional boilers; and
- Convene the MANE-VU/MRPO Industrial, Commercial, and Institutional boiler workgroup (with participation by the Southeastern States and U.S. EPA) to re-examine the workgroup's January 2007 straw proposal. Indiana is currently actively involved with this group.

Therefore, Indiana does not believe at this time that it can commit to any particular course of action until it is determined, through the above work and further discussions, what actions may be appropriate to meet reasonable progress goals given Indiana's marginal impact on those areas.

8.0 Best Available Retrofit Technology

On July 6, 2005, U.S. EPA published the Best Available Retrofit Technology (BART) guidelines in the Federal Register (70 FR 39104). These guidelines are a component of the July 1, 1999 Regional Haze regulations, that are intended to protect and improve visibility in national parks and wilderness areas.

The process of establishing BART emission limitations includes identification of those sources that meet the definition of "BART-eligible source", a determination of whether these sources are emitting any air pollutant that may be contributing to any impairment of visibility in a Class 1 area, and identification of the appropriate type and the level of control for reducing emissions.

8.1 BART - Eligible Sources in Indiana

The BART-eligible sources in Indiana are shown in the following table. The BART-eligible sources were identified using the methodology in the “Regional Haze Regulations and Guidelines for Best Available Retrofit Technology (BART) Determinations; Final Rule” (40 CFR Part 51).

IDEM identified sources within the BART source categories and sent a survey to obtain additional information to develop a list of BART-eligible sources. Based on the surveys and subsequent discussions and comments, IDEM determined that sources in Table 9 have at least one BART-eligible unit. Supporting documentation is in Appendix 5 - BART Eligible Units.

Table 9 Indiana Sources with BART-Eligible Units

<u>County</u>	<u>County ID</u>	<u>Plant ID</u>	<u>Name</u>
Cass	017	00006	Logansport Municipal Light & Power
Cass	017	00005	ESSROC Materials, Inc.
Clark	019	00008	ESSROC Cement Corporation
Dearborn	029	00002	American Electric Power-Tanners Creek
Gibson	051	00013	Duke Energy – Gibson
Jasper	073	00008	NIPSCO - R. M. Schahfer
Lake	089	00318	Mittal Steel USA Inc.- Indiana Harbor West
Lake	089	00003	BP Products North America, Inc. - Whiting Refinery
Lake	089	00112	Carmeuse Lime, Inc.
Lake	089	00210	State Line Energy, L.L.C.
Lake	089	00121	U.S. Steel - Gary Works
Lake	089	00316	Mittal Steel USA Inc.- Indiana Harbor East
Lake	089	00117	NIPSCO - D. H. Mitchell Station
Laporte	091	00021	NIPSCO - Michigan City
Lawrence	093	00002	Lehigh Cement Company
Marion	097	00033	IPL Harding Street Station
Marion	097	00034	Citizens Thermal Energy
Pike	125	00002	Indianapolis Power & Light/AES Petersburg
Pike	125	00001	Hoosier Energy - Ratts Station
Porter	127	00002	NIPSCO - Bailly Station
Porter	127	00001	Mittal Steel USA Inc.- Burns Harbor
Posey	129	00002	SABIC Innovative Plastics (formerly GE Plastics)
Posey	129	00010	SIGECO - A. B. Brown
Putnam	133	00002	Buzzi Unicem USA
Sullivan	153	00005	Hoosier Energy - Merom Station
Tippecanoe	157	00012	Purdue University
Vermillion	165	00001	Duke Energy – Cayuga
Vermillion	165	00009	Eli Lilly and Company-Clinton Labs
Vigo	167	00021	Duke Energy – Wabash River
Warrick	173	00002 & 00007	ALCOA Inc.
Warrick	173	00001	SIGECO - F. B. Culley Generating Station
Wayne	177	00009	Richmond Power & Light

8.2 Sources Subject to BART

IDEM conducted further modeling in coordination with the MRPO to determine which BART-eligible sources are subject to BART. Using dispersion modeling (Option 1 in the BART guidelines), IDEM determined that the following non-EGUs are subject to BART: ALCOA Inc., ESSROC Cement Corporation, SABIC Innovative Plastics (formerly GE Plastics), and Mittal Steel USA Inc.-Burns Harbor. Modeling indicates that the following EGUs are subject to BART: ALCOA Inc., Hoosier Energy - Ratts Station, Richmond Power & Light, State Line Energy, NIPSCO - D. H. Mitchell Station, NIPSCO - Michigan City, NIPSCO - Bailly Station, SIGECO - A. B. Brown, and SIGECO - F. B. Culley Generating Station.

In addition, IDEM has identified the following fossil-fuel fired generating power plants as having a capacity in excess of 750 megawatts: Duke Energy - Gibson, Duke Energy - Cayuga, Indianapolis Power & Light/AES Petersburg, IPL - Harding Street Station, NIPSCO - R. M. Schahfer, American Electric Power-Tanners Creek, Duke Energy - Wabash River, and Hoosier Energy - Merom Station.

Indiana has accepted the U.S. EPA analysis that the Clean Air Interstate Rule (CAIR) achieves greater progress than BART and may be used by States as a BART substitute (70 FR 39137). The Indiana Air Pollution Control Board, on November 1, 2006, adopted CAIR for the Indiana EGUs to participate in the cap and trade program. CAIR therefore satisfies the BART NO_x and SO₂ requirements for these sources. However, for these sources their PM impact on Class 1 areas will need to be addressed. One EGU, ALCOA-Warrick Power Plant Boiler # 4, has been determined to be subject to BART.

8.3 BART Analysis

The department began the BART rulemaking process in August 2006. Following the due process of rulemaking which included the notices of hearings and comments, the rule 326 IAC 26-1, Best Available Retrofit Technology, was final adopted on October 3, 2007 and became effective February 22, 2008. A copy of this rule is in Appendix 7.

The rule requires that sources subject to BART, upon notification from the department, submit to the department a BART analysis. The rule incorporates by reference the U.S. EPA BART guidelines codified as Appendix Y at 40 CFR 51. The analysis should be performed following these guidelines. The analysis must address at a minimum SO₂, NO_x, and particulate matter (PM) and consider the following factors: (1) The cost of compliance, (2) the energy and non-air quality environmental impacts of compliance, (3) any existing pollution control technology in use at the source, (4) the remaining useful life of the source, and (5) the degree of visibility improvement that may reasonably be anticipated from the use of BART.

The guidelines require that the States consider, at a minimum, certain control alternatives in determining BART controls. These alternatives include: BACT, LAER, NSPS, and MACT, as applicable, pollution prevention, use of retrofit controls and, if available, improvement of existing controls. In addition, the rule allows sources to propose alternatives to source-specific BART, provided the alternative achieves greater reasonable progress towards improving visibility. The alternative could include emissions controls at different locations of the same source, different sources, or at a source not subject to BART.

The requirements for sources that choose an alternative to source-specific BART, in details, are included in 326 IAC 26-1 and 40 CFR 51.308(i).

The department will review the analyses for completeness and approvability in accordance with 326 IAC 26-1, the BART guidelines, and 40 CFR 51.308(e) and (i). The emission limits representing BART or an alternative to BART will be included in the sources' Part 70 permits and submitted to U.S. EPA for approval into the SIP. The sources shall be required to comply with these requirements within five years of the effective date of this rule, i.e., in 2013.

9.0 Long Term Strategy

9.1 Strategy requirements

40 CFR 51.308(d)(3) requires Indiana to include in its SIP a long-term strategy that addresses regional haze visibility impairment for each mandatory Class 1 Federal area which may be affected by emissions from Indiana sources. The long-term strategy must include enforceable emissions limitations, compliance schedules and other measures necessary to achieve the reasonable progress goals established by the states or tribes where the Class 1 areas are located. The strategy must be based on consultation with the states with Class 1 areas impacted by Indiana emissions and must be based on factors such as ongoing air pollution programs, construction activity impact mitigation measures, smoke management techniques for agricultural and forestry management purposes, source retirement and replacement schedules, and emission limitations and schedules for compliance to achieve the reasonable progress goals. This section describes how Indiana plans to meet its long-term strategy obligations.

9.2 Discussion

Indiana does not have any Class 1 areas, however, emissions from Indiana were determined to impact Class 1 areas in other states. Indiana consulted with those states to develop reasonable progress goals. The consultation with other states and Federal Land Managers is explained in detail in Sections 2 and 3 respectively. Indiana consulted with other states and tribes by participation in the MRPO Regional Haze Workgroup calls and other MRPO discussions to develop technical information necessary for development of coordinated strategies. Indiana also coordinated with CENRAP and MANE-VU to develop a weight of evidence analysis that was used to develop Indiana's long-term strategy. Strategy development considered the impacts of Indiana's emissions on Class 1 areas outside of Indiana. The emission inventory and modeling used to develop reasonable progress goals are described in detail in Sections 4.0, 5.0, and 6.0. The results of Class 1 area analyses are described in detail in Section 7.0. The analyses show no reductions from Indiana sources are necessary to meet the reasonable progress goals of the areas analyzed at this time. However, MANE-VU, based on its analysis, has requested controls from Indiana EGUs and Industrial, Commercial, and Institutional boilers.

Indiana has in place a number of programs to control pollution from stationary and mobile sources. Some of the measures include Reasonably Available Control Technology (RACT) on particulate and VOC sources, measures in the Rate of Progress Plans (RFPs) to meet the 1-hour ozone NAAQS, NO_x SIP Call, and CAIR. Indiana is currently working on additional programs such as the revised PM_{2.5} and 8-hour ozone NAAQS. These programs will further reduce Indiana's contribution to Class 1 areas in other States.

In Indiana, prescribed burning must be conducted in accordance with state law under IC 13-17-9 and regulations under 326 IAC 4-1. County or local ordinances may also apply in some parts of the state. In addition, the Indiana Department of Natural Resources (IDNR) has developed a fact sheet on prescribed burning that includes smoke management recommendations (Appendix 6). Prescribed burning of state-owned land by IDNR is allowed under 326 IAC 4-1-3(c), but must be extinguished if it creates a pollution problem. Prescribed burning also may not be conducted during unfavorable weather conditions, including when a pollution alert or ozone action day has been declared. Most burning of agricultural land is exempt from regulation.

9.3 Strategy

As explained above, at this time, no reductions in Indiana emissions are needed to meet the reasonable progress goals in other states. Therefore, at this time, the Indiana Regional Haze SIP does not include any emission limitations, compliance schedules, and other measures necessary to achieve the reasonable progress goals in those states. However, to help achieve those states meet their reasonable progress goals and to minimize its contribution to those states, Indiana commits to the following actions:

1. Effectively enforce the existing control measures.
2. Work with U.S. EPA to address multi-pollutant air quality problems in the eastern and northeastern U.S., in particular, nonattainment for ozone and PM_{2.5}, and regional haze. (See Appendix 3, pages 65 - 66 for the letter from Mr. Thomas W. Easterly, Commissioner, Indiana Department of Environmental Management to Mr. Robert J. Meyers, Acting Assistant Administrator, U.S. EPA. November 15, 2007 addressing the OTC "Ask".).
3. Continue consultation with states with Class 1 areas to monitor their progress in meeting their reasonable progress goals and develop coordinated strategies, as and when needed, to mitigate visibility impacts in those areas.
4. Develop effective BART control measures.
5. Consult with MANE-VU to understand its analysis which asks for EGU and non-EGU controls in Indiana and to seek controls of these sources at national level, as needed.

10.0 State Implementation Plan Revisions and Adequacy of the Existing Plan

10.1 State Implementation Plan Revisions

40 CFR 51.308(f) requires Indiana to revise its regional haze implementation plan and submit a plan revision to U.S. EPA by July 31, 2018 and every ten years thereafter. In accordance with the requirements listed in 40 CFR 51.308(f) of the federal rule for regional haze, Indiana commits to revising and submitting this regional haze implementation plan by July 31, 2018 and every ten years thereafter.

In addition, 40 CFR 51.308(g) requires periodic reports evaluating progress towards the reasonable progress goals established for each mandatory Class 1 area. In accordance with the requirements listed in 40 CFR 51.308(g) of the federal rule for regional haze, Indiana commits to submitting a report on reasonable progress to U.S. EPA every five years following the initial submittal of the SIP. The report will be in the form of a SIP revision. The reasonable progress report will evaluate the progress made

towards the reasonable progress goal for each mandatory Class 1 area which may be affected by emissions from Indiana sources. All requirements listed in 40 CFR 51.308(g) shall be addressed in the SIP revision for reasonable progress.

10.2 Determination of the Adequacy of the Existing Plan

Depending on the findings of the five-year progress report, Indiana commits to taking one of the actions listed in 40 CFR 51.308(h), “Determination of the adequacy of existing implementation plan”. The findings of the five-year progress report will determine which action is appropriate and necessary. The actions in 40 CFR 51.308(h) include the following:

- (1) If the state determines that the existing implementation plan requires no further substantive revision at this time in order to achieve established goals for visibility improvement and emissions reductions, the state must provide to the Administrator a negative declaration that further revision of the existing implementation plan is not needed at this time.
- (2) If the state determines that the implementation plan is or may be inadequate to ensure reasonable progress due to emissions from sources in another state(s) which participated in a regional planning process, the state must provide notification to the Administrator and to the other state(s) which participated in the regional planning process with the states. The state must also collaborate with the other state(s) through the regional planning process for the purpose of developing additional strategies to address the plan's deficiencies.
- (3) Where the state determines that the implementation plan is or may be inadequate to ensure reasonable progress due to emissions from sources in another country, the state shall provide notification, along with available information, to the Administrator.
- (4) Where the state determines that the implementation plan is or may be inadequate to ensure reasonable progress due to emissions from sources within the state, the state shall revise its implementation plan to address the plan's deficiencies within one year.

Appendices

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**Appendix 1 - Class 1 Areas Located Within (or Impacted by) Midwest
RPO States**

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Draft List of Class I Areas Located Within (or Impacted by) Midwest RPO States

The purpose of this paper is to provide a draft list of Class I areas located within or impacted by a Midwest Regional Planning Organization (MRPO) State. A variety of technical analyses were considered in developing the draft list, including base year (2002) and future year (2018) modeling, back trajectories, and other data analyses. This information shows that every MRPO State impacts multiple Class I areas in the eastern U.S.

Regulatory Requirements

EPA's regional haze rule requires a state to "address regional haze in each mandatory Class I Federal area located within the State and in each mandatory Class I Federal area located outside the State which may be affected by emissions from within the State." (40 CFR Part 51.308(d)) EPA has interpreted this provision as requiring a table identifying each mandatory Class I Federal area located within the State and each mandatory Class I Federal area located outside the State affected by emissions from within the State (see Draft EPA Checklist for Regional Haze SIPs Submitted Under 40 CFR 51.308 - *7/13/06 Staff Draft*).

Discussion

Technical analyses conducted by the RPOs were consulted to obtain information on areas of influence and culpability for Class I areas in the eastern U.S.¹ A summary of this information is provided below and in Table 1.

For the MRPO analyses, a state was assumed to affect visibility impairment in a Class I area if it contributes 2% (or more) to total light extinction. This criterion was selected based on a review of the back trajectory and modeling results which showed that states contributing 2% (or more) make-up about 90-95% of total light extinction, whereas states contributing 5% (or more) make-up only about 75-80% of total light extinction. For the other RPO analyses, deference was given to the criteria established by each group to identify contributing states.

(1) MRPO Back Trajectory Analyses

An initial trajectory analysis was conducted using data for 1997-2001 (all sampling days), a start height of 200 m, and a 72-hour (3-day) trajectory period (Cite: "Quantifying Transboundary Transport of PM_{2.5}: A GIS Analysis", May 2003, LADCO). By combining trajectory frequencies with concentration information, the average contribution to PM_{2.5} mass and individual PM_{2.5} species was estimated (which, in turn, was used to estimate the average contribution to light extinction). The results for 17 Class I areas in eastern U.S. were examined to identify those Class I areas where an MRPO state had at least a 2% contribution to total light extinction (based on all days).

¹ Back trajectories and modeling conducted by the WRAP indicate that the Midwest RPO States are not important contributors to visibility impairment due to sulfates and nitrates in western Class I areas (Cite: "Attribution of Haze Phase I Report, Geographic Attribution for the Implementation of the Regional Haze Rule", March 14, 2005). The analyses show only five groups of western Class I areas with at least 5% contribution from states outside the WRAP. The outside-WRAP contribution is generally small (on the order of 0-15%), and is likely due mostly to nearby CENRAP states.

A second trajectory analysis was conducted using data for 2000-2003 (20% highest and lowest days), a start height of 200m, and a 120-hour (5-day) trajectory period (Cite: “Sensitivity Analysis of Various Trajectory Parameters”, June 2005, LADCO). Back trajectory plots were prepared for each of the four northern Class I areas in Michigan and Minnesota for the high extinction days (see Figure 1 – note: areas in orange are mostly likely upwind and the areas in green are least likely upwind on poor visibility days). Although somewhat qualitative, these results provide additional information in identifying states impacting the northern Class I areas.

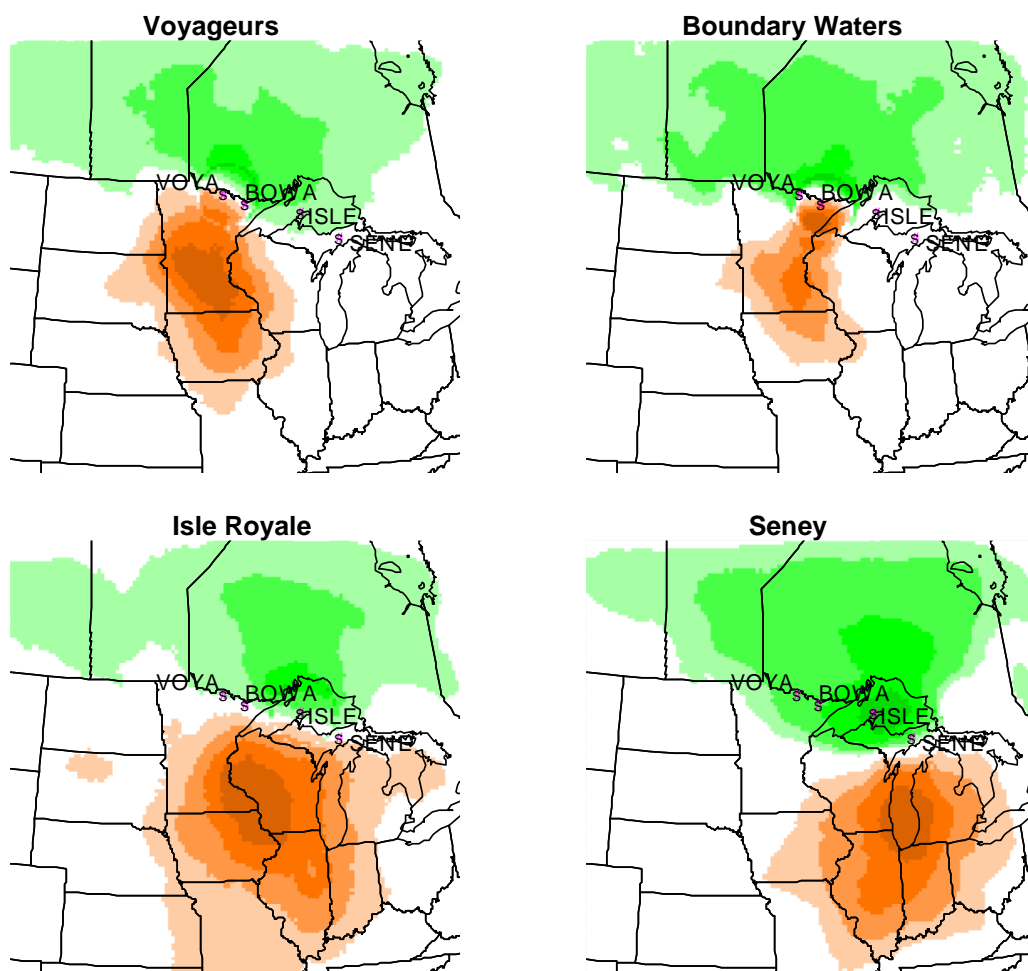


Figure 1. Contoured trajectory plots for poor visibility days for Class I areas in northern Minnesota and Michigan

(2) MRPO PSAT Modeling

A photochemical grid model (CAMx) was applied to provide source contribution information for 2018 conditions. Specifically, the model estimated the impact of 18 geographic source regions and 6 source sectors (EGU point, non-EGU point, on-road, off-road, area, and ammonia sources) at Class I areas in the eastern U.S. Example results for four Class I areas (Seney, Mammoth Cave, Mingo, and Shenandoah) are presented in Figure 2. The results for 13 Class I areas in eastern U.S. were examined to identify those Class I areas where an MRPO state had at least a 2% contribution to total light extinction.

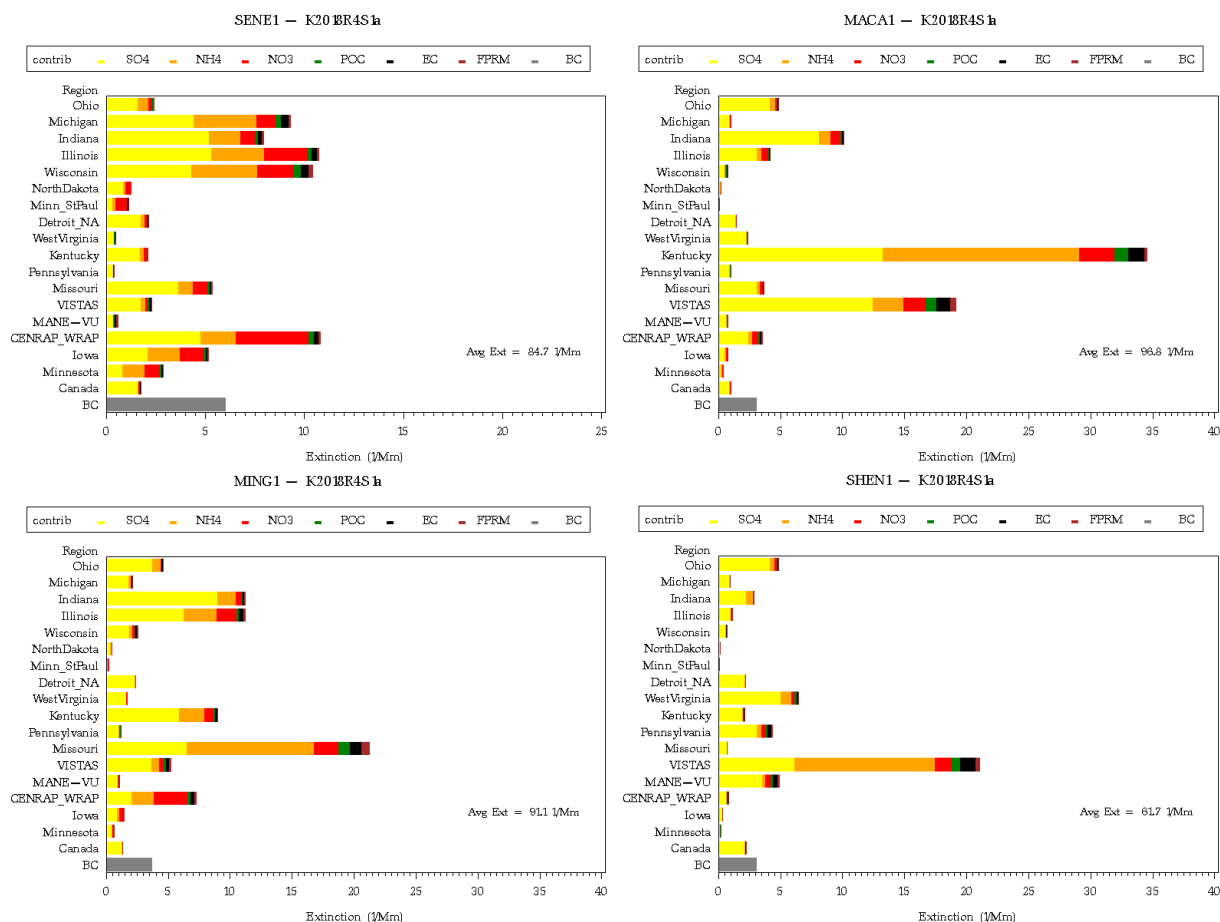


Figure 2. Source region contributions to light extinction based on MRPO PSAT modeling for select Class I areas: Seney, Mammoth Cave, Mingo, and Shenandoah

(3) MANE-VU Contribution Assessment

A weight-of-evidence report was prepared by NESCAUM (on behalf of MANE-VU) to understand the causes of sulfate-driven visibility impairment at Class I areas in the northeastern and mid-Atlantic portions of the U.S. (cite: “Contributions to Regional Haze in the Northeast and Mid-Atlantic United States”, August 2006) The report provides information on the relative contribution of various emissions sources and geographic source regions. The analytical and assessment tools considered include Eulerian and Lagrangian air quality models, and data analysis techniques, such as source apportionment analyses, back trajectories, and examination of emissions and monitoring data. Sulfate impacts were quantified using five analytical techniques based on 2002 conditions: REMSAD, Q/d, CALPUFF (w/ NWS data), CALPUFF (w/ MM5 data), and percent time upwind (based on trajectory analyses). Figure 3 summarizes the five sets of results for three MANE-VU Class I areas. Although no specific criteria were identified in the report to determine a significant contribution, the States of Vermont, New Hampshire, Maine, and New Jersey assumed a 2% sulfate impact in recent letters to other states inviting them to consult on reasonable progress goals. The MRPO States identified as contributing to a MANE-VU Class I area were Illinois, Indiana, Michigan, and Ohio

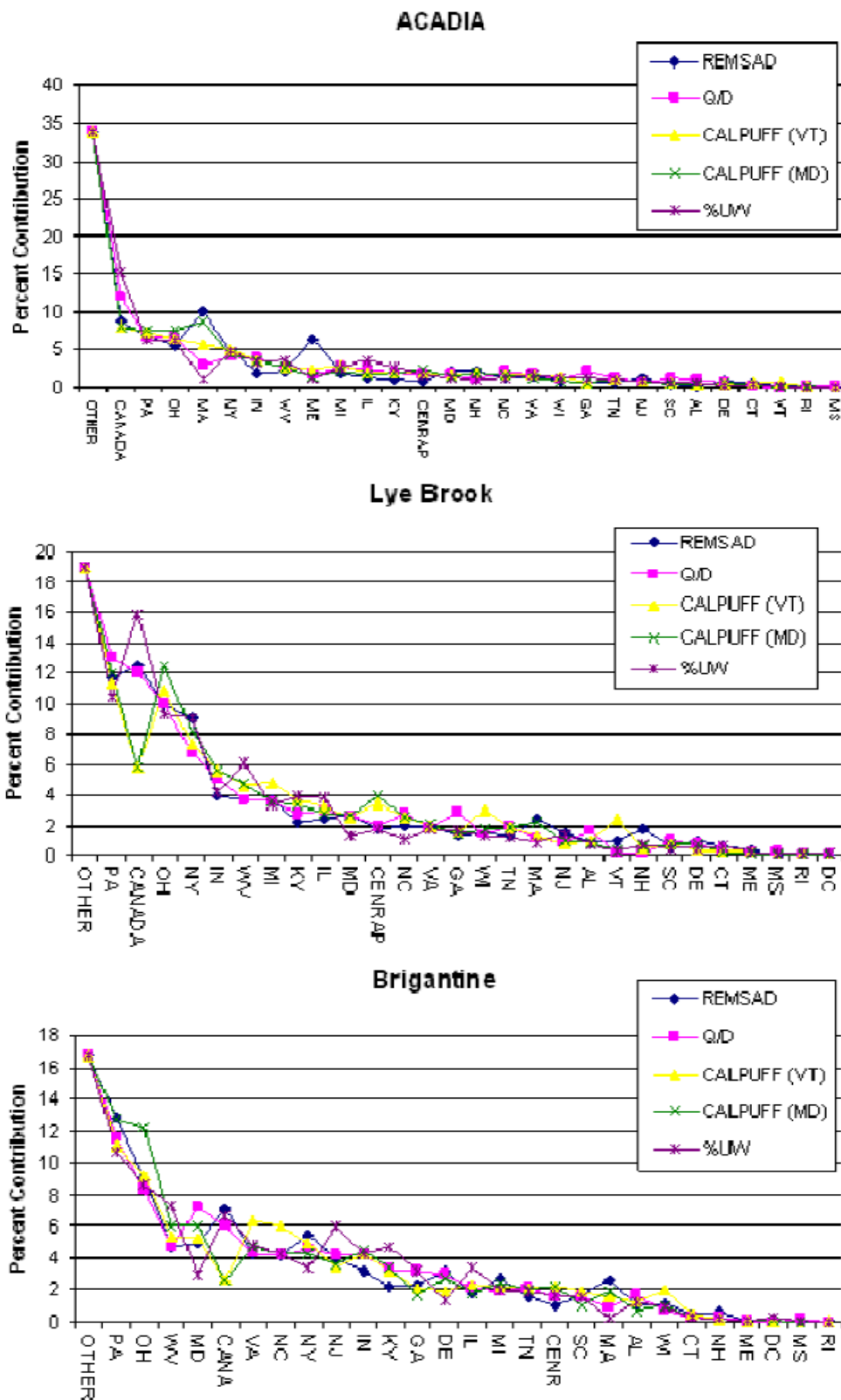


Figure 3. Percent contribution results using different techniques for ranking state contributions to sulfate levels at MANE-VU Class areas (cite: "Contributions to Regional Haze in the Northeastern and Mid-Atlantic Portions of the U.S.", August 2006)

(4) Missouri-Arkansas Contribution Assessment

The draft Consultation Plan for the two Missouri and two Arkansas Class I areas provides information on source regions affecting these Class I areas (i.e., areas of influence) using a variety of data and analyses. (cite: “Central Class I Areas Consultation Plan”, States of Missouri and Arkansas, February 2007) A decision on whether a given state is a contributor to visibility impairment in these Class I areas was based on the combined results of three approaches: areas of influence (see Figure 4), PSAT modeling (based on 2018 conditions), and monitoring data analyses (PMF and back trajectories). According to the draft plan, if a state was a major contributor for at least two of the three approaches (for either sulfate or nitrate), then it was determined to be a significant contributor. The MRPO States identified as contributing to a central CENRAP Class I area were Illinois, Indiana, and Ohio.

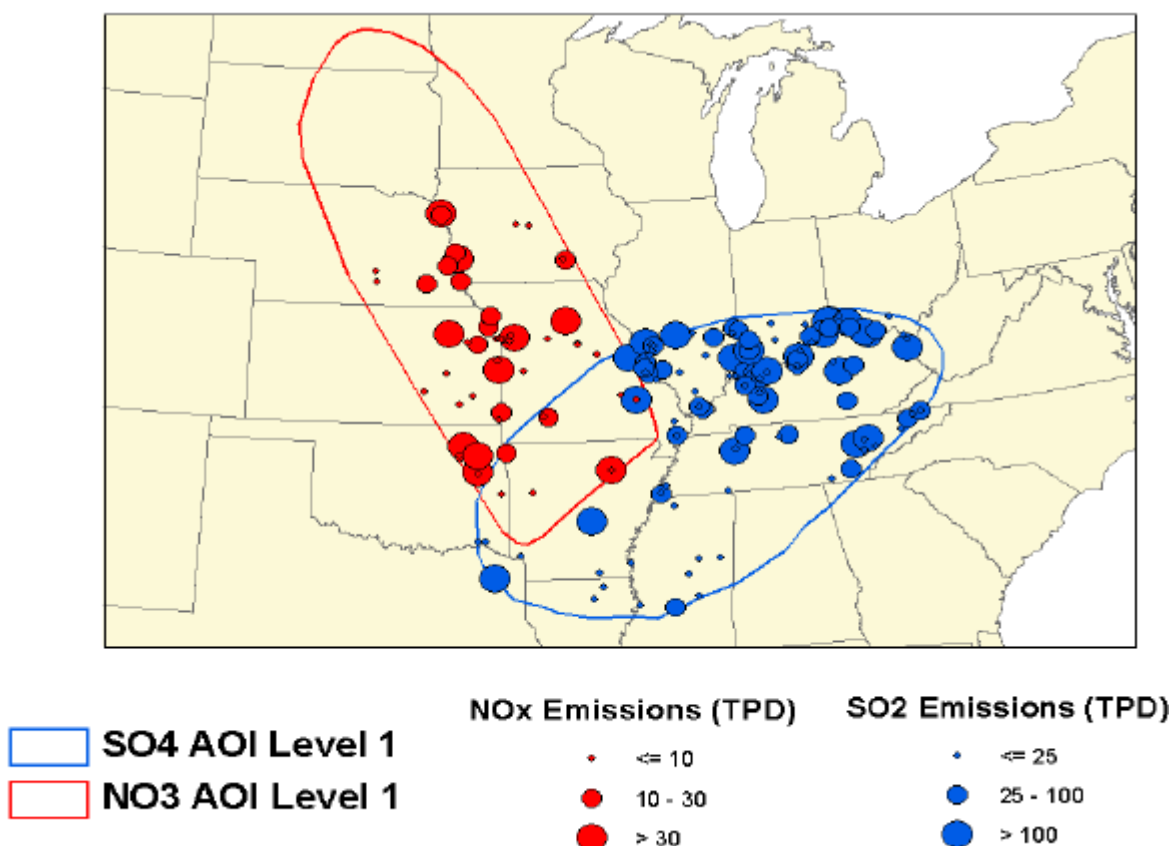


Figure 4. Areas of Influence for Central CENRAP Class I Areas (cite: “Central Class I Areas Consultation Plan”, States of Missouri and Arkansas, February 2007)

(5) VISTAS Area of Influence Analysis

Areas of influence (AOI) were identified for Class I areas in the southeastern U.S. using residence time plots based on wind trajectory direction and frequency, and weighted by visibility impact (light extinction by ammonium sulfate, ammonium nitrate, or elemental carbon). (Cite: “VISTAS Areas of Influence Analysis”, Draft, February 28, 2007). These extinction-weighted residence time analyses were overlaid on gridded emissions (for both 2002 and 2018) to define emission sources in the areas of greatest influence for each Class I area. Figure 5 shows the plots for two VISTAS Class I areas. AOIs were defined on the basis of residence times greater than 10%. The MRPO States identified as contributing to a VISTAS Class I area were Illinois, Indiana, and Ohio.

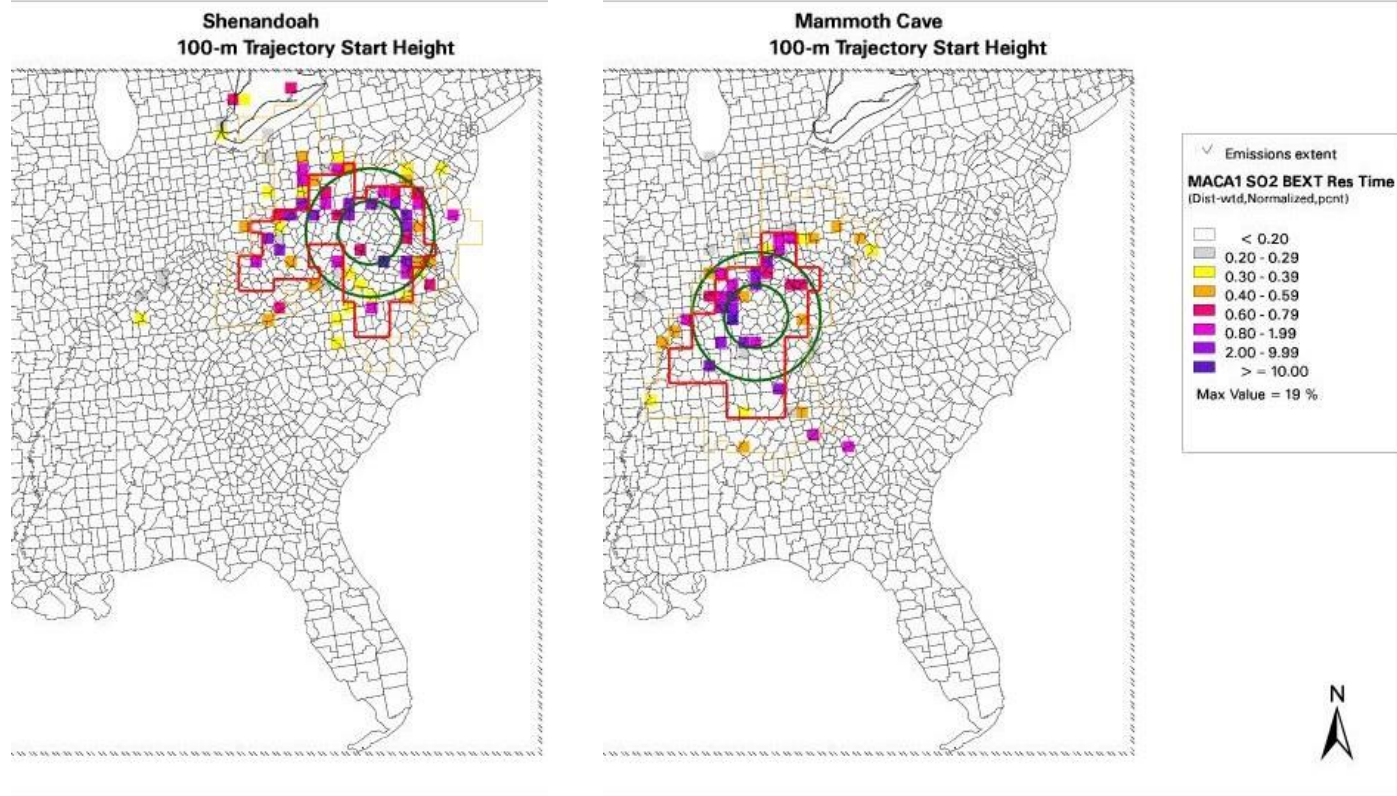


Figure 5. Areas of Influence for Shenandoah (left) and Mammoth Cave (right) for 2018 conditions (cite: “VISTAS Area of Influence Analyses” PowerPoint presentation, November 28, 2006)

Note: green circles indicate 100- and 200-km radii from Class I area, red line perimeter indicate AOI with residence time $\geq 10\%$, and orange line perimeter indicate AOI with residence time $\geq 5\%$

Table 1. Draft List of Class I Areas Impacted by MRPO States - References

AREA NAME	IL	IN	MI	OH	WI
81.401 Alabama.					
Sipsey Wilderness Area	(1)	(1)			
81.404 Arkansas.					
Caney Creek National Wilderness Area	(2), (4)	(2), (4)		(2), (4)	
Upper Buffalo National Wilderness Area	(1),(2),(4),(5)	(2), (4)		(2), (4)	(2)
81.408 Georgia.					
Cohotta Wilderness Area					
Okefenokee Wilderness Area					
Wolf Island Wilderness Area					
81.411 Kentucky.					
Mammoth Cave National Park	(1), (2), (5)	(1), (2), (5)	(1), (2)	(1), (2), (5)	
81.412 Louisiana.					
Breton Wilderness Area					
81.413 Maine.					
Acadia National Park	(3)	(3)	(3)	(3)	
Moosehorn Wilderness Area.	(3)	(3)	(3)	(3)	
81.414 Michigan.					
Isle Royale National Park	(1), (2)	(1), (2)	(1), (2)		(1), (2)
Seney National Wilderness Area	(1), (2)	(1), (2)	(1), (2)	(1), (2)	(1), (2)
81.415 Minnesota.					
Boundary Waters Canoe Area National Wilderness Area	(2)	(2)	(2)		(1), (2)
Voyageurs National Park	(2)	(2)			(1), (2)
81.416 Missouri.					
Hercules-Glades National Wilderness Area	(2), (4), (5)	(2), (4), (5)		(2), (4)	(2)
Mingo National Wilderness Area	(2), (4), (5)	(2), (4), (5)	(2)	(2), (4)	(2)
81.419 New Hampshire.					
Great Gulf National Wilderness Area	(3)	(3)	(3)	(1), (3)	
Pres. Range-Dry River National Wilderness Area					

AREA NAME	IL	IN	MI	OH	WI
81.42 New Jersey.					
Brigantine National Wilderness Area	(3)	(3)	(1), (3)	(1), (3)	
81.422 North Carolina.					
Great Smoky Mountains NP{1}	(1)	(1)		(1)	
Joyce Kilmer-Slickrock Wilderness Area{2}					
Linville Gorge Wilderness Area.					
Shining Rock Wilderness Area.					
Swanquarter Wilderness Area					
81.426 South Carolina.					
Cape Romain Wilderness					
81.428 Tennessee.					
Great Smoky Mountains NP{1}.	(1)	(1)		(1)	
Joyce Kilmer-Slickrock Wilderness{2}					
81.431 Vermont.					
Lye Brook National Wilderness Area	(2), (3)	(2), (3)	(2), (3)	(1), (2), (3)	
81.433 Virginia.					
James River Face National Wilderness Area	(2)	(2)	(2)	(2), (5)	
Shenandoah National Park	(2), (3)	(1), (2), (3)	(2), (3)	(1),(2),(3),(5)	
81.435 West Virginia.					
Dolly Sods/Otter Creek National Wilderness Area	(2), (3)	(1), (2), (3)	(1), (2), (3)	(1),(2),(3),(5)	

Key

- (1) MRPO Back Trajectory Analyses
- (2) MRPO PSAT Modeling
- (3) MANE-VU Contribution Assessment
- (4) Missouri-Arkansas Contribution Assessment
- (5) VISTAS Areas of Influence

Appendix 2 - Letters Requesting Participation by States with Class I Areas

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Letters requesting Participation by States with Class I Areas

As a result of the various analyses performed by the MRPO and other RPOs, Indiana was invited to participate in a number of consultations regarding contributions to Class I areas. The states and organizations include Michigan, Minnesota, Arkansas and Missouri, Vermont, New Hampshire, New Jersey, and MANE-VU, also including Vermont, New Hampshire, and New Jersey. Copies of letters from Arkansas and Missouri, Vermont, New Hampshire, New Jersey, and MANE-VU follow.

Indiana participated in these processes, attending meetings and calls as appropriate.

Initial letter from Missouri and Arkansas requesting Indiana participation in their regional planning process for Mingo Wilderness, Hercules Glades Wilderness, Upper Buffalo Wilderness, and Caney Creek Wilderness areas.



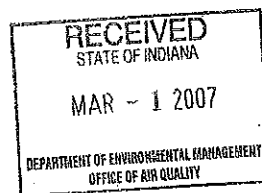
Matt Blunt, Governor • Doyle Childers, Director

DEPARTMENT OF NATURAL RESOURCES

www.dnr.mo.gov

FEB 26 2007

Ms. Kathryn Watson, Branch Chief
Indiana Department of Environmental Management
Office of Air Quality
100 North Senate Avenue
Indianapolis, IN 46206



Dear Ms. Watson:

As you are probably aware, the U.S. Environmental Protection Agency (EPA) promulgated the federal Regional Haze Rule on July 1, 1999. The federal Regional Haze Rule and the Clean Air Act require consultation between the States and the Federal Land Managers (FLMs) responsible for managing federal Class I areas. This consultation process provides an opportunity for us to work together to achieve a common goal of protecting the visibility of Class I areas.

The Missouri Department of Natural Resources' Air Pollution Control Program and the Arkansas Department of Environmental Quality would like to officially begin this consultation process for the following Class I areas located in Missouri and Arkansas:

- Mingo Wilderness Area (Missouri)
- Hercules Glades Wilderness Area (Missouri)
- Upper Buffalo Wilderness Area (Arkansas)
- Caney Creek Wilderness Area (Arkansas)

To do so, we are requesting your participation in a "kick-off" conference call to initiate this multi-state planning effort. We would like to schedule this conference call in March 2007.

Enclosed is a draft Consultation Plan that includes the objectives, timelines, activities, and technical information to facilitate the consultation. Please review this draft plan so that we can discuss it and consider any changes that might be beneficial on the call. Participants in the central Class I Areas consultation process will include States and Tribes that have been identified by modeling and technical analysis to have an impact on visibility at these four Class I areas. A list of the invitees that have been requested for the consultation is included in the draft plan. Regional Planning Organizations, FLMs and the EPA will also have the opportunity to participate in this process. The Arkansas Department of Environmental Quality may also provide additional information before the consultation call.



Ms. Kathryn Watson
Page Two

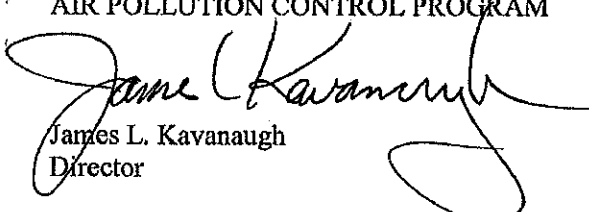
At this time, the modeling analysis shows that we are very close to meeting the reasonable progress goal at the four central Class I areas. It is our hope that through the consultation process we will be able to obtain additional information on the controls currently being implemented or planned by the participating states and tribes, and that we will be able to use that information in the model to demonstrate that we will be able to meet the first progress goal for these areas.

We look forward to working with you on this important effort and request that you please respond to this letter by advising who will be participating in this call for your organization along with their contact information. We will be working with them to develop an agenda and date for the "kick-off" conference call.

If you should have any questions about this letter or the consultation process, please contact either Calvin Ku of the Missouri Department of Natural Resources' Air Pollution Control Program at (573) 751-4817 or Tony Davis of the Arkansas Department of Environmental Quality at (501) 682-0728. Thank you.

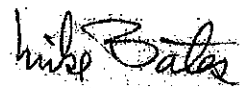
Sincerely,

MISSOURI DEPARTMENT OF NATURAL RESOURCES
AIR POLLUTION CONTROL PROGRAM



James L. Kavanaugh
Director

ARKANSAS DEPARTMENT OF ENVIRONMENTAL QUALITY



Mike Bates
Chief - Air Division

Enclosure

JLK/MB:ckt

c: Mr. Daniel R. Schuette, Missouri Department of Natural Resources
Ms. Annette Sharp, CENRAP

Initial letter from Vermont requesting Indiana's participation in regional consultations.



State of Vermont
Department of Environmental Conservation

TE
Kathy
AGENCY OF NATURAL RESOURCES

AIR POLLUTION CONTROL DIVISION
Building 3 South
103 South Main Street
Waterbury, VT 05671-0402

TEL 802-241-3840

Dept. of Environmental Management FAX 802-241-2590

Commissioner's Office

February 23, 2007

MAR 12 2007

Thomas Easterly, Commissioner
Indiana Department of Environmental Management
100 North Senate Avenue, P.O. Box 6015
Indianapolis, Indiana 46206-6015

Dear Commissioner Easterly:

This letter has two purposes. Its first purpose is to present a brief summary of results of analyses which the State of Vermont, in conjunction with the Regional Planning Organization (RPO) MANE-VU, has conducted to fulfill requirements for the protection of visibility in federally managed areas of the United States known as Class I areas (Section 169A of the Clean Air Act). The analyses indicate that sources of visibility impairing air pollutants in the State of Indiana are contributing significantly to regional haze in the Class I Lye Brook Wilderness area located in Vermont.

Its second purpose is to invite you and/or representatives from the department/agency responsible in your state for regulatory air matters, to participate in a consultation process to determine an appropriate mitigation strategy for Lye Brook Wilderness. The consultation process will develop a recommendation for the most cost-effective strategy, agreeable to all jurisdictions involved, for implementation of long-term measures and controls which demonstrate that reasonable progress goals for the Class I area, to be established in Vermont's State Implementation Plan (SIP), will be achieved.

Background:

Environmental Protection Agency (EPA) final regional haze rules promulgated on July 1, 1999 require every state, whether containing a Class I area or not, to develop a SIP describing that state's control commitments (if any) to a long-term strategy for achieving reasonable progress goals (RPGs) in all Class I areas by 2018. 2018 is the end of the first 10 year period in a series of periodic SIP submittals that are required by the rules. The first SIPs under the regional haze rules (40 CFR 51.300) must be submitted to EPA by December 2007. Individual state plans that are developed need to be consistent with each other for them to be effective in achieving the RPGs. The regulations at 40 CFR 51.308 (d) (1) (iv) require a documented consultation process between all states involved in any multi-state strategy aimed at achieving the RPGs. This consultation record is one element required in the SIP of any state such as Vermont which contains one or more Class I areas. This letter serves to initiate the formal consultation process between our two states regarding the strategies to be incorporated in our state SIPs for submittal in December 2007.



Regional Offices - Barre/Essex Jct./Rutland/Springfield/St. Johnsbury

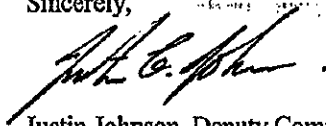
Because the development of an effective strategy for mitigation of regional haze will be regional in nature, several other states have also been invited to participate in this consultative process to develop a SIP strategy that demonstrates the RPGs for visibility will be met in Lye Brook Wilderness Area by 2018. Vermont is a member of the Regional Planning Organization MANE-VU which is comprised of the New England States and New York, New Jersey, Pennsylvania, Delaware, Maryland, and the District of Columbia. All other MANE-VU member states are being invited to consult with Vermont on our SIP strategy. In addition, a total of eleven other states outside of MANE-VU have been identified as having a level of impact on regional haze in the Lye Brook Wilderness area which is considered "significant" for this first round of regional haze SIPs with a 2018 target for RPGs. The attached Table 1 identifies all of the states with which Vermont believes it must consult during this planning period.

Table 1 summarizes the specific analytical results for each state which lead us to believe sources of haze-causing air pollutants in your state contribute significantly to the regional haze experienced at Vermont's Class I area. Over the past three years MANE-VU has conducted a number of studies and used several accepted scientific methodologies to identify the sources of impacts on visibility at all of the Class I areas in the northeast. These have been collected into a technical document entitled "Contributions to Regional Haze in the Northeast and Mid-Atlantic United States" dated August 2006 (<http://manevu.org>). This information will be available along with other technical study results during our consultative process. All MANE-VU states have determined that they will participate in each of the consultation processes for each of the MANE-VU Class I areas. In that context, if your state is a member of MANE-VU, staff from your state will already be aware of the consultation that has been ongoing internally through committees and workgroups involved in MANE-VU RPO planning efforts.

If your state is not a member of MANE-VU, you are also invited and encouraged to send a representative to future consultation meetings which will be scheduled through contacts between our respective RPOs (MANE-VU, VISTAS, MRPO). These meetings will be held over a period of months in the near future. At the meetings, establishment of the 2018 RPGs for each of the Class I areas in the northeastern U.S. will be discussed and strategies intended to achieve the RPGs will be proposed and defined. Please send us the name, address and contact phone number and/or email address of the appropriate person within your organization to contact when details of the first consultation meeting have been finalized.

The Vermont contact for this consultation process is Paul Wishinski, Air Quality Planning Chief for the Vermont Air Pollution Control Division, Phone: 802-241-3862, Fax: 802-241-2590, email: Paul.Wishinski@state.vt.us. Please contact him if you have any questions about the regional haze planning consultation process that we are formally proposing with this letter.

Sincerely,



Justin Johnson, Deputy Commissioner
Department of Environmental Conservation
Vermont Agency of Natural Resources



States to be Consulted on Establishing Vermont's Class I Area 2018 Reasonable Progress Goals and Strategies for Achieving Them

<u>State Name</u>	<u>Primary Haze-Causing Significant Impact⁽¹⁾ and/or Other Reason for Inclusion</u>
Connecticut	MANE-VU member
Delaware	MANE-VU member
District of Columbia	MANE-VU member
Georgia	Sources impact > 2% Sulfate Contribution
Illinois	Sources impact > 2% Sulfate Contribution
Indiana	Sources impact > 2% Sulfate Contribution
Kentucky	Sources impact > 2% Sulfate Contribution
Maine	MANE-VU member
Maryland	Sources impact > 2% Sulfate Contribution
Massachusetts	Sources impact > 2% Sulfate Contribution
Michigan	Sources impact > 2% Sulfate Contribution
New Hampshire	MANE-VU member
New Jersey	MANE-VU member
New York	Sources impact > 2% Sulfate Contribution
North Carolina	Sources impact > 2% Sulfate Contribution
Ohio	Sources impact > 2% Sulfate Contribution
Pennsylvania	Sources impact > 2% Sulfate Contribution
Rhode Island	MANE-VU member
Tennessee	Sources impact > 2% Sulfate Contribution
Virginia	Sources impact > 2% Sulfate Contribution
West Virginia	Sources impact > 2% Sulfate Contribution
Wisconsin	Sources impact > 2% Sulfate Contribution

⁽¹⁾ From the report entitled "Contributions to Regional Haze in the Northeast and Mid-Atlantic United States", prepared by NESCAUM for the Mid-Atlantic / Northeast Visibility Union (MANE-VU), August 2006. The primary criteria Vermont used to identify a state as having a significant impact on Vermont's Class I area was the modeled base-year 2002 state-wide sulfur oxide emission impacts on the ambient sulfate levels predicted at receptors in the Class I area. Any state with a modeled annual average sulfate ion impact greater than 2% of all modeled sulfate ion impacts was considered to have "significant impacts" for purposes of consultation on long-term strategies and reasonable progress goals.

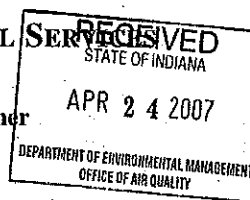
Initial letter from New Hampshire requesting Indiana's participation in regional consultations.



The State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES

Thomas S. Burack, Commissioner

April 4, 2007



Thomas W. Easterly
Commissioner
IN DEM
100 N. Senate Ave., Mail Code 50-01
Indianapolis, IN 46204-2251

Dept. of Environmental Management
Commissioner's Office

APR 13 2007

Dear ^{Tam}Commissioner Easterly:

As you are aware, New Hampshire is home to two Class I areas as designated under Section 169A of the U.S. federal Clean Air Act. The Great Gulf and the Presidential Range – Dry River Class I areas are located on the beautiful slopes of Mt. Washington, the highest point in the Northeastern United States. While this area is renowned for having some of the most challenging weather in the world, it also is known for providing very impressive vistas, that is, when visibility is not impaired by air pollution. Fortunately for those who visit this region and for those who live and work there, the Regional Haze rule requires that these areas and 154 others nationwide gradually improve visibility, with a goal of achieving natural conditions by 2064. While this ultimate goal is decades away, we begin today by taking reasonable actions and by partnering in consultation with states and Canadian provinces, as needed, to begin planning to take the first steps toward meeting this goal. I write today because we have identified your state or province as one that needs to be part of our collective solution to regional haze in New Hampshire.

According to the Clean Air Act, all U.S. states must submit State Implementation Plans (SIPs) by December 2007 for regional haze, regardless of whether they are home to a Class I area. Under the Act's section 169A (including regulations at 40 CFR 51.300), the regional haze SIP must demonstrate that reasonable progress will be made at nearby Class I areas at 10-year intervals, beginning in 2018. The regulations of 40 CFR 51.308(d)(1)(iv) specify that states with Class I areas should develop reasonable progress goals for their Class I areas and associated measures to meet those goals, in consultation with any jurisdiction that may reasonably cause or contribute to visibility impairment in those areas. The Federal Land Managers for the Class I area are also required to be consulted in this process.

While it is believed by the scientific community that every U.S. state contributes in some way to air pollution in The Great Gulf and the Presidential Range – Dry River Class I areas, we have limited our requests for consultations to only those states and Canadian providences that our analyses indicate have the potential for contributions over certain thresholds for PM_{2.5} and/or sulfate to regional haze in our Class I areas. Beyond this, we are asking all states within our own Regional Planning Organization, the Mid-Atlantic

DES Web site: www.des.nh.gov
P.O. Box 95, 29 Hazen Drive, Concord, New Hampshire 03302-0095
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Northeast – Visibility Union (MANE-VU) to consult with us. Because we have asked you to join us in consultation does not necessarily imply that we will be asking for air pollution control beyond measures you may have already identified as necessary for your own state for ozone and PM_{2.5} ambient air standard attainment. By joining us, you can help us shape our regional haze progress goals for 2018 and help play a part in determining the best way to meet those goals for the New Hampshire Class I areas.

We, or a representative from MANE-VU, will be contacting you soon to arrange a consultation meeting. Thank you for your anticipated participation in this consultation and we look forward to working with you and your staff. Should you have any questions, please contact Jeff Underhill of my staff at 603-271-1370 (or email: junderhill@des.state.nh.us).

Sincerely Yours,



Thomas S. Burack
Commissioner

cc: Robert Scott, NHDES Air Resources Division
Jeffrey Underhill, NHDES Air Resources Division
Anna Garcia, OTC
Arthur Marin, NESCAUM
Susan Weirman, MARAMA

Initial letter from New Jersey requesting Indiana's participation in regional consultations.

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P.02/04



State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
PO Box 402
TRENTON, NJ 08625-0402
TEL. # (609) 292-2885
FAX # (609) 292-7695

JON S. CORZINE
Governor

LISA P. JACKSON
Commissioner

March 15, 2007

Thomas Easterly, Commissioner
Indiana Department of Environmental Management
100 North Senate Avenue
Indianapolis, Indiana 46204

Dear Mr. Easterly,

New Jersey is home to an area designated as a Class I area under Section 169A of the federal Clean Air Act, namely the Brigantine Wilderness area of the Edwin B. Forsythe National Wildlife Refuge. This area is one of 156 Class I areas located throughout the United States. Among the Class I areas in the eastern United States are the Otter Creek Wilderness area in West Virginia, Shenandoah National Park in Virginia, the Cape Romain Wilderness area in South Carolina and Acadia National Park in Maine. States with Class I areas are required to maintain and improve visibility in these areas to achieve natural background conditions by the year 2064. Existing visibility impairment in these Class I areas, also called regional haze, is caused by many sources located over a wide region.

All States, regardless of whether they are home to a Class I area, must prepare a State Implementation Plan (SIP) for Regional Haze by December, 2007, to meet the United States Environmental Protection Agency (USEPA) rules implementing Section 169A of the Clean Air Act (40 CFR 51.300). This Regional Haze SIP must demonstrate that reasonable progress towards improved visibility at the nearby Class I area will be made by certain milestone years. The first milestone year is 2018. The regulations at 40 CFR 51.308 (d) (1) (iv) require States with Class I areas to develop reasonable progress goals in consultation with any State that may reasonably cause or contribute to visibility impairment in the Class I area. This letter is part of New Jersey's consultation process for improving visibility at Brigantine.

Thus we are seeking your consultation on the reasonable progress goal and development of a coordinated emissions management strategy. For the purpose of establishing reasonable progress goals for the first Regional Haze SIP, the New Jersey Department of Environmental Protection has identified several States that may reasonably contribute to visibility impairment at Brigantine¹ or

¹ From the report entitled "Contributions to Regional Haze in the Northeast and Mid-Atlantic United States", prepared by NESCAUM for the Mid-Atlantic / Northeast Visibility Union (MANE-VU), August 2006.

that are members of the Mid-Atlantic Northeast -Visibility Union (MANE-VU) planning organization. These States and the reason for their inclusion in our first consultation process are listed in the attached Table 1.

Future regulations to control air pollutant emissions that affect visibility must be evaluated and included in our Regional Haze SIPs before setting this first reasonable progress goal for the year 2018. To be as inclusive as possible in this important planning process, this letter is being sent to all States within the eastern United States. We plan to focus our initial planning efforts, and to jointly develop a coordinated emission management strategy to meet the first reasonable progress goal of this first round of SIP development, on the States identified in Table 1.

Regardless of whether your State has been identified as causing or contributing to visibility impairment at the Brigantine Wilderness area, you are invited to send a representative of your State to future meetings to be scheduled through our respective Regional Planning Organizations. At these meetings, establishment of the first reasonable progress goal for the Class I areas of the northeastern United States will be specifically discussed. New Jersey will be working with your State through MANE-VU, a regional planning group formed to coordinate and facilitate the regional haze SIP activities. MANE-VU will also be working with other Regional Planning Organizations (RPOs) to which your State may belong (i.e.; the Mid-West RPO or VISTAS). Please send us the name, address and telephone number of the appropriate person within your organization to contact to inform them of the particulars of the first meeting. Please send this to Ray Papalski, 401 East State Street, P. O. Box 418, Trenton, New Jersey 08625-0418.

Should your staff have any questions on this request or on the technical aspects of this letter, please call Ray Papalski at (609) 633-7225 or e-mail him at ray.papalski@dep.state.nj.us. Should you have any questions on New Jersey's plans for the consultation process, please call Mr. Chris Salmi of my staff at (609) 292-6710. Thank you for your anticipated cooperation, and we look forward to working with you and your staff in the near future.

Sincerely yours,



Lisa P. Jackson
Commissioner

Attachment

c: Arthur Marin, NESCAUM
Susan Weirman, MARAMA
Chris Recchia, OTC
Raymond Werner, USEPA
Sandra Silva, USFWS
Randy Moore, USDA, FS
Chris Shaver, NPS

Table 1**States to be Consulted on Establishing New Jersey's Class I Area 2018 Reasonable Progress Goals**

<u>State Name (alphabetical order)</u>	<u>Technique / Reason for Inclusion²</u>
Connecticut	MANE-VU member
Delaware	MANE-VU member
District of Columbia	MANE-VU member
Georgia	> 0.1 ug/m ³ or > 2% Sulfate Contribution
Illinois	> 0.1 ug/m ³ or > 2% Sulfate Contribution
Indiana	3 of 5 techniques (Q/D, Calpuff 1 & 2)
Kentucky	> 0.1 ug/m ³ or > 2% Sulfate Contribution
Maine	MANE-VU member
Maryland	4 of 5 techniques (Q/D, Remsad, Calpuff 1 & 2)
Massachusetts	MANE-VU member
Michigan	> 0.1 ug/m ³ or > 2% Sulfate Contribution
New Hampshire	MANE-VU member
New York	4 of 5 techniques (Q/D, Remsad, Calpuff 1 & 2)
North Carolina	4 of 5 techniques (Q/D, Remsad, Calpuff 1 & 2)
Ohio	All techniques
Pennsylvania	All techniques
Rhode Island	MANE-VU member
South Carolina	> 0.1 ug/m ³ or > 2% Sulfate Contribution
Tennessee	> 0.1 ug/m ³ or > 2% Sulfate Contribution
Vermont	MANE-VU member
Virginia	4 of 5 techniques (Q/D, Remsad, Calpuff 1 & 2)
West Virginia	All techniques

Letter from MANE VU Regional Planning Organization requesting Indiana's participation in regional consultations.



July 10, 2007

KOR

Thomas Easterly, Commissioner
Indiana Department of Environmental
Management
100 North Senate Avenue, Room N1255
Indianapolis, IN 46204-2222

Connecticut

Delaware

District of Columbia

Maine

Maryland

Massachusetts

New Hampshire

New Jersey

New York

Pennsylvania

Rhode Island

Vermont

Virginia

Christopher Recchia
Executive Director

444 N. Capitol St. NW
Suite 638
Washington, DC 20001
(202) 508-3840
FAX (202) 508-3841
e-mail: ozone@otcair.org

Dear Mr. Easterly,

On behalf of New Jersey, New Hampshire, Vermont, and Maine, the Mid-Atlantic/Northeast Visibility Union (MANE-VU) States with Class I areas, I am pleased to invite you to our upcoming State-to-State consultation call and meetings. We are holding these events in order to comply with the consultation requirements specified in 40 CFR, Part 51, and in accordance with the Inter-RPO Consultation Framework that MANE-VU approved at its May 5, 2005 Board Meeting.

Our goal for these and future consultation calls and meetings is to help states exchange and understand information regarding visibility issues in MANE-VU Class I areas, and to facilitate States' working together to develop acceptable approaches and policies for improving visibility.

After reviewing technical analyses the MANE-VU Class I states have formulated some ideas on the types and amounts of emissions reductions that are reasonable and, therefore, necessary to achieve reasonable progress in improving visibility at MANE-VU Class I areas. Due to the downwind location of MANE-VU Class I areas, these emissions reductions would be from states both within and outside the MANE-VU region. We know that you have also been working hard to address the visibility issues facing your own region's Class I areas. The consultation calls and meetings we engage in over the next several weeks will allow us to compare our work and findings, discuss what adjustments may be appropriate, and provide an opportunity to develop mutually beneficial solutions.

MANE-VU has been working closely with the Midwest Regional Planning Organization (MRPO) to find mutually convenient dates and times for these events, and we hope that you will be able to participate in these discussions. The schedule of calls and meetings that have been planned are as follows:

- Open Technical Call on July 19, 2007 from 10 am – 12:30 pm EDT, 9:00 am – 11:30 am CDT (call-in number 1-866-537-1634, passcode 7545482#); and

- In-person Consultation Meeting on August 6, 2007 (still to be confirmed) in Chicago, IL from 10:00 am – 3:30 pm CDT.

The purpose of the Open Technical Call on July 19th is to provide a forum for States/staff from all three RPOs to summarize their technical analyses and findings, and to discuss the initial ideas on the types and amounts of reductions that may be needed to achieve reasonable progress. The call is open to all States and Tribes in the MANE-VU, MRPO, and VISTAS regions, and open to all levels of participation (Commissioner/Secretary, Air Director and staff), as well as to representatives from the U.S. Environmental Protection Agency and the Federal Land Manager agencies.

The purpose of the in-person Consultation Meeting on August 6th is to have State-to-State policy discussions based on the technical analyses and findings presented during the Open Technical Call. We anticipate that at this meeting we will go into greater depth in our discussion of the types of actions and reductions necessary to achieve reasonable progress, in accordance with the requirements of the Regional Haze Rule. The meeting is open to all States and tribes in the MANE-VU and MRPO regions, as well as to representatives from the U.S. Environmental Protection Agency and the Federal Land Manager agencies. We welcome all levels of State and Tribal participation, but it will be particularly important to have decision-makers in attendance who can engage in meaningful discussions with other States and Tribes on policies and solutions to the visibility issues affecting the Class I areas.

As both the Open Technical Call and the in-person Consultation Meeting are government-to-government transactions, stakeholders are not to participate.

Attached are draft agendas for the Open Technical Call and the in-person Consultation Meeting. We are circulating these drafts for your review and comment, and will work with the MRPO to revise as necessary to facilitate our discussions.

In addition, attached is the draft table of contents for a briefing book which will contain summaries of the technical analyses and work that MANE-VU has performed. We will be developing these briefing books and getting them to you in advance for your use during the Open Technical Call and Consultation Meeting.

Finally, we are attaching a copy of four actions recently approved by MANE-VU. The first is a Resolution by the MANE-VU States with Class I areas outlining the principles they will follow in implementing the Regional Haze Rule. The second is a Statement that lays out a course of action that MANE-VU, as a region, will pursue toward assuring reasonable progress.

The third is a Statement that outlines the MANE-VU States' initial request for a course of action by States outside of the MANE-VU region toward assuring reasonable progress at our Class I areas. The course of action described is intended as a starting point for our discussions, and will be examined in light of the technical work and findings provided by or on behalf of the affected States during the Open Technical Call and the in-person Consultation Meeting. The fourth of these attachments is a request that we are making of the U.S. Environmental Protection Agency to work with the eastern Regional Planning Organizations to develop a national proposal to achieve additional cost-effective SO₂ reductions. MANE-VU would welcome support from other RPOs for this request for EPA action.

Please contact me if you have any questions about the scheduling or logistics of the call or meeting, or generally about the consultation process. On behalf of the MANE-VU States, I look forward to working with you and the MRPO to develop an informative and productive consultation process of that yields mutually beneficial results.

Sincerely,



Anna Garcia
Acting Executive Director

Cc: Daniel Murray, Indiana DEM
Ken Ritter, Indiana DEM
Christine Pedersen, Indiana DEM

Enclosures