MISSISSIPPI

DEPARTMENT OF ENVIRONMENTAL QUALITY

OFFICE OF POLLUTION CONTROL

STATE IMPLEMENTATION PLAN (SIP) REVISION
REGARDING FEDERAL REGIONAL HAZE PROGRAM REQUIREMENTS

INCLUDING THE SIP NARRATIVE
ADDRESSING VISIBILITY IMPROVEMENT
IN FEDERAL CLASS I AREAS

Adopted August 28, 2008

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1.44 Introduction: State Implementation Plan (SIP) Revision Regarding Regional Haze Requirements of the Federal Clean Air Act Addressing Visibility in Federal Class I Areas.

Regional haze is pollution that impairs visibility over a large region, including national parks, forests, and wilderness areas (many termed "Class I" areas). Regional haze is caused by sources and activities emitting fine particles and their precursors, often transported over large regions. Particles affect visibility through the scattering and absorption of light. Reducing fine particles in the atmosphere is an effective method of improving visibility. In the southeast, the most important sources of haze-forming emissions are coal-fired power plants, industrial boilers and other combustion sources, but mobile source emissions, area sources, fires, and wind blown dust also contribute.

An easily understood measure of visibility to most people is visual range. Visual range is the greatest distance, in kilometers or miles, at which a dark object can be viewed against the sky. However, the most useful measure of visibility impairment is light extinction, which affects the clarity and color of objects being viewed. The measure used by the regional haze rule is the deciview (dv), calculated directly from light extinction using a logarithmic scale.

The regional haze rule requires states to demonstrate reasonable progress toward meeting the national goal of a return to natural visibility conditions by 2064. The rule directs states with Class I areas to graphically show what would be a "uniform rate of progress", also known as the "glide path", toward natural conditions for each Class I area within the State.

Mississippi does not have any Class I areas, but the Class I areas: the Breton National Wildlife Refuge (Breton) in Louisiana, Sipsey Wilderness Area (Sipsey) in Alabama, and Caney Creek Wilderness Area (Caney Creek) in Arkansas, are the closest to its state boundaries and the impact of sources in Mississippi to those Class I areas has been assessed. The Area of Impact (AOI) analysis, developed by VISTAS, indicates that sources in Mississippi do not significantly contribute to visibility impairment for Sipsey, Caney Creek, or any other Class 1 area. Sources in Mississippi appear to contribute to visibility impact for Breton. The AOI emission contribution spreadsheets are further discussed in Section 7.5 and found in Appendix M. Since there are no Class I areas in Mississippi, "uniform rate of progress" (or "glide path") toward natural conditions will not be presented.

The Regional Haze SIP Narrative included in Appendix R of this SIP Revision contains summaries of the technical analyses that will be used by Mississippi Department of Environmental Quality (MDEQ) to support the regional haze state implementation plan pursuant to §§107(d)(3)(D) and (E) of the Clean Air Act, as amended.

1.45 Notification of Public Hearing for Regional Haze SIP Revision.

Public participation on the Regional Haze SIP Revision was achieved by a public hearing held on Wednesday, July 16, 2008, at 1:30 p.m. in the Commission Hearing Room at the offices of the Mississippi Department of Environmental Quality, 515 E. Amite Street, Jackson, Mississippi in accordance with the information provided in the public notice and Mississippi Administrative Procedures Act. The notice for public hearing will be published consistent with procedures approved by EPA.

The notice of public hearing was published on June 16, June 23, and June 30, 2008, in daily newspapers in the cities of Gulfport, Jackson, and Tupelo in the State of Mississippi. The notice of public hearing and the proposed SIP revision was made available for public review in the main branches of the public libraries in the above mentioned cities and at the offices of the Mississippi Department of Environmental Quality, 515 E. Amite Street, Jackson, Mississippi. This notice was also mailed to persons on the air pollution control regulation mailing list.

The notice of public hearing follows this page.

MISSISSIPPI COMMISSION ON ENVIRONMENTAL QUALITY
NOTICE OF PROPOSED PLAN REVISION
NOTICE OF PUBLIC HEARING
PUBLIC NOTICE START DATE: June 16, 2008

PLEASE TAKE NOTE that the Mississippi Commission on Environmental Quality ("Commission") is considering a Revision to the State Implementation Plan for Air Pollution Control (SIP Revision) and will conduct a public hearing to receive comments on the proposed SIP Revision. The proposed SIP Revision involves the implementation of federal regional haze regulations as promulgated by the U.S. Environmental Protection Agency (EPA). The proposed SIP Revision will be applicable statewide.

I. Subject of the Proposed Action.

The SIP Revision involves the State of Mississippi's plan for implementing federal regional haze regulations as promulgated by EPA. The SIP Revision addresses reasonable progress goals for visibility improvement in nearby Federal Class I areas and includes Best Available Retrofit Technology (BART) determinations for emission sources located in the State of Mississippi. A summary of comments previously received from the Federal Land Managers (FLMs) is included as an appendix to the proposed SIP Revision.

II. Manner By Which the Public May Comment.

Copies of the proposed SIP Revision may be obtained by calling Ms. Maya Rao at 601-961-5242 or Mr. Elliott Bickerstaff at 601-961-5176 or writing to Mississippi Department of Environmental Quality, Air Division, P. O. Box 2262, Jackson, Mississippi 39225. For those persons with internet access, a copy of the proposed SIP revision may be found on the Mississippi Department of Environmental Quality's website at http://www.deq.state.ms.us. Also, copies of the proposed SIP Revision will be available for public review through Wednesday, July 16, 2008, in the main branch of public libraries in the cities of Gulfport, Jackson, and Tupelo in the State of Mississippi. The proposed SIP Revision may also be reviewed in the offices of the Mississippi Department of Environmental Quality, 515 E. Amite St., Jackson, Mississippi. For an appointment to review the proposed SIP Revision at the offices of MDEQ, contact Mr. Elliott Bickerstaff at (601) 961-5176.

Members of the public may present verbal or written comments at the public hearing described below. Also, written statements regarding the proposed SIP Revision will be made part of the public hearing record if delivered by 5:00 p.m., Wednesday, July 16, 2008, to the attention of Ms. Maya Rao at the address shown above.

III. Notice of Public Hearing.

A public hearing regarding the proposed SIP Revision will be conducted. The hearing will be held on Wednesday, July 16, 2008, at 1:30 p.m. in the Commission Hearing Room (Room 104A) of the Mississippi Department of Environmental Quality Office Building at 515 E. Amite St., Jackson, Mississippi.

IV. Additional Information.

For additional information, please contact Ms. Maya Rao at 601-961-5242 or Mr. Elliott Bickerstaff at 601-961-5176.

Regional Haze SIP Public Notice June 16 2008

3.21 Legal Authority for the Regional Haze SIP Revision

No legislative actions are needed concerning this Regional Haze SIP revision. The State of Mississippi Air & Water Pollution Control Law, Section 49-17-1 to 49-17-43, Mississippi Code of 1972, gives the Commission on Environmental Quality the necessary legal authority to adopt and implement this Regional Haze SIP revision. State law (as of July 1, 2007) Mississippi Code Annotated, Section 49-17-13(1) designates the Commission as the State air pollution control agency for all purposes of the federal pollution control legislation and programs and to take all actions necessary thereto.

Public participation on this Regional Haze SIP revision was achieved by a public hearing held on Wednesday, July 16, 2008, at 1:30 p.m. in the Commission Hearing Room at the offices of the Mississippi Department of Environmental Quality, 515 E. Amite Street, Jackson, Mississippi.

5.19 Control Strategy for the Regional Haze SIP Revision

The SIP narrative in Appendix R addresses control strategies for improvement of visibility in Federal Class I areas.

6.23 Control Regulations for the Regional Haze SIP Revision

The regional haze SIP Revision does not include any changes to state regulations. The regional haze SIP Revision is a non-regulatory action. The SIP Narrative in Appendix R references Federal requirements addressing visibility in Federal Class I areas.

14.1.18 Health Effects of the Regional Haze SIP Revision

No adverse health effects are expected to be caused by this Regional Haze SIP revision.

14.3.18 Economics Effects of the Regional Haze SIP Revision

No adverse economic effects due to this Regional Haze SIP revision are foreseen.

14.5.18 Social Effects of the Regional Haze SIP Revision

No adverse social effects are foreseen as a result of this Regional Haze SIP revision.

14.6.18 Air Quality Effects of the Regional Haze SIP Revision

This Regional Haze SIP revision will not have any adverse air quality effects.

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF POLLUTION CONTROL

STATE IMPLEMENTATION PLAN REVISION
REGARDING REGIONAL HAZE PROGRAM REQUIREMENTS

APPENDIX R

SIP NARRATIVE
ADDRESSING VISIBILITY IMPROVEMENT
IN FEDERAL CLASS I AREAS

Adopted August 28, 2008

Preface: This document contains summaries of the technical analyses that will be used by Mississippi Department of Environmental Quality (MDEQ) to support the regional haze state implementation plan pursuant to §§107(d)(3)(D) and (E) of the Clean Air Act, as amended.

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EXECUTIVE SUMMARY

Introduction

Regional haze is pollution that impairs visibility over a large region, including national parks, forests, and wilderness areas (many termed "Class I" areas). Regional haze is caused by sources and activities emitting fine particles and their precursors, often transported over large regions. Particles affect visibility through the scattering and absorption of light. Reducing fine particles in the atmosphere is an effective method of improving visibility. In the southeast, the most important sources of haze-forming emissions are coal-fired power plants, industrial boilers and other combustion sources, but mobile source emissions, area sources, fires, and wind blown dust also contribute.

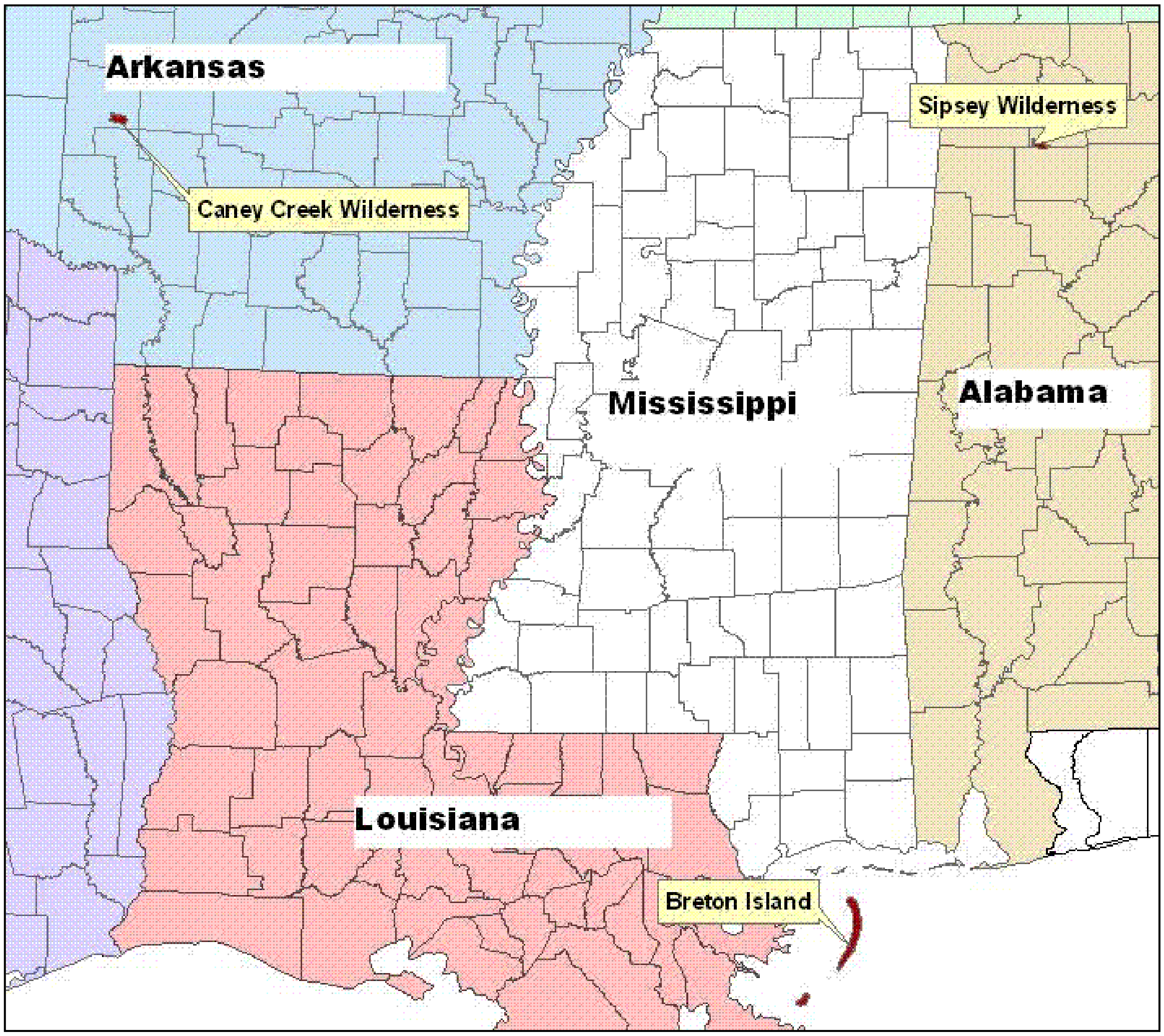
An easily understood measure of visibility to most people is visual range. Visual range is the greatest distance, in kilometers or miles, at which a dark object can be viewed against the sky. However, the most useful measure of visibility impairment is light extinction, which affects the clarity and color of objects being viewed. The measure used by the regional haze rule is the deciview (dv), calculated directly from light extinction using a logarithmic scale.

The regional haze rule requires states to demonstrate reasonable progress toward meeting the national goal of a return to natural visibility conditions by 2064. The rule directs states with Class I areas to graphically show what would be a "uniform rate of progress", also known as the "glide path", toward natural conditions for each Class I area within the State.

No Class I Areas within the State Boundaries of Mississippi

Mississippi does not have any Class I areas, but the Class I areas: the Breton National Wildlife Refuge (Breton) in Louisiana, Sipsey Wilderness Area (Sipsey) in Alabama, and Caney Creek Wilderness Area (Caney Creek) in Arkansas, are the closest to its state boundaries and the impact of sources in Mississippi to those Class I areas has been assessed. The Area of Impact (AOI) analysis, developed by VISTAS, indicates that sources in Mississippi do not significantly contribute to visibility impairment for Sipsey, Caney Creek, or any other Class 1 area. Sources in Mississippi appear to contribute to visibility impact for Breton. The AOI emission contribution spreadsheets are further discussed in Section 7.5 and found in Appendix M. Since there are no Class I areas in Mississippi, "uniform rate of progress" (or "glide path") toward natural conditions will not be presented.

The *Executive Summary Figure 1* below illustrates the location of these Class I areas that are nearest to Mississippi.



Executive Summary Figure 1. Class I Areas in States Surrounding Mississippi.

State Implementation Plan Requirements

States are required to submit state implementation plans (SIPs) to the United States Environmental Protection Agency (USEPA) that set out each state's plan for meeting the national goal of a return to natural visibility conditions by 2064 for states with Class I areas. The plan includes the states' reasonable progress goals, expressed in deciviews, for visibility improvement at each affected Class I area for each 10-year period until 2064. Since Mississippi does not have any Class I areas, Reasonable Progress Goals are not presented. The reasonable progress goals for Class I areas near Mississippi are under the purview/scope of the states where the Class I areas reside. However, Mississippi has addressed the impact of sources in Mississippi on Class I areas in surrounding states and considered those impacts in the development of the long term strategy for Mississippi.

The long-term strategy includes enforceable emissions limitations, compliance schedules, and other measures as necessary to help achieve the reasonable progress goals. States must also consider ongoing control programs, measures to mitigate construction activities, source retirement and replacement schedules, smoke management programs for agriculture and forestry, and enforceability of specific measures.

These plans will cover long-term strategies for visibility improvement between baseline conditions in 2000-2004 and 2018. States are required to evaluate progress toward reasonable progress goals every 5 years to assure that installed emissions controls are on track with emissions reduction forecasts in each SIP.

Federal and State Control Requirements

There are significant control programs being implemented between the baseline period and 2018. These programs will all reduce the particulate emissions that affect visibility in the Class I areas, and include: the Clean Air Interstate Rule (CAIR), the NO_x SIP Call, consent agreement with Chevron, one-hour ozone SIPs submitted by Birmingham, Alabama and Baton Rouge, Louisiana, NO_x RACT in 8-hour nonattainment area SIPs, heavy duty diesel (2007) engine standard (for on-road trucks and buses), Tier 2 tailpipe standards for on-road vehicles, large spark ignition and recreational vehicle rule, nonroad diesel rule, and various Federal Maximum Achievable Control Technology regulations (MACT). For more detailed explanation of these control programs see Section 7.2.1 – Emission Control Modeled and Requirements. Of these, the CAIR rule has the largest effect. It requires significant reductions of SO_2 and NO_x from Electric Generating Units (EGU) in a cap and trade program. Several large Electric Generating Units in South Mississippi are planning to install NO_x and SO_2 controls to reduce emissions.

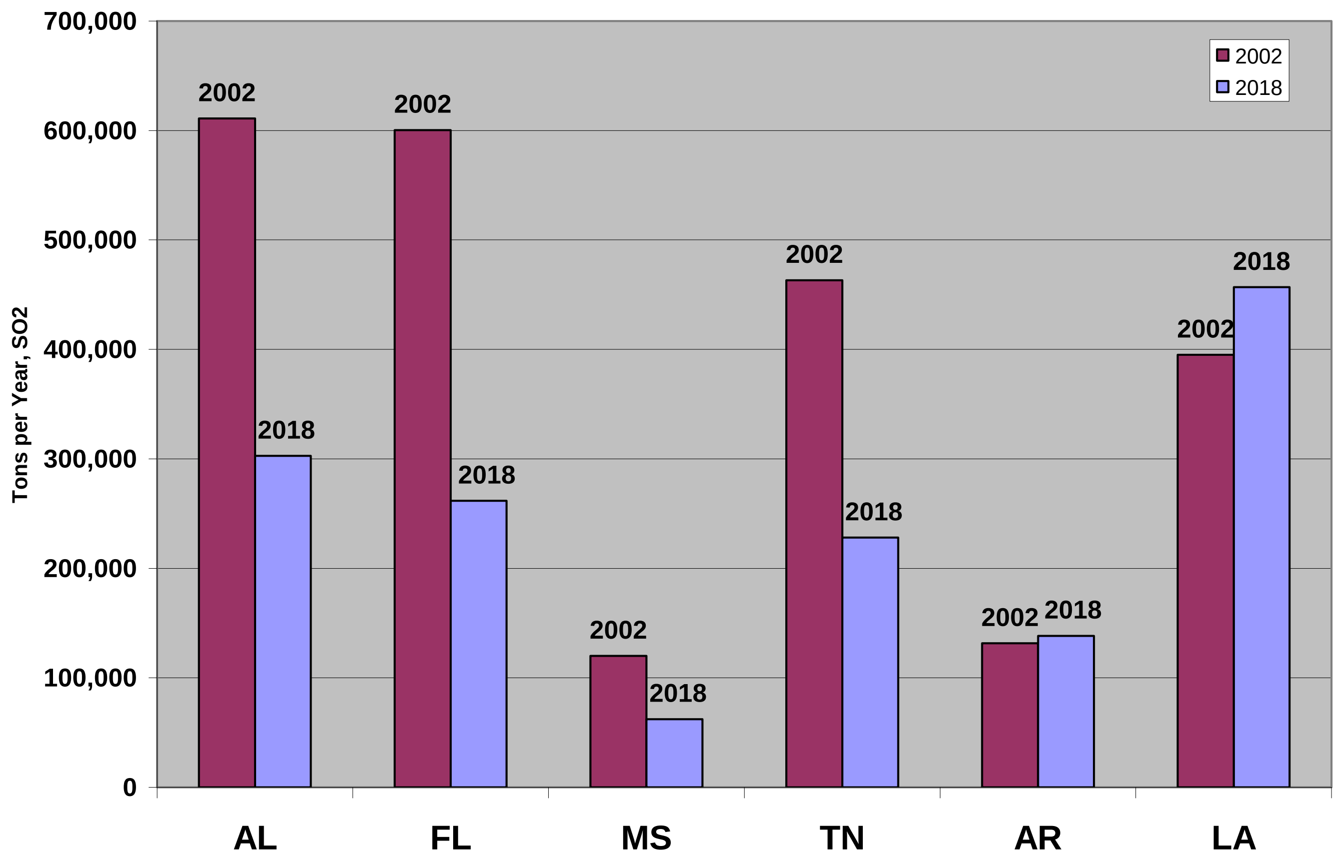
The regional haze rule also requires states to determine best available retrofit technology (BART) for certain facilities. There are fifteen (15) BART eligible Sources in Mississippi. Thirteen (13) of the BART-eligible sources were able to demonstrate that the facilities did not cause or contribute to visibility impairment, two are BART subject. BART analysis of one of the subject sources, Mississippi Phosphates in Pascagoula, Mississippi, found that no additional controls may be necessary. This facility is currently working on a construction application for planned modifications. As part of this process, they will address the BART requirements and submit their complete engineering analysis by the end of the year. The planned modifications will result in reduced emissions for Mississippi Phosphates. The other facility, Chevron Refinery in Pascagoula, Mississippi (Appendix L.10) is BART subject and there are significant emission reductions scheduled. Section 7.3.2 provides detail on how the BART eligible sources were able to demonstrate they were not subject to BART.

Interstate Consultation

The Regional Haze Rule requires interstate consultation between states. As part of VISTAS, MDEQ has consulted with other VISTAS states regarding the impact of Mississippi's sources on Class I areas in VISTAS states. In addition, Mississippi borders the CENtral Regional Air Planning (CENRAP) Organization which contains Class I areas in Breton, Louisiana and Caney Creek, Arkansas. Mississippi has attended CENRAP meetings and, particularly, has consulted with Louisiana with regard to impact of Mississippi sources on Breton. Please refer to Section 10 and Appendix J for details on consultation.

Conclusion

The modeling analysis performed by Visibility Improvement State and Tribal Association of the Southeast (VISTAS) finds that sulfur dioxide (SO_2) is the primary pollutant impacting visibility in the southeast. Executive Summary Figure 2 shows that emissions of SO_2 from Mississippi sources are significantly less than those from surrounding states. Further, MDEQ is expecting significant emissions reductions by 2018. Section 7.2 addresses expected emission reductions from various sources resulting from existing federal measures and Section 7.6 addresses facilities reviewed for Reasonable Progress Goals.



Executive Summary Figure 2. SO_2 Emission Totals for Mississippi and Surrounding States, 2002 and 2018 (2018 emission totals may not reflect all emission reductions for each state).

Since Mississippi does not have any Class I areas within the state boundaries, it is not in scope/purview of the state of Mississippi to set reasonable progress goals for any surrounding areas. However, there are significant emissions reductions expected from Mississippi sources that will help in attaining the reasonable progress goals for Class I areas in surrounding states.

1.0 INTRODUCTION

1.1 What is regional haze?

Regional haze is pollution from disparate sources that impairs visibility over a large region, including national parks, forests, and wilderness areas (federal “Class I” areas). Regional haze is caused by sources and activities emitting fine particles and their precursors. Those emissions are often transported over large regions.

Particles affect visibility through the scattering and absorption of light, and fine particles – particles similar in size to the wavelength of light – are most efficient, per unit of mass, at reducing visibility. Fine particles may either be emitted directly or formed from emissions of precursors, the most important of which are sulfur dioxides (SO_2) and nitrogen oxides (NO_x). Reducing fine particles in the atmosphere is generally considered to be an effective method of reducing regional haze, and thus improving visibility. Fine particles also adversely impact human health, especially respiratory and cardiovascular systems. The United States Environmental Protection Agency (USEPA) has set national ambient air quality standards for daily and annual levels of fine particles with diameter smaller than 2.5 μm (PM2.5). The most important sources of PM2.5 and its precursors are coal-fired power plants, industrial boilers and other combustion sources. Other significant contributors to PM2.5 and visibility impairment include mobile source emissions, area sources, fires, and wind blown dust.

1.2 What are the requirements under the Clean Air Act for addressing regional haze?

In Section 169A of the 1977 Amendments to the Clean Air Act (CAA), Congress set forth a program for protecting visibility in Federal Class I areas which calls for the “prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I Federal areas which impairment results from manmade air pollution.” Congress adopted the visibility provisions to protect visibility in 156 national parks and wilderness areas. On December 2, 1980, USEPA promulgated regulations to address visibility impairment (45 FR 80084). The 1980 regulations were developed to address visibility impairment that is “reasonably attributable” to a single source or small group of sources. These regulations represented the first phase in addressing visibility impairment and deferred action on regional haze that emanates from a variety of sources until monitoring, modeling and scientific knowledge about the relationships between pollutants and visibility impairment improved.

In the 1990 Amendments to the CAA, Congress added section 169B and called on USEPA to issue regional haze rules. The Regional Haze rule (RHR) that USEPA promulgated on July 1, 1999 (64 FR 35713), revised the existing visibility regulations in order to integrate provisions addressing regional haze impairment and establish a comprehensive visibility protection program for Class I Federal areas. States are required to submit state implementation plans (SIPs) to USEPA that set out each states’ plan for complying with the regional haze rule, including consultation and coordination with other states and with federal land managers. The timing of the SIP submittal is tied to USEPA's promulgation of designations for the National Ambient Air Quality Standard (NAAQS) for fine particulate matter (PM2.5) at 40 CFR Part 81. States must submit a regional haze implementation plan to USEPA within three years after the date of designation. Because USEPA promulgated PM2.5 designation dates on December 17, 2004, regional haze SIPs must be submitted by December 17, 2007, which is also specified at 40 CFR 51.308(b).

The regional haze rule addressed the combined visibility effects of various pollution sources over a wide geographic region. This wide reaching pollution net meant that many states – even those without Class I Areas – would be required to participate in haze reduction efforts. USEPA designated five Regional Planning Organizations (RPO) to assist with the coordination and cooperation needed to address the visibility issue. Those states that make up the southeastern portion of the contiguous United States are known as VISTAS (Visibility Improvement – State and Tribal Association of the Southeast), and include the following states: Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia.

Figure 1.2-1. Geographical Areas of Regional Planning Organizations.

1.3 General overview of regional haze SIP requirements

The regional haze rule (RHR) at 51.308(d) requires states to demonstrate reasonable progress toward meeting the national goal of a return to natural visibility conditions by 2064. As a guide for reasonable progress, the RHR directs states to graphically show what would be a "uniform rate of progress" toward natural conditions for each mandatory Class I Federal area within the State and/or for each mandatory Class I Federal area located outside the State, which may be affected by emissions from sources within the State. States are to establish baseline visibility conditions for 2000-2004, natural background visibility conditions in 2064, and the rate of uniform progress between baseline and background conditions. The uniform rate of progress is also known as the "glidepath."

The RHR then requires States with Class 1 areas to establish reasonable progress goals (RPGs), expressed in deciviews, for visibility improvement at each affected Class I area covering each (approximately) 10-year period until 2064. The goals must provide for reasonable progress towards 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 (see §51.308(d)(1)).

In order to ensure that visibility goals are properly met and set, state implementation plans must include determinations, for each Class I area, of the baseline visibility conditions (expressed in deciviews) for the most impaired and least impaired days. SIPs must also contain supporting documentation for all required analyses used to calculate the degree of visibility impairment under natural visibility conditions for the most impaired and least impaired days (see §51.308(d)(2)). In addition, states must include a monitoring strategy for measuring, characterizing, and reporting of regional haze visibility impairment that is representative of all mandatory Class I Federal areas within the state (see §51.308(d)(4)).

This first set of reasonable progress goals must be met through measures contained in the state's long-term strategy covering the period from the present until 2018. The long-term strategy includes enforceable emissions limitations, compliance schedules, and other measures as necessary to achieve the reasonable progress goals, including all controls required or expected under all federal and state regulations by 2009 and by 2018. During development of the long-term strategy, states are also required to consider specific factors such as the abovementioned ongoing control programs, measures to mitigate construction activities, source retirement and replacement schedules, smoke management programs for agriculture and forestry, and enforceability of specific measures (see §51.308(d)(3)).

In addition, a specific component of each state's first long-term strategy is dictated by the specific best available retrofit technology (BART) requirements in 40 CFR 51.308(e) of the RHR. The RHR at §51.308(e) requires states to include a determination of BART for each BART-eligible source in the State that emits any air pollutant, which may reasonably be anticipated to cause or contribute to any impairment of visibility in any mandatory Class I Federal area. Clean Air Act section 169A(b) defines BART-eligible sources as sources in 26 specific source categories, in operation within a 15-year period prior to enactment of the 1977 Clean Air Act Amendments, and has the potential to emit 250 tons a year of visibility-impairing pollution. States must determine BART according to five factors set out in section 169A(g)(7) of the Clean Air Act. Emission limitations representing BART and schedules for compliance with BART for each source subject to BART must be included in the long-term strategy.

State Implementation Plans for the first review period are due December 17, 2007. These plans will cover long-term strategies for visibility improvement between baseline conditions in 2000-2004 and 2018. States are required to evaluate progress toward reasonable progress goals every 5 years to assure that installed emissions controls are on track with emissions reduction forecasts in each SIP. The first interim review would be due to USEPA in December 2012. If emissions controls are not on track to meet SIP forecasts, then states may need to take action to assure emissions controls by 2018 will be consistent with the SIP or to revise the SIP to be consistent with the revised emissions forecast. The periodic review is addressed in more detail in section 11.

1.4 Class I areas near Mississippi

Mississippi has no Class I areas within its borders: The Class I Areas that are closest to Mississippi are Breton National Wildlife Refuge in Louisiana, Sipsey Wilderness Area in Alabama and Caney Creek Wilderness Area in Arkansas. The Air Division of the Mississippi Department of Environment Quality (MDEQ) is responsible for developing the Regional Haze SIP. This SIP establishes a long-term strategy that will help achieve the reasonable progress goals set by the neighboring states within the first regional haze planning period.

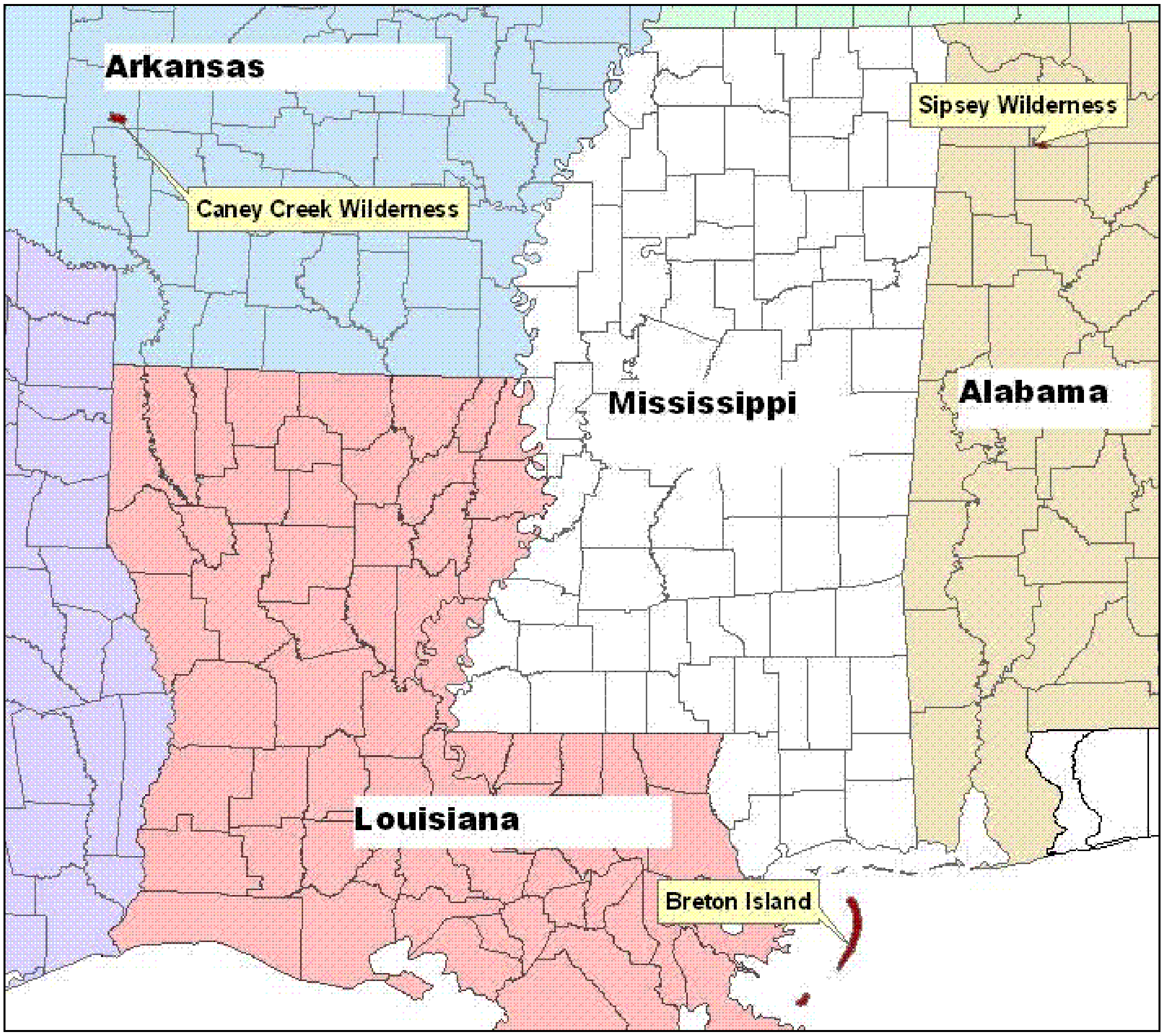


Figure 1.4-1. Class I Areas Near Mississippi.

In developing this SIP, MDEQ has also considered that emission sources within Mississippi may affect visibility at some of the Class I areas in neighboring states. Through VISTAS, the southeastern states have worked together to assess state-by-state contributions to visibility impairment in Class I areas within the VISTAS region and those in neighboring regions. This technical work is discussed further in chapters 5, 6, and 7 below. Consultations to date between Mississippi and other states are summarized in chapter 10; consultations are ongoing.

Congress considered several legislative bills to reduce sulfur dioxide and nitrogen oxides from electric generating utilities. In 2004, USEPA promulgated the Clean Air Interstate Rule (CAIR) to require emissions reductions for sulfur dioxide and nitrogen dioxide from electric generating utilities in 26 eastern states. The CAIR rule allows for interstate trading of emissions to find cost effective reductions. These reductions will improve visibility in Class I areas closest to Mississippi.

1.5 State and Federal Land Manager (FLM) coordination

As required by 40 CFR §51.308(i), the regional haze SIP must include procedures for continuing consultation between the States and Federal Land Managers on the implementation of the visibility protection program, including development and review of implementation plan revisions and 5-year progress reports, and on the implementation of other programs having the potential to contribute to impairment of visibility in any mandatory Class I Federal area.

Successful implementation of a regional haze program will involve long-term regional coordination among States. VISTAS was formed in 2001 to address regional haze and visibility problems in the southeastern United States. Jurisdictions represented by VISTAS members include the Eastern Band of Cherokee Indians; the States of Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia; and the local air pollution control programs located in these States. A copy of the VISTAS Memorandum of Agreement and Bylaws, which Mississippi intends to reference as a guideline for consultation procedures, is enclosed as Appendix A. Additional consultation procedures with FLMs are described in Sections 11 and 12.

The objectives of the VISTAS project are to establish natural background visibility conditions across the mandatory Class I Federal areas, identify current visibility impairment levels, analyze emission control levels that will achieve interim visibility goals, and provide adequate documentation to member agencies so that the states/tribes/local agencies can develop the regional haze State/Tribal Implementation Plans (SIP/TIP). *Figure 1.5-1* shows the eighteen (18) mandatory Class I Federal areas in the VISTAS Region, where visibility is an important value. *Table 1.5-1* lists these Class I areas. Mississippi is on the western Boundary of VISTAS. Two of the three closest Class I areas are in the Central Regional Air Planning Organization (CENRAP). In the technical analysis VISTAS considered these areas. Mississippi has also attended CENRAP meetings and been in consultation with Louisiana.

Figure 1.5-1. Class I Areas in the VISTAS Region and Neighboring States.

Mandatory Class I Federal Areas in the VISTAS Region and Neighboring States where Visibility is an Important Value			
Regulation Citation and State	**Area Name**	**Acreage**	**Federal Land Manager**
40 CFR §81.401 Alabama	Sipsey Wilderness	24,922	USDA-FS
40 CFR §81.407 Florida	Chassahowitzka Wilderness	23,360	USDI-FWS
	Everglades National Park	1,397,429	USDI-NPS
	St. Marks Wilderness	17,745	USDI-FWS
40 CFR §81.408 Georgia	Cohotta Wilderness	36,977	USDA-FS
	Okefenokee Wilderness	343,850	USDI-FWS
	Wolf Island Wilderness	5,126	USDI-FWS
40 CFR §81.411 Kentucky	Mammoth Cave National Park	51,303	USDI-NPS
40 CFR §81.422 North Carolina	Great Smoky Mountains National Park	273,551	USDI-NPS
	Joyce Kilmer-Slickrock Wilderness	17,394	USDA-FS
	Linville Gorge Wilderness	12,002	USDA-FS
	Shining Rock Wilderness	18,483	USDA-FS
	Swanquarter Wilderness	9,000	USDI-FWS
40 CFR §81.426 South Carolina	Cape Romain Wilderness	28,000	USDI-FWS
40 CFR §81.428 Tennessee	Great Smoky Mountains National Park	241,207	USDI-NPS
	Joyce Kilmer-Slickrock Wilderness	17,394	USDA-FS
40 CFR §81.433 Virginia	James River Face Wilderness	8,886	USDA-FS
	Shenandoah National Park	190,535	USDI-NPS
40 CFR §81.435 West Virginia	Dolly Sods Wilderness	10,215	USDA-FS
	Otter Creek Wilderness	20,000	USDA-FS
40 CFR §81.412 Louisiana	Breton National Wildlife Refuge (CENRAP)	5,000	USDI-FWS
40 CFR §81.404 Arkansas	Caney Creek Wilderness (CENRAP)	14,460	USDA-FS
	Upper Buffalo Wilderness (CENRAP)	12,035	USDA-FS

Table 1.5-1. Mandatory Class I Federal Areas in the VISTAS Region and nearby where Visibility is an Important Value.

A technical support document for the regional haze state implementation plans (Appendix G) was prepared cooperatively by VISTAS staff and states to characterize regional haze in the southeastern United States. The report includes a review of the science and situation, calculation of initial baseline visibility, review of monitoring data/data gaps, and recommendations for additional monitoring, initial emission inventory characterization and projections, and compliance with existing control programs. Source contributions to VISTAS and nearby mandatory Class I Federal areas are also assessed.

2.0 ASSESSMENT OF BASELINE AND CURRENT CONDITIONS AND ESTIMATE OF NATURAL BACKGROUND CONDITIONS IN CLASS I AREAS

The responsibility to assess the baseline and current conditions, determine natural background and the glidepath falls to the states that the Class I areas are within. Since there are no Class I areas in Mississippi, these items will not addressed.

3.0 GLIDEPATHS TO NATURAL CONDITIONS

The responsibility to assess the baseline and current conditions and determine natural background falls to the states that the Class I areas are within. Since there are no Class I areas in Mississippi, these items will not addressed.

4.0 EMISSION INVENTORY IMPROVEMENTS

4.1 Baseline Emissions Inventory

The Regional Haze Rule at 51.308(d) (4) (v) requires a statewide emissions inventory of pollutants that are reasonably anticipated to cause or contribute to visibility impairment in any mandatory Class I area. An inventory was developed for the baseline year 2002 and projected to 2009 and 2018. The pollutants inventoried include volatile organic compounds (VOC), nitrogen oxides (NO_x), fine particulate (PM2.5), coarse particulate (PM10), ammonia (NH4) and sulfur dioxide (SO_2). The baseline emissions inventory for 2002 was developed for MS following the methods described in Appendix D.

There are five different emission inventory source classifications: stationary point, stationary area, off-road mobile, on-road mobile, and biogenic sources. Stationary point sources are those sources that emit greater than 100 tons per year of any criteria pollutant, with data provided at the facility level. Electric generating utilities and industrial sources are the major categories for stationary point sources. Stationary area sources are those sources whose individual emissions are relatively small, but due to the large number of these sources, the collective emissions from the source category could be significant (i.e., dry cleaners, service stations, agricultural sources, fire emissions, etc.). These types of emissions are estimated on a countywide level. Non-road (or off-road) mobile sources are equipment that can move but do not use the roadways, i.e., lawn mowers, construction equipment, railroad locomotives, aircraft, etc. The emissions from these sources, like stationary area sources, are estimated on a countywide level. On-road mobile sources are automobiles, trucks, and motorcycles that use the roadway system. The emissions from these sources are estimated by vehicle type and road type and are summed to the countywide level. Biogenic sources are the natural sources like trees, crops, grasses and natural decay of plants. The emissions from these sources are estimated on a countywide level.

In addition to the various source classifications, there are also various types of emission inventories. The first is the actual base year inventory. This inventory is the base year emissions that correspond to the meteorological data used, which for this modeling effort is data from 2002. These emissions are used for evaluating the air quality model performance.

The second type of inventory is the typical base year inventory. This inventory is similar to the actual base year inventory, except that for sources whose emissions change significantly from year to year, a more typical emission value is used. In this modeling effort, typical emissions were developed for the electric generating units (EGUs) and the wildland fire emissions. The air quality modeling runs using the typical base year inventory provide results which are then used to calculate relative reduction factors for future years. These relative reduction factors for future years are then used to demonstrate reasonable progress toward visibility goals.

Below is an overview of the inventories used for each source classification. More detailed discussion of the emissions inventory development is contained in Appendix D.

4.1.1 Stationary Point Sources

Point source emissions are emissions from individual sources having a fixed location. Generally, these sources must have permits to operate, and their emissions are inventoried on a regular schedule. Large sources emitting at least 100 tons per year (tpy) of a criteria pollutant, 10 tpy of a single hazardous air pollutant (HAP), or 25 tpy total HAP are inventoried annually. Smaller sources have been inventoried less frequently. The point source emissions data can be grouped as EGU sources and other industrial point sources, also called non-EGUs.

<u>Electric Generating Units</u>

The actual base year inventory for the EGU sources used 2002 continuous emissions monitoring (CEM) data reported to the USEPA's Acid Rain program or 2002 hourly emissions data provided by stakeholders. These data provide hourly emissions profiles for SO_2 and NO_x that can be used in air quality modeling. Emissions profiles are used to estimate emissions of other pollutants (volatile organic compounds, carbon monoxide, ammonia, fine particles, soil) based on measured emissions of SO_2 and NO_x.

Emissions from EGU vary daily and seasonally as a function of variability in energy demand and utilization and outage schedules. To avoid anomalies in future year emissions created by relying on 2002 operations to represent future operations, a typical base year emissions inventory was developed for EGUs. This approach is consistent with the USEPA's modeling guidance. To develop a typical year 2002 emissions inventory for EGU sources, each unit's average CEM heat input for 2000 through 2004 was divided by the 2002 actual heat input to generate a unit specific normalizing factor. This normalizing factor was then multiplied by the 2002 actual emissions. The heat inputs for the period 2000 through 2004 were used because the modeling current design values use monitored data from this same 5-year period. If a unit was shut down for an entire year during the 2000 through 2004 period, the average of the years the unit was operational was used. If a unit was shut down in 2002, but not permanently shutdown, the emissions and heat inputs from 2001 (or 2000) were used in the normalizing calculations.

As part of the VISTAS air quality modeling, VISTAS, in cooperation with the other eastern RPOs, contracted with ICF Resources, L.L.C., to generate future year emission inventories for the electric generating sector of the contiguous United States using the Integrated Planning Model (IPM), Version 2.1.9. IPM is a dynamic linear optimization model that can be used to examine air pollution control policies for various pollutants throughout the contiguous United States for the entire electric power system. The dynamic nature of IPM enables projection of the behavior of the power system over a specified future period. Optimization logic in IPM determines the least-cost means of meeting electric generation and capacity requirements while complying with specified constraints including air pollution regulations, transmission bottlenecks, and plant-specific operational constraints. The versatility of IPM allows users to specify which constraints to exercise, and to populate IPM with their own datasets.

The IPM modeling runs took into consideration CAIR implementation, resulting in future reduction of NOx and SO2 air emissions for several EGUs in Mississippi. The IPM model predicted the shut down of several gas/oil-fired EGU sources; however, those sources have no closure intentions. Therefore, these sources were re-integrated into the IPM model using 2002 emission inventory data.

Other Industrial Point Sources

For the non-EGU sources, the same inventory is used for both the actual and typical base year emissions inventories. The non-EGU category uses annual emissions as reported under the Consolidated Emissions Reporting Rule (CERR) for the year 2002. These emissions are temporally allocated to month, day, and hour using source category code (SCC)-based allocation factors.

The general approach for assembling future year data was to use recently updated growth and control data consistent with USEPA's CAIR analyses. This data was supplemented with state-specific growth factors and stakeholder input on growth assumptions.

4.1.2 Stationary Area Sources

Stationary area sources are sources whose individual emissions are relatively small, but due to the large number of these sources, the collective emissions could be significant (i.e., combustion of fuels for heating, structure fires, service stations, etc.). Emissions are estimated by multiplying an emission factor by some known indicator of collective activity, such as fuel usage, number of households, or population. Stationary area source emissions are estimated at the countywide level.

The actual base year inventory will serve as the typical base year inventory for all area source categories except for wildland fires. For wildland fires, a typical year inventory was used to avoid anomalies in wildfire activity in 2002 compared to longer term averages. Development of a typical year fire inventory provided the capability of using a comparable data set for both the base year and future years. Thus, fire emissions remain the same for air quality modeling in both the base and any future years. The VISTAS Fire Special Interest Work Group used State records to ratio the number of acres burned over a longer term period (three or more years, as available from state records) to 2002. Based on these ratios, the 2002 acreage was then scaled up or down to develop a typical year inventory.

Future year emissions
The VISTAS contractor generated future year emissions inventories for 2009 and 2018 for the regional haze modeling. Growth factors, supplied either by states or taken from the CAIR emission projections, were applied to project the controlled emissions to 2018. If no growth factor was available from either a state or the CAIR growth factor files, then the USEPA's Economic Growth and Analysis System Version 5 growth factors were used.

4.1.3 Off-Road Mobile Sources

Off-road (or non-road) mobile sources are equipment that can move but do not use the roadways, such as construction equipment, aircraft, railroad locomotives, lawn and garden equipment, etc. For the majority of the non-road mobile sources, the emissions for 2002 were estimated using the USEPA's NONROAD2005c model. For the three source categories not included in the NONROAD model, i.e., aircraft engines, railroad locomotives and commercial marine, more traditional methods of estimating the emissions were used. The same inventory is used for both the actual and typical base year emissions inventories.

For the source categories estimated using the USEPA's NONROAD model, the model growth assumptions were used to create the 2009 and 2018 future year inventories. The NONROAD model takes into consideration regulations affecting emissions from these source categories. For the commercial marine, railroad locomotives and the remaining airport emissions, the VISTAS contractor calculated the future growth in emissions using detailed inventory data (both before and after controls) for 1996 and 2010, obtained from the CAIR Technical Support Document. When available, state-specific growth factors were used.

4.1.4 Highway Mobile Sources

For onroad vehicles, the newest version of the MOBILE model, MOBILE6.2, was used. Key inputs for MOBILE include information on the age of vehicles on the roads, the average speeds on the roads, the mix of vehicles on the roads, any programs in place in an area to reduce emissions for motor vehicles (e.g., emissions inspection programs), and temperature.

The MOBILE model takes into consideration regulations that affect emissions from this source sector. The same MOBILE run is used to represent the actual and typical year emissions for onroad vehicles using input data reflective of 2002. The MOBILE model then is run for 2018 inventory using input data reflective of that year. The 2002 vehicle miles traveled (VMT) and vehicle mix data were obtained from the Mississippi Department of Transportation (**M**DOT).

4.1.5 Biogenic Emission Sources

Biogenic emissions were prepared with the SMOKE-BEIS3 (Biogenic Emission Inventory System 3 version 0.9) preprocessor. SMOKE-BEIS3 is a modified version of the Urban Airshed Model (UAM)-BEIS3 model. Modifications include use of MM5 data, gridded land use data, and improved emissions characterization. The emission factors that are used in SMOKE-BEIS3 are the same as the emission factors as in UAM-BEIS3. The basis for the gridded land use data used by BEIS3 is the county land use data in the Biogenic Emissions Landcover Database version 3 (BELD3) provided by the USEPA. A separate land classification scheme, based upon satellite (AVHRR, 1 km spatial resolution) and census information, aided in defining the forest, agriculture and urban portions of each county.

4.1.6 Summary of the Final 2002 (October 2007 version) Baseline Emissions Inventory

Below is a summary of the 2002 baseline emission inventory for Mississippi. The complete inventory and discussion of the methodology is contained in Appendix D. The emissions summaries for other VISTAS states can also be found in Appendix D.

	VOC	NO_x	PM2.5	PM10	NH_3	SO_2
Point	43,852	104,661	11,044	21,106	1,359	103,389
Area	131,808	4,200	50,401	343,377	58,721	771
On-Road Mobile	86,811	110,672	2,089	2,828	3,549	4,566
Non-Road Mobile	41,081	88,787	4,690	5,010	23	11,315
Biogenics	1,544,646	20,305	0	0	0	0
TOTAL	1,848,199	328,626	68,223	372,321	63,652	120,040

Table 4.1. 2002 Emissions Inventory Summary for MS in tons.

4.1.7 Emissions Inventory Improvements

Since the initial model performance evaluation, VISTAS has made several improvements to the emissions inventory which in turn improves model performance. These inventory improvements are detailed in the VISTAS emissions inventory report and Appendix D, and are summarized here:

- For electric generating utilities, the Integrated Planning Model (IPM) was used to provide estimates of future year utility production and emissions. Continuous Emissions Monitoring data was used to define seasonal variability in production and emissions. For Base G2 emissions, states updated IPM model projections from 2005 with control data provided by utility companies in 2006 through winter 2007.
- For on-road vehicle emissions, states and local agencies provided updated MOBILE model input and vehicle-miles-traveled data.
- For ammonia emissions from agricultural sources, the Carnegie Mellon University ammonia model was used to improve annual and monthly estimates.
- For fires, the VISTAS states provided fire activity data for 2002 for wildfires, prescribed fire, land clearing and agricultural burning and MACTEC developed a 2002 fire inventory. Where data allowed, Alpine Geophysics modeled fire events as point sources. In 2006,United States Forest Service and Fish and Wildlife Service provided projections of increased prescribed burning in 2009 and 2018; these data were incorporated in the Base G inventory for all states except Florida.
- For non-road engines, the updated USEPA NONROAD2005 emissions model was used in Base G.
- For commercial marine emissions in shipping lanes in the Gulf of Mexico and Atlantic Oceans, ENVIRON created gridded emissions for the VISTAS modeling domain using inventory data newly developed for USEPA by Corbett at University of Delaware. These emissions were incorporated in the Base G modeling.
- Updated inventories from the neighboring RPOs, Mexico, and Canada were incorporated as available.

4.2 Assessment of Relative Contributions from Specific Pollutants and Sources Categories

Ammonium sulfate is the largest contributor to visibility impairment for Class I in the southeastern United States, and reduction of SO_2 emissions would be the most effective means of reducing ammonium sulfate. As illustrated in *Figure 4.2-1*, ninety-six (96) percent of SO_2 emissions in the VISTAS states are attributable to electric generating facilities and industrial point sources. As shown in *Table 4.1*, eight-six (86) percent of SO_2 emissions in Mississippi are attributable to electric generating facilities and industrial point sources.

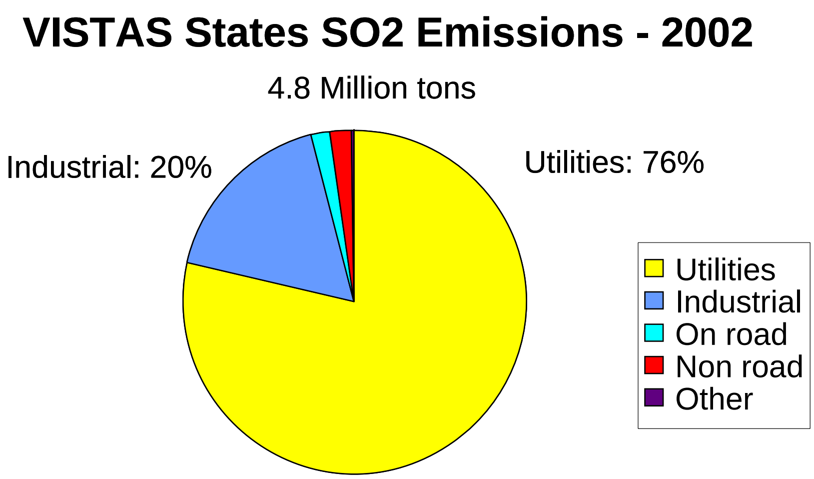


Figure 4.2-1. SO_2 emissions in 2002 in the VISTAS States.

5.0 REGIONAL HAZE MODELING METHODS AND INPUTS

Modeling for regional haze was performed by VISTAS for the ten southeastern states, including Mississippi. The sections below outline the methods and inputs used by VISTAS for the regional modeling. Additional details are provided in Appendices C.

5.1 Analysis Method

The modeling analysis is a complex technical evaluation that begins by selection of the modeling system. VISTAS decided to use the following modeling system:

- Meteorological Model: The Pennsylvania State University/National Center for Atmospheric Research (PSU/NCAR) Mesoscale Meteorological Model (MM5) is a nonhydrostatic, prognostic meteorological model routinely used for urban- and regional-scale photochemical, fine particulate matter, and regional haze regulatory modeling studies.
- Emissions Model: The Sparse Matrix Operator Kernel Emissions (SMOKE) modeling system is an emissions modeling system that generates hourly gridded speciated emission inputs of mobile, nonroad mobile, area, point, fire and biogenic emission sources for photochemical grid models.
- Air Quality Model: USEPA's Models-3/ Community Multiscale Air Quality (CMAQ), version 4.51 with SOAmods enhancement, modeling system is an 'One-Atmosphere' photochemical grid model capable of addressing ozone, particulate matter (PM), visibility and acid deposition at regional scale for periods up to one year.

The USEPA Modeling Guidance recommends modeling an entire year or at a minimum several days in each quarter of a year to adequately represent the range of meteorological conditions that contribute to elevated levels of fine particulate matter. The year 2002 was selected by VISTAS as the modeling year for this demonstration. Meteorological inputs were developed for 2002 using the meteorological model. Emission inventories were also developed for 2002 and processed through the emissions model. These inputs were used in the air quality model to predict fine particle mass and visibility. The model results for 2002 were compared with observed meteorological and air quality data to evaluate model performance. Several configurations of the meteorological and air quality model were evaluated to select a configuration that gave the best overall performance for the VISTAS region.

Once model performance was deemed adequate, the current and future year emissions were processed through the emissions model. The air quality modeling results are used to determine a relative reduction in future visibility impairment, which is used to determine reasonable progress.

The complete modeling protocol used for this analysis can be found in Appendix C.

5.2 Model Selection

To ensure that a modeling study is defensible, care must be taken in the selection of the models to be used. The models selected must be scientifically appropriate for the intended application and be freely accessible to all stakeholders. Scientifically appropriate means that the models address important physical and chemical phenomena in sufficient detail, using peer-reviewed methods. Freely accessible means that model formulations and coding are freely available for review and that the models are available to stakeholders, and their consultants, for execution and verification at no or low cost.

The following sections outline the criteria for selecting a modeling system that is both defensible and capable of meeting the study's goals. These criteria were used in selecting the modeling system used for this modeling demonstration.

5.2.1 Selection of Photochemical Grid Model

Criteria

For a photochemical grid model to qualify as a candidate for use in a regional haze SIP, a State needs to show that it meets the same several general criteria as a model for an attainment demonstration for a national ambient air quality standard (NAAQS):

- The model has received a scientific peer review
- The model can be demonstrated applicable to the problem on a theoretical basis
- Data bases needed to perform the analysis are available and adequate
- Available past appropriate performance evaluations have shown the model is not biased toward underestimates or overestimates
- A protocol on methods and procedures to be followed has been established
- The developer of the model must be willing to make the source code available to users for free or for a reasonable cost, and the model cannot otherwise be proprietary.

Overview of CMAQ

The photochemical model selected for this study was CMAQ version 4.5. For more than a decade, the USEPA has been developing the Models-3 CMAQ modeling system with the overarching aim of producing a ‘One-Atmosphere’ air quality modeling system capable of addressing ozone, fine particulate matter, visibility and acid deposition within a common platform. The original justification for the Models-3 development emerged from the challenges posed by the 1990 CAAA and the USEPA’s desire to develop an advanced modeling framework for ‘holistic’ environmental modeling utilizing state-of-science representations of atmospheric processes in a high performance computing environment. The USEPA completed the initial stage of development with Models-3 and released the CMAQ model in mid-1999 as the initial operating science model under the Models-3 framework. The most recent rendition is CMAQ version 4.5, which was released in September 2005.

An advantage of choosing CMAQ as the atmospheric model is the ability to do one-atmospheric modeling. The same model configuration is being applied for the ozone and $PM_{2.5}$ attainment demonstrations SIPs, as well as the regional haze SIP. A number of features in CMAQ's theoretical formulation and technical implementation make the model well suited for annual PM modeling.

VISTAS used Version 4.51 of the Community Multi-scale Air Quality (CMAQ) modeling system with an enhanced secondary organic aerosol (SOA) module (SOAmods). Initial CMAQ 2002 simulations performed by VISTAS found that the model greatlyunderestimate Organic Mass Carbon (OMC) concentrations, especially in the summer (Morris et al., 2004b). A review of the CMAQ formulation found that it failed to treat Secondary Organic Aerosol (SOA) formation from sesquiterpenes and isoprene and also failed to account for polymerization of SOA so that it is no longer volatile and stays in the particle form. The standard versions of CMAQ V4.51 assume that SOA is volatile so that once an aerosol is formed it can evaporate from particle to gaseous form depending on atmospheric conditions (e.g., temperature and humidity). After a detailed literature review, VISTAS updated the CMAQ SOA module to include these missing processes and found that the updated CMAQ V4.5 SOAmods produced much better OMC model performance in the summer (Morris et al., 2006c).

The configuration used for this modeling demonstration, as well as a more detailed description of the CMAQ model, can be found in Section 1.3.3.3 of the Technical Support Document (Appendix G).

5.2.2 Selection of Meteorological Model

Criteria

Meteorological models, either through objective, diagnostic, or prognostic analysis, extend available information about the state of the atmosphere to the grid upon which photochemical grid modeling is to be carried out. The criteria for selecting a meteorological model are based on both the models ability to accurately replicate important meteorological phenomena in the region of study, and the model's ability to interface with the rest of the modeling systems -- particularly the photochemical grid model. With these issues in mind, the following criteria were established for the meteorological model to be used in this study:

- Non-Hydrostatic Formulation
- Reasonably current, peer reviewed formulation
- Simulates Cloud Physics
- Publicly available on no or low cost
- Output available in I/O API format

- Supports Four Dimensional Data Assimilation (FDDA)
- Enhanced treatment of Planetary Boundary Layer heights for AQ modeling

Overview of MM5

The non-hydrostatic MM5 model is a three-dimensional, limited-area, primitive equation, prognostic model that has been used widely in regional air quality model applications. The basic model has been under continuous development, improvement, testing and open peer-review for more than 20 years and has been used worldwide by hundreds of scientists for a variety of mesoscale studies.

MM5 uses a terrain-following non-dimensionalized pressure, or "sigma", vertical coordinate similar to that used in many operational and research models. In the non-hydrostatic MM5, the sigma levels are defined according to the initial hydrostatically-balanced reference state so that the sigma levels are also time-invariant. The gridded meteorological fields produced by MM5 are directly compatible with the input requirements of ‘one atmosphere’ air-quality models using this coordinate. MM5 fields can be easily used in other regional air quality models with different coordinate systems by performing a vertical interpolation, followed by a mass-conservation re-adjustment.

Distinct planetary boundary layer (PBL) parameterizations are available for air-quality applications, both of which represent sub-grid-scale turbulent fluxes of heat, moisture and momentum. One scheme uses a first-order eddy diffusivity formulation for stable and neutral environments and a modified first-order scheme for unstable regimes. The other scheme uses a prognostic equation for the second-order turbulent kinetic energy, while diagnosing the other key boundary layer terms.

Initial and lateral boundary conditions are specified for real-data cases from mesoscale three-dimensional analyses performed at 12-hour intervals on the outermost grid mesh selected by the user. Surface fields are analyzed at three-hour intervals. A Cressman-based technique is used to analyze standard surface and radiosonde observations, using the National Meteorological Center's spectral analysis, as a first guess. The lateral boundary data are introduced using a relaxation technique applied in the outermost five rows and columns of the coarsest grid domain.

MM5 modeling system in regulatory air quality application studies have been widely reported in the literature (e.g., Emery et al., 1999; Tesche et al., 2000, 2003) and many have involved comparisons with other prognostic models such as the Regional Atmospheric Modeling System (RAMS) and the Systems Application International Mesoscale Model. The MM5 enjoys a far richer application history in regulatory modeling studies compared with RAMS or other models. Furthermore, in evaluations of these models in over 60 recent regional scale air quality application studies since 1995, it has generally been found that the MM5 model tends to produce somewhat better photochemical model inputs than alternative models.

The configuration used for this modeling demonstration, as well as a more detailed description of the MM5 model, can be found in the meteorological modeling protocol (Appendix E).

5.2.3 Selection of Emissions Processing System

Criteria

The principal criterion for an emissions processing system is that it accurately prepares emissions files in a format suitable for the photochemical grid model being used. The following list includes clarification of this criterion and additional desirable criteria for effective use of the system.

- File System Compatibility with the I/O API
- File Portability
- Ability to grid emissions on a Lambert Conformal projection
- Report Capability
- Graphical Analysis Capability
- MOBILE6 Mobile Source Emissions
- Biogenic Emissions Inventory System version 3 (BEIS-3)
- Ability to process emissions for the proposed domain in a reasonable amount of time.
- Ability to process control strategies
- No or low cost for acquisition and maintenance
- Expandable to support other species and mechanisms

Overview of SMOKE

The SMOKE Emissions Processing System Prototype was originally developed at the Micro-computing Center of North Carolina. As with most 'emissions models', SMOKE is principally an *emission processing system* and not a true *emissions modeling system* in which emissions estimates are simulated from 'first principles'. This means that, with the exception of mobile and biogenic sources, its purpose is to provide an efficient, modern tool for converting emissions inventory data into the formatted emission files required by an air quality simulation model. For mobile sources, SMOKE actually simulates emissions rates based on input mobile-source activity data, emission factors and outputs from transportation travel-demand models.

SMOKE was originally designed to allow emissions data processing methods to utilize emergent high-performance-computing as applied to sparse-matrix algorithms. Indeed, SMOKE is the fastest emissions processing tool currently available to the air quality modeling community. The sparse matrix approach utilized throughout SMOKE permits both rapid and flexible processing of emissions data. The processing is rapid because SMOKE utilizes a series of matrix calculations instead of less efficient algorithms used in previous systems. The processing is flexible because the processing steps of temporal projection, controls, chemical speciation, temporal allocation, and spatial allocation have been separated into independent operations wherever possible. The results from these steps are merged together at a final stage of processing.

SMOKE contains a number of major features that make it an attractive component of the modeling system. The model supports a variety of input formats from other emissions processing systems and models. It supports both gridded and county total land use scheme for biogenic emissions modeling. SMOKE can accommodate emissions files from up to 10 countries and any pollutant can be processed by the system.
For additional information about the SMOKE model please refer to Modeling Protocol (Appendix C).

5.3 Selection of the Modeling Year

A crucial step to SIP modeling is the selection of the period of time to model to represent current air quality conditions and to project changes in air quality in response to changes in emissions. The year 2002 was selected as the base year for several reasons.

The USEPA's April 2007 *Guidance on the use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5, and Regional Haze* identifies specific goals to consider when selecting one or more episodes for use in demonstrating reasonable progress in attaining the regional haze air quality goals. The USEPA recommends that episode selection derive from three principal criteria:

- Simulate a variety of meteorological conditions;
- Model time periods in which observed concentrations are close to the appropriate baseline design value or visibility impairment;
- Model periods for which extensive air quality/meteorological data bases exist; and
- Model a sufficient number of days so that the modeled attainment test applied at each monitor violating the NAAQS is based on multiple days.

For regional haze modeling, the guidance goes further by suggesting that the preferred approach is to model a full, *representative* year. Moreover, the required RRF values should be based on model results averaged over the 20% worst and 20% best visibility days determined for each Class I are based on monitoring data from the 2000 – 2004 baseline period.

The USEPA also lists several other considerations to bear in mind when choosing potential regional haze episodes including: (a) choose periods which have already been modeled, (b) choose periods which are drawn from the years upon which the current design values are based, (c) include weekend days among those chosen, and (d) choose modeling periods that meet as many episode selection criteria as possible in the maximum number of nonattainment or Class I areas as possible. Finally, the USEPA explicitly recommended in its 2007 guidance to use 2002 as the baseline inventory year.

VISTAS adopted a logical, stepwise approach in implementing the USEPA guidance in order to identify the most preferable, representative year for regional haze modeling.
These steps include the following:

Representativeness of Meteorological Conditions: The VISTAS meteorological contractor (BAMS) identified important meteorological characteristics and data sets in the VISTAS region directly relevant to the evaluation of candidate annual modeling episodes.

Initial Episode Typing: At the time of selection in 2003, meteorological and air quality data were available for 2002 for model inputs and model performance evaluation. VISTAS used Classification and Regression Tree Analyses to evaluate visibility conditions for 2000, 2001, and 2002, the candidate modeling years. The year 2002 was found to be representative of conditions in the other two years. Subsequently, these analyses were repeated with the meteorological and air quality monitoring data for 2000 to 2004 to evaluate how well the 2002 modeling year represented the full 2000-2004 baseline period. This analysis confirmed that visbility and PM2.5 mass in 2002 were representative of the five-year baseline period for the VISTAS Class I areas. This analysis is discussed in more detail in the project report in Appendix B.

Data Availability: In parallel with the CART analysis, episode characterization analyses, collaborative investigations by VISTAS states intensively studied the availability of PM2.5, meteorological, and emissions data and representativeness of alternative Baseline modeling periods from a regulatory standpoint. Additionally, 2002 was the year that USEPA was requiring states to provide emissions inventory data for the Comprehensive Emissions Reporting Rule, it made sense to use 2002 as the modeling year to take advantage of the 2002 inventory.
Years to be used by other RPOs: VISTAS also considered what years other RPO would be modeling, and several had already chosen calendar year 2002 as the modeling year.

After a lengthy process of integrated studies, the episode selection process culminated in the selection of calendar year 2002 (1 January through 31 December) as the most current, representative, and pragmatic choice for VISTAS regional haze modeling. All of the USEPA criteria for regional haze episode selection were directly considered in this process together with many other considerations (e.g., timing of new emissions or aerometric data deliveries by the USEPA or the states to the modeling teams).

5.4 Modeling Domains

5.4.1 Horizontal Modeling Domain

The USEPA's modeling guidance recommends a 12-km modeling grid resolution for PM2.5 modeling while a 36-km grid is considered acceptable for regional haze. For the VISTAS modeling, a coarse 36-km grid resolution was used for modeling the entire United States and a finer 12-km grid was used to model the eastern United States.

The CMAQ model was run in one-way nested grid mode. This allowed the larger outer domains to feed concentration data to the inner nested domain. One-way nesting is believed to be appropriate for the generally stagnant conditions experienced during ozone episodes. Two-way nesting was not considered due to numerical and computational uncertainty associated with the technique.

The horizontal coarse grid modeling domain boundaries were determined through a national effort to develop a common grid projection and boundary. A smaller 12-km grid, modeling domain was selected in an attempt to balance location of areas of interest, such as ozone and fine particulate matter nonattainment areas, as well as Class 1 and wilderness areas for regional haze. Processing time was also a factor in choosing a smaller 12-km grid, modeling domain.

The coarse 36-km horizontal grid domain covers the continental United States. This domain was used as the outer grid domain for MM5 modeling with the CMAQ domain nested within the MM5 domain. *Figure 5.4.1-1* shows the MM5 horizontal domain as the outer most, blue grid with the CMAQ 36-km domain nested in the MM5 domain.

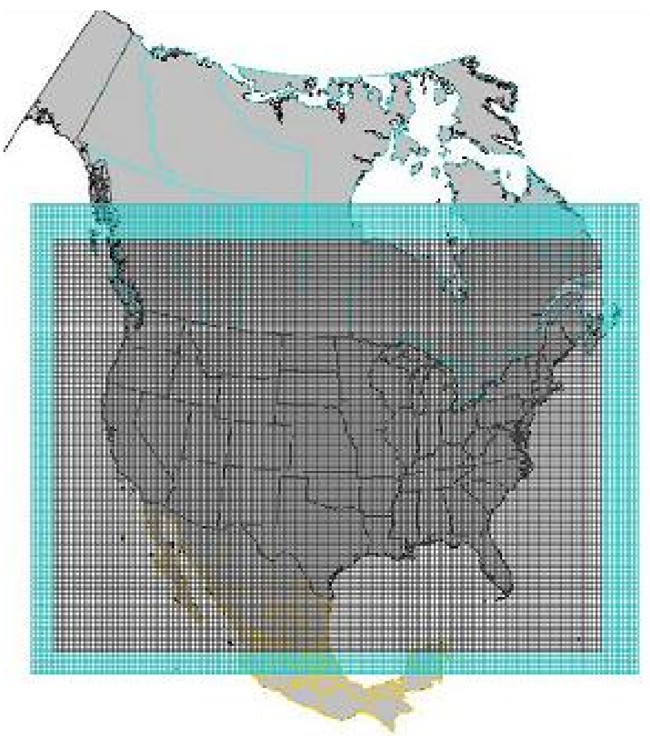


Figure 5.4.1-1. The MM5 horizontal domain is the outer most, blue grid, with the CMAQ 36-km domain nested in the MM5 domain.

To achieve finer spatial resolution in the VISTAS states, a one-way nested high resolution (12-km grid resolution) was used. *Figure 5.4.1-2* shows the 12-km grid, modeling domain for the VISTAS region. This is the modeling domain for which the reasonable progress goals will be assessed.

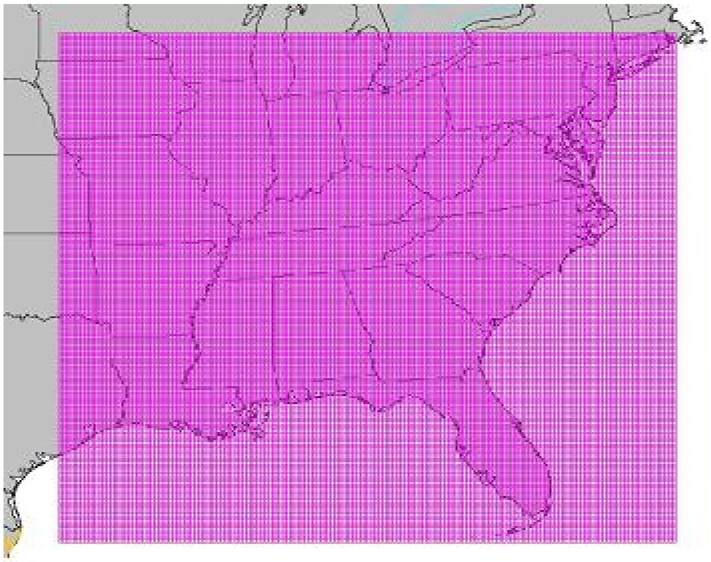


Figure 5.4.1-2. A more detailed view of the 12-km grid over the VISTAS region.

5.4.2 Vertical Modeling Domain

The CMAQ vertical structure is primarily defined by the vertical grid used in the MM5 modeling. The MM5 model employed a terrain following coordinate system defined by pressure, using 34 layers that extend from the surface to the 100 mb. A layer-averaging scheme was used to generate 19 vertical layers for CMAQ to reduce the computational cost of the CMAQ simulations. The effects of layer averaging were evaluated in conjunction with the VISTAS modeling effort and was found to have a relatively minor effect on the model performance metrics when both the 34 layer and a 19 layer CMAQ models were compared to ambient monitoring data.

6.0 MODEL PERFORMANCE EVALUATION

The initial modeling effort focused on evaluating previous regional air quality modeling applications and testing candidate model configurations for the SMOKE emissions and CMAQ model for the VISTAS 36-km and 12-km modeling domains. This effort resulted in a report recommending the model configuration for the annual emissions and air quality modeling, which is included as part of the VISTAS Emissions and Air Quality Modeling Protocol. The evaluation of the meteorological modeling configuration can be found in Appendix F, with a summary of the final meteorological and air quality modeling configuration in the modeling protocol contained in Appendix E and Appendix C, respectively.

Air quality model performance for the 2002 modeling year was initially tested in 2004 using an early version of the VISTAS emissions inventory. In keeping with the one-atmosphere objective of the CMAQ modeling platform, model performance was evaluated based on measured ozone, fine particles, and acid deposition in the Air Quality System (AQS), IMPROVE, Speciated Trends Network (STN), Southeastern Aerosol Research and Characterization (SEARCH), National Acid Deposition Program (NADP) and Clean Air Status and Trends Network (CASTNet) monitoring networks (*Figure 6.0-1*). An examination of the results is summarized in Appendix B.

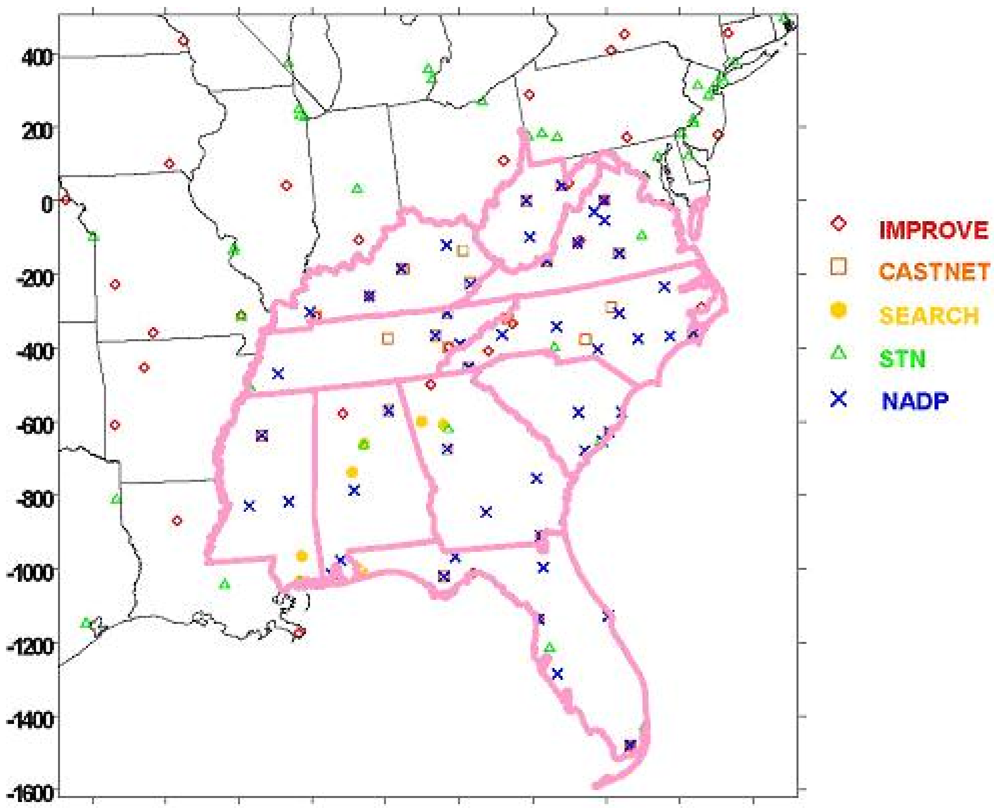


Figure 6.0-1. Monitoring Networks used for VISTAS 2002 model performance evaluation and their location within the VISTAS 12km domain.

6.1 Modeling Performance Goals, and Criteria

In 2004, VISTAS established model performance goals and criteria for components of fine particle mass (*Table 6.1-1*) based on previous model performance for ozone and fine particles. The USEPA modeling guidance for fine particulate matter at the time noted that PM models might not be able to achieve the same level of performance as ozone models. VISTAS' evaluation considered several statistical performance measures and displays. Fractional bias and mean fractional error were selected as the most appropriate metrics to summarize model performance; other metrics were also calculated and are included for IMPROVE monitors in the full model performance evaluation (Appendix F).

Fractional Bias	**Mean Fractional Error**	**Comment**
≤15 percent	≤35 percent	Goal for PM model performance based on ozone model performance, considered excellent performance
≤30 percent	≤50 percent	Goal for PM model performance, considered good performance
≤60 percent	≤75 percent	Criteria for PM model performance, considered average performance. Exceeding this level of performance indicates fundamental concerns with the modeling system and triggers diagnostic evaluation.

Table 6.1-1. Established model performance goals and criteria for the component species of fine particle mass.

Several graphic displays of model performance were prepared including:

1. Scatter plots of predicted and observed concentrations and deposition by species, monitoring network, and month
2. Time series plots of predicted and observed concentrations and deposition by species, monitoring site, and month
3. Spatially average time series plots
4. Time series plots of monthly fractional bias and error for a species, region, and network
5. Performance goal plots ("soccer plots") that summarize model performance by species, region, season
6. Concentration performance plots ("bugle plots") that display fractional bias or error as a function of concentration by species, region, monitoring network, and month

The "soccer plots" and "bugle plots" are relatively new tools in model performance evaluations, and have recently been included as model performance evaluation displays in the USEPA's modeling guidance for Ozone, PM2.5, and Regional Haze (2007). Both "soccer plots" and "bugle plots" allow for convenient way to examine model performance with respect to set goals and criteria. The bugle plots have the added benefit of adjusting the goals and criteria to consider the concentration of the species. Analysis of "bugle plots" generally suggests that greater emphasis should be placed on performance of those components with the greatest contribution to PM mass and visibility impairment (e.g. sulfate and organic carbon) and that greater bias and error could be accepted for components with smaller contributions to total PM mass (e.g. elemental carbon, nitrate, and soil).

6.2 VISTAS Domain-Wide Performance

Further discussion of model performance in this document will focus on the comparison of observational data from the IMPROVE monitors and model output data from the 2002 VISTAS BaseG2-Actual annual air quality modeling. Focus is limited to the IMPROVE monitoring network as these sites are the locations used in projecting attainment visibility improvement goals in the Class I areas.

The evaluation will primarily focus on the air quality model's performance with respect to individual components of fine particulate matter ($PM_{2.5}$), as good model performance of the component species will dictate good model performance of total or reconstituted fine particulate matter. Model performance of the total fine particulate matter and the resulting total light extinction will also be provided as a means to discuss the overall model performance for this Implementation Plan.

In our analyses, mean fractional bias (error) is used in lieu of mean bias (error), to prevent low observations and model predictions from skewing the metrics. A full list of model performance statistics is found in Appendix G. The soccer and bugle plots for the all of the VISTAS IMPROVE monitors are included here for summary purposes. Plots have been developed for the average monthly concentrations and the performance statistics for all of the most significant light scattering component species (Sulfate, Nitrate, and Organic Carbon) for the 20% best days and 20% worst days.

The soccer plots of monthly concentrations (*Figures. 6.2-1 and 6.2-2*) show that values for nitrate generally fall outside of criteria performance thresholds. Sulfates and organic carbon generally fall within goal thresholds, with a couple of months falling just outside the goal thresholds but well within the criteria thresholds. *Figure 6.2-3* contains separate soccer plots for each season. The seasonal plots emphasize poorer nitrate performance in the summer (does not even appear on the plots provided because performance is off scale with other constituents), when observed nitrate is quite low and predicted nitrate is even lower. When concentration is factored into performance criteria, nitrate performance improves with respect to MFB and MFE (*Figures 6.2-4 and 6.2-5*).

Additionally, performance assessed at the "one atmosphere" level was also deemed acceptable for ozone and particulate matter at various monitoring sites (STN, FRM, CASTNet, etc.). Overall, VISTAS found the Base G2 modeling results to be representative and acceptable for use in modeling projection for ozone, particulate matter, and regional haze.

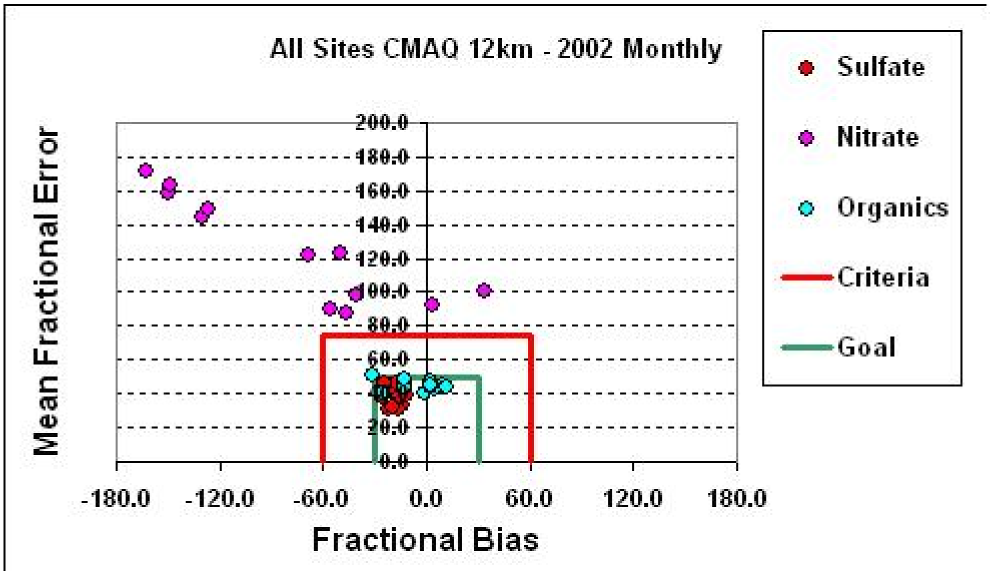


Figure 6.2-1. Soccer plot depicting both the mean fractional error and fractional bias for component concentration for all VISTAS sites based on Base G2 results. Each point represents a monthly value as compared to the model performance criteria (red box) and modeling performance goals (green box).

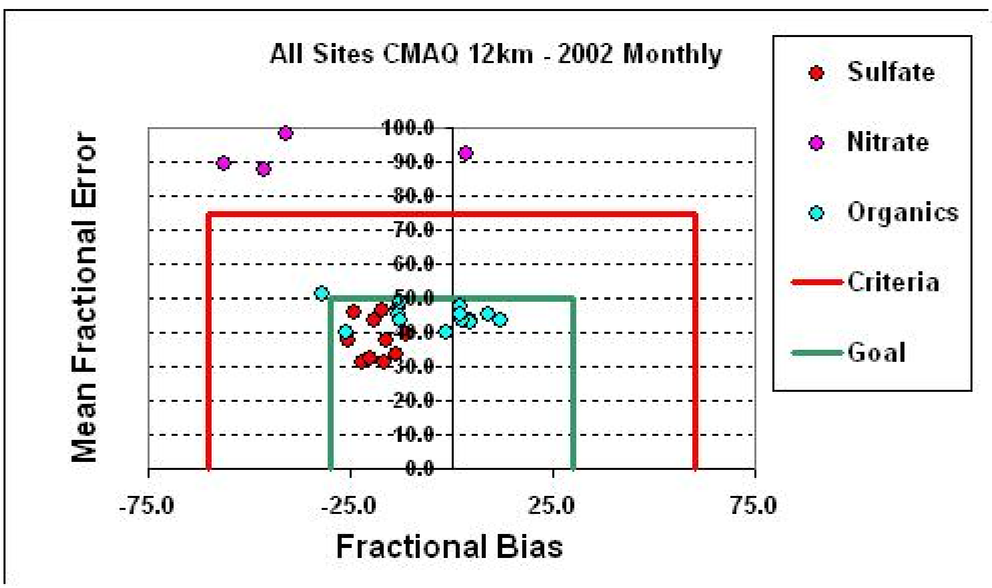


Figure 6.2-2. A zoomed view of the soccer plot depicting both the mean fractional error and fractional bias for component concentration for all VISTAS sites based on Base G2 results. Each point represents a monthly value as compared to the model performance criteria (red box) and modeling performance goals (green box).

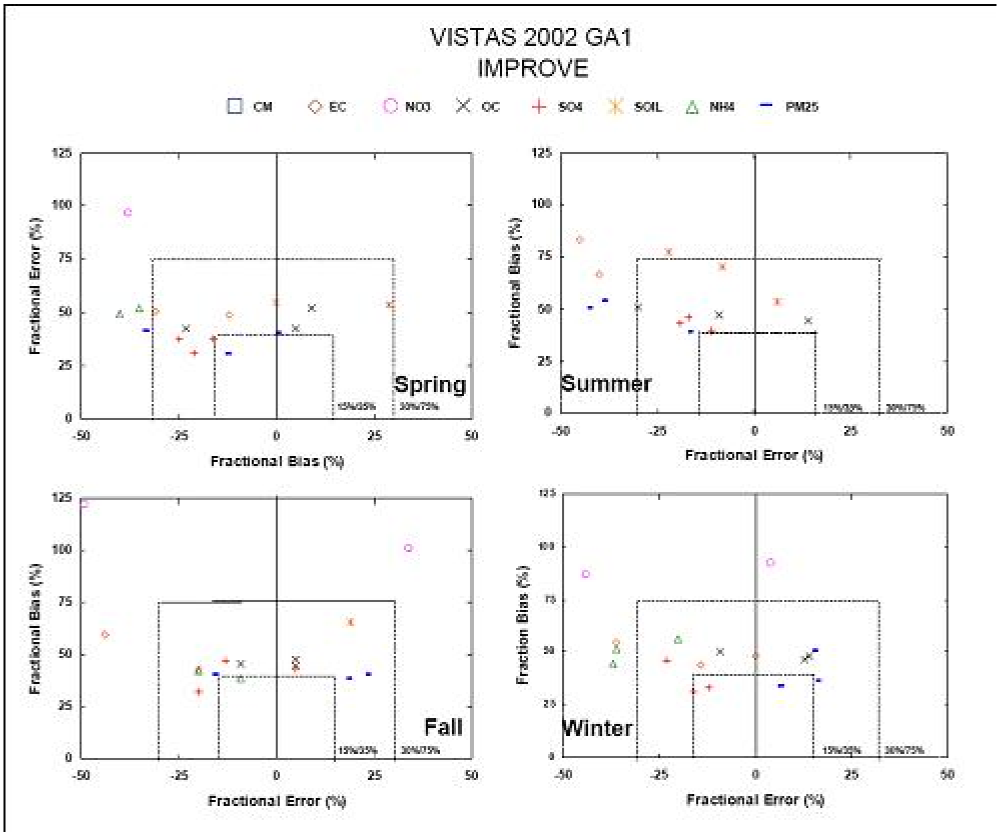


Figure 6.2-3. Seasonal soccer plots based on Base G1 results for all VISTAS IMPROVE monitors.

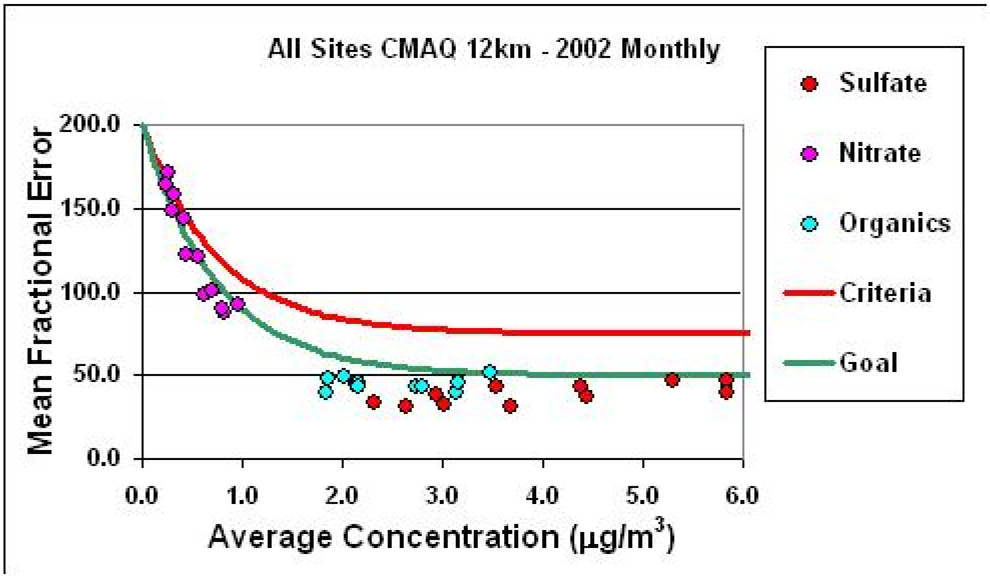


Figure 6.2-4. Bugle plot of the mean fraction bias for particulate matter and its component concentrations for all VISTAS sites based on Base G2 results. Each point represents a monthly mean fraction bias value as compared to the model performance criteria (red lines) and modeling performance goals (green lines).

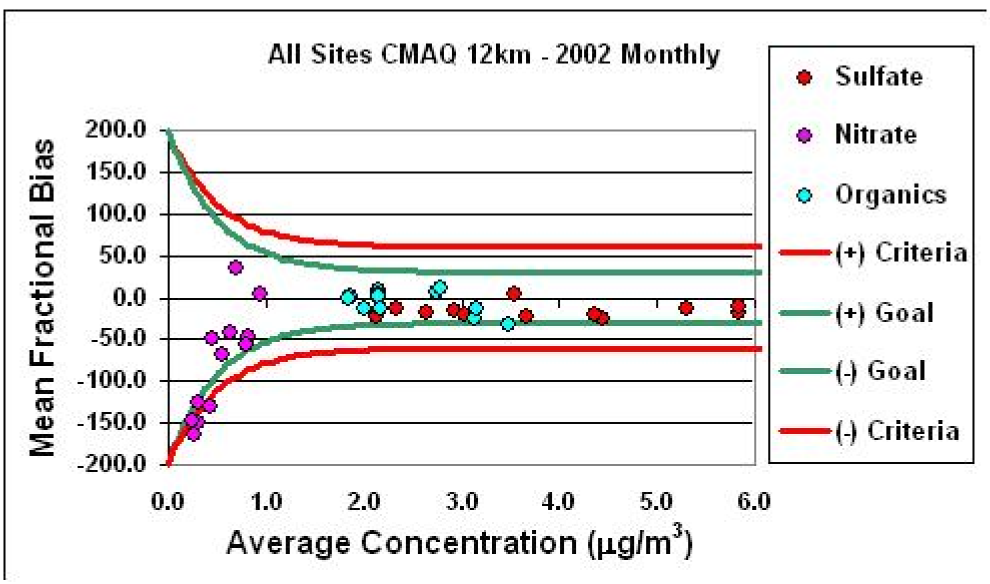


Figure 6.2-5. Bugle plot of mean fraction error for particulate matter and its component species for all VISTAS sites based on Base G2 results. Each point represents a monthly mean fraction bias value as compared to the model performance criteria (red lines) and modeling performance goals (green lines).

6.3 Performance in Nearby Class 1 Areas

The following section provides stack bar charts (Figures 6.3.1 and 6.3.2) for closest Class 1 areas, Breton and Sipsey, comparing observed fine particulate matter composition and modeled fine particulate matter composition for the 20% worst days.

The stacked bar chart allows a side by side comparison of each day's observed and modeled compositional and total light extinction. Within each bar the color codes are:

- Yellow = light extinction due to sulfates (bextSO4)
- Red = light extinction due to nitrates (bextNO3)
- Green = light extinction due to organic carbon (bextOC)
- Black = light extinction due to elemental (bextEC)
- Brown = light extinction due to soil (bextSoil)
- Grey = light extinction due to coarse mass (bextCM)

The components are presented in the same order for both the observed (left hand bar) and modeled bar (right hand bar), so it easy to identify days when the predicted light extinction for the component differs from the observed. The total height of the bar provides the total reconstructed particulate matter light extinction value.

Overall, model performance is good. Both the modeled and observed values demonstrate that sulfates are the largest contributor to visibility impairment. The model does significantly underestimate the observed values on a number of days. Since Breton is near the southern boundary of the modeling domain, there is significant uncertainty when the winds are from a southerly direction. This also indicates that Breton may experience significant influence from international emissions that are difficult to quantify or control.
Section 3.5 of the Technical Support Document found in Appendix G discusses the model performance in the various Class 1 areas more completely.

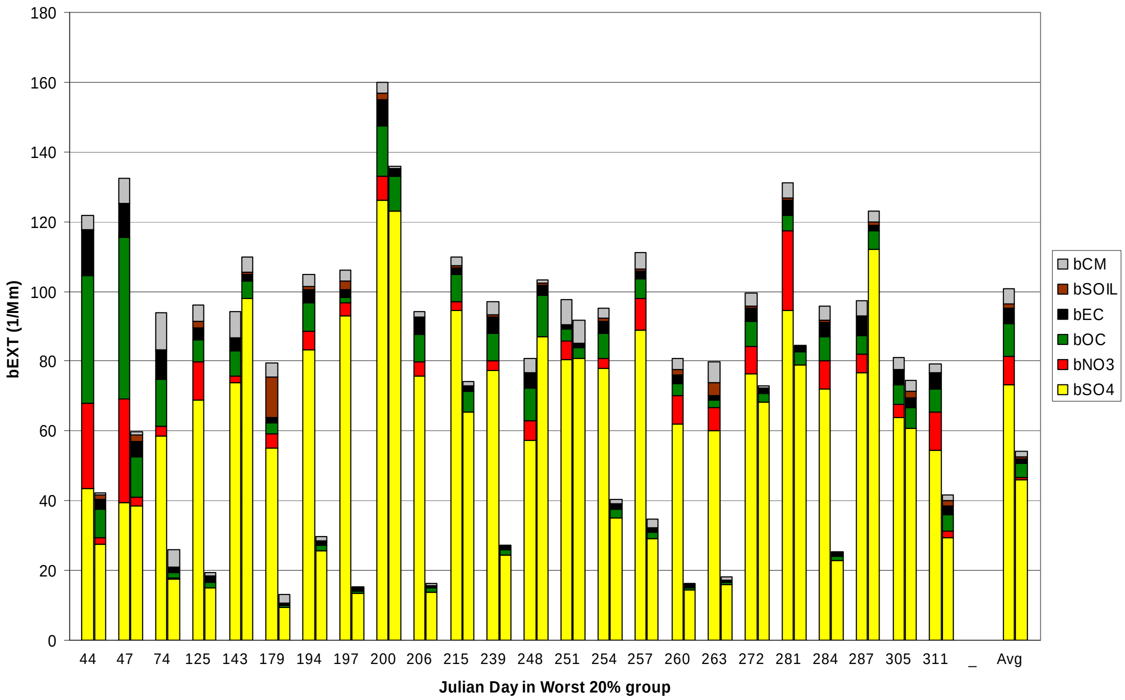


Figure 6.3.1 Model Performance 20% Haziest Days in 2002 - Breton, LA
Observations (left) vs Modeled Base G2a (right)

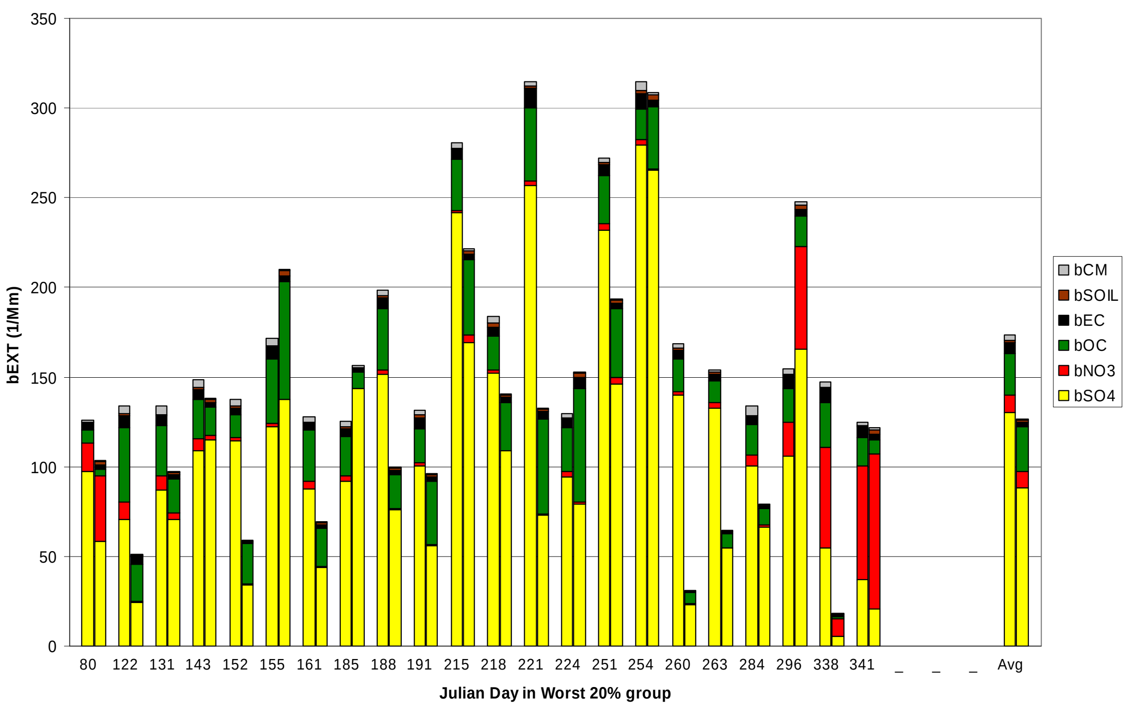


Figure 6.3.2 Model Performance 20% Haziest Days in 2002 - Sispey, AL
Observations (left) vs Modeled Base G2a (right)

7.0 LONG-TERM STRATEGY FOR CLASS I AREAS THAT ARE NEAR MISSISSIPPI

As stated in section 1.3 above, the regional haze rule requires States to establish reasonable progress goals, expressed in deciviews, for visibility improvement at each affected Class I area covering each (approximately) 10-year period until 2064. This first set of reasonable progress goals must be met through measures contained in the state's long-term strategy covering the period from the baseline until 2018. This section discusses development of Mississippi's long-term strategy.

7.1 Overview of the Long-Term Strategy Development Process

The monitored data and modeling analyses cited in sections 2 and 5 above establish that for the VISTAS region, the key contributors to regional haze in the 2000-2004 baseline timeframe were large stationary sources of sulfur dioxide emissions. Keeping that key conclusion in mind, this section addresses the following questions:

a. Assuming implementation of existing federal and state air regulatory requirements in Mississippi and the VISTAS region, how much visibility improvement, compared to the glidepath, would MDEQ expect to see at Class I areas near Mississippi between now and 2018?

b. What additional emission controls represent BART in Mississippi?

c. What pollutants and source categories would the greatest visibility benefits be realized between the baseline and 2018?

d. In what geographic locations are the emissions which have the greatest impact on visibility in specific Class I areas?

e. What types of emissions sources does MDEQ find in those geographic locations?

f. Which specific individual sources in those geographic locations have the greatest visibility impacts at a given Class I area?

g. What additional emission controls represent reasonable progress for those specific sources?

7.2 Expected Visibility Results in 2018 for Class I Areas Neighboring Mississippi under existing and planned emissions controls (Base G2 Inventory)

There are significant emissions control programs being implemented between the baseline period and 2018. These programs are described in more detail below.

PURPOSE

The purpose of the section is to outline the State's strategy for complying with the Long-term Strategy requirements of our Regional Haze SIP under 40 CFR 51.308(d)(3), and the requirements for establishing best available retrofit technology (BART) controls under 40 CFR 51.308(e).

The MDEQ long term strategy contains the following components:

I. **Inventory of all controls required or expected under all federal and state regulations by 2009 and 2018.**
II. **Discussion of emissions sensitivity model runs to help determine which pollutants and source categories are contributing the most to visibility impairment at Class I areas (runs conducted by Georgia Institute of Technology).**
III. **Examination of SO_2 Area of Influence (AOIs) projections for neighboring Class I areas to determine which specific sources are most likely to be impairing visibility at specific Class I areas.**
IV. **Using the results of the four factor analyses, identification of control determinations for specific sources.**
V. **Identification of BART-eligible sources.**
VI. **BART exemption modeling for BART-eligible sources.**
VII. **BART determinations for sources subject to BART.**
VIII. **Modeling demonstration of visibility improvement after inclusion of BART and reasonable progress control determinations.**

7.2.1 Emission Controls Modeled and Requirements

<u>**CAIR.**</u> Utility projections are based on the Integrated Planning Model® (IPM®). CAIR will permanently cap emissions of sulfur dioxide (SO_2) and nitrogen oxides (NO_x) in the eastern United States. CAIR achieves large reductions of SO_2 and/or NO_x emissions across 28 eastern states and the District of Columbia. When fully implemented, CAIR will reduce SO_2 emissions in these states by over seventy (70) percent and NO_x emissions by over sixty (60) percent from 2003 levels.

<u>NO_x SIP Call</u>. Phase I of the NO_x SIP call applies to certain EGUs and large non-EGUs, including large industrial boilers and turbines, and cement kilns. Those states affected by the NO_x SIP call in the VISTAS region have developed rules for the control of NO_x emissions that

have been approved by the USEPA. The NO_x SIP Call has resulted in a sixty-eight (68) percent reduction in NO_x emissions from large stationary combustion sources. For this analysis, the emissions for NO_x SIP call-affected sources were capped at 2007 levels, and carried forward the capped levels for the 2009 and 2018 future year inventories. Mississippi was not subject to the NO_x SIP call; however, states north and east of Mississippi are subject and the resulting emission reductions should improve conditions at Class I areas throughout the Southeast.

Consent Agreements (Tampa Electric Company, Virginia Electric Power Company, Gulf Power Crist 7, Chevron Pascagoula Refinery).

- The settlement requires Tampa Electric Company (TECO) to pay a $3.5 million civil penalty. Under the agreement, TECO will install permanent emissions-control equipment to meet stringent pollution limits; implement a series of interim pollution-reduction measures to reduce emissions while the permanent controls are designed and installed; and retire pollution emission allowances that TECO or others could use, or sell to others, to emit additional pollution into the environment. The settlement also requires the company to spend between $10 and $11 million on environmentally beneficial projects in the region designed to mitigate the impact of emissions from the company's plants.
- Virginia Electric and Power Co. (VEPCO) agreed to spend $1.2 billion between now and 2013 to eliminate 237,000 tons of sulfur dioxide (SO_2) and nitrogen oxides (NO_x) emissions each year from eight coal-fired electricity generating plants in Virginia and West Virginia.
- The 2002 agreement calls for Gulf Power to upgrade its operation to cut nitrogen oxide emission rates by sixty-one (61) percent at its Crist generating plant by 2007 with major reductions beginning in early 2005. The Crist plant is a significant source of nitrogen oxide emissions in the Pensacola area.
- Under a 2005 settlement agreement, Chevron Refinery Pascagoula was required to significantly reduce emissions, particularly of Sulfur Dioxide and Nitrogen Oxides. Emissions of other pollutants will be reduced to lesser extents. The major emissions points with reductions are two sulfur recovery units, the FCC regenerator, flares, and several boilers and heaters. The Chevron consent decree will result in emission reductions of 2900 lbs/hr of SO_2, 960 lbs/hr of NOx, and 40 lbs/hr of PM10 with a modeled visibility improvement of 2.99dv at Breton. All of the reductions are to be in place by the end of 2011. Greater details of the consent decree and the emissions reductions can be found in the BART analysis, appendix L.10.

One-hour ozone SIP

New SIPs have been submitted to the USEPA to demonstrate attainment of the one-hour ozone National Ambient Air Quality Standard (NAAQS) for areas in neighboring states. One-hour ozone SIPs Atlanta (Federal Register: June 15, 2005 (Volume 70, Number 114)) / Birmingham (March 12, 2004 (Volume 69, Number 49))/ Northern Kentucky (Federal Register: September 16, 2004 (Volume 69, Number 179)). The purpose of a state implementation plan (SIP) is to demonstrate attainment or maintenance of the 1-hour ozone National Ambient Air Quality Standard (NAAQS). States must determine which Clean Air Act requirements are applicable to their area and submit plans to USEPA for public comment and approval.

Heavy Duty Diesel (2007) Engine Standard (for onroad trucks and buses).
USEPA set a PM emissions standard for new heavy-duty engines of 0.01 grams per brake-horsepower-hour (g/bhp-hr), to take full effect for diesels in the 2007 model year. Also includes standards for NO_x and non-methane hydrocarbons (NMHC) of 0.20 g/bhp-hr and 0.14 g/ bhp-hr, respectively. These NO_x and NMHC standards will be phased in together between 2007 and 2010, for diesel engines. Sulfur in diesel fuel must be lowered to enable modern pollution-control technology to be effective on these trucks and buses. USEPA will require a ninety-seven (97) percent reduction in the sulfur content of highway diesel fuel from its current level of 500 parts per million (low sulfur diesel, or LSD) to 15 parts per million (ultra-low sulfur diesel, or ULSD).

Tier 2 Tailpipe (Onroad vehicles).
USEPA mobile rules include the Tier 2 fleet averaging program, modeled after the California LEV II standards. Manufacturers can produce vehicles with emissions ranging from relatively dirty to zero, but the mix of vehicles a manufacturer sells each year must have average NO_x emissions below a specified value. Tier 2 standards became effective in the 2005 model year.

Large Spark Ignition and Recreational Vehicle Rule.
USEPA has adopted new standards for emissions of oxides of nitrogen (NO_x), hydrocarbons (HC), and carbon monoxide (CO) from several groups of previously unregulated nonroad engines. Included in these are large industrial spark-ignition engines and recreational vehicles. Nonroad spark-ignition engines are those powered by gasoline, liquid propane gas, or compressed natural gas rated over 19 kilowatts (kW) (25 horsepower). These engines are used in commercial and industrial applications, including forklifts, electric generators, airport baggage transport vehicles, and a variety of farm and construction applications. Nonroad recreational vehicles include snowmobiles, off-highway motorcycles, and all-terrain-vehicles. These rules were initially effective in 2004 and will be fully phased-in by 2012.

Nonroad Diesel Rule.
This rule sets standards that will reduce emissions by more than ninety (90) percent from nonroad diesel equipment, and reduce sulfur levels by ninety-nine (99) percent from current levels in nonroad diesel fuel starting in 2007. This step will apply to most nonroad diesel fuel in 2010 and to fuel used in locomotives and marine vessels in 2012.
(http://www.epa.gov/nonroad-diesel/)

Industrial Boiler / Process Heater / Reciprocating Internal Combustion Engines (RICE) Maximum Achievable Control Technology (MACT) standards. The USEPA issued final rules to substantially reduce emissions of toxic air pollutants from industrial, commercial and institutional boilers, process heaters and stationary RICE. These rules reduce emissions of a number of toxic air pollutants, including hydrogen chloride, manganese, lead, arsenic and mercury by 2009. This rule also reduces emissions of sulfur dioxide and particulate matter in conjunction with the toxic air pollutant reductions. The applied MACT control efficiencies were four (4) percent for SO_2 and forty (40) percent for PM10 and PM2.5. The USEPA's industrial boiler MACT rules were vacated on June 8, 2007. However, the USEPA is required under the Clean Air Act to issue revised boiler MACT rules. These rules are scheduled to be proposed in 2009 and final in 2010. As such, it is likely that by 2018 MACT controls will be required for industrial boilers. Therefore, the VISTAS States decided to include control assumptions for industrial boilers due to MACT.

Combustion Turbine MACT.
The projection inventories do not include the NO_x co-benefit effects of the MACT regulations for Gas Turbines or stationary Reciprocating Internal Combustion Engines (RICE), which USEPA estimates to be small compared to the overall inventory.

VOC 2-, 4-, 7-, and 10-year MACT Standards.
Volatile Organic Chemical (VOC) 2-, 4-, 7-, and 10-year MACT Standards. The point source MACTs and associated emission reductions were designed from Federal Register (FR) notices and discussions with USEPA's Emission Standards Division (ESD) staff. MDEQ did not apply reductions for MACT standards with an initial compliance date of 2001 or earlier, assuming that the effects of these controls are already accounted for in the 2002 inventories supplied by the States.

7.2.2 Point Source Controls (EGU and non-EGU)

Different approaches were used for the EGU and the non-EGU sectors of the point source inventory:

- For the EGUs, the State relied primarily on the Integrated Planning Model® (IPM®) to project future generation as well as to calculate the impact of the future emission control program CAIR. The IPM results were adjusted based on state and local agency knowledge of planned emission controls at specific EGUs.
- For non-EGUs, MDEQ used recently updated growth and control data consistent with the data used in USEPA's CAIR analyses, and supplemented these data with available state and local agency input and updated fuel use forecast data for the U.S. Department of Energy.

For both sectors, MDEQ generated 2009 and 2018 inventories for a control scenario which accounts for post-2002 emission reductions from promulgated and proposed federal, state, local, and site-specific control programs as of July 1, 2004.

7.2.2.1 Electric Generating Units (EGU)

State and local agencies specified a number of changes to the IPM results to better reflect current information on when and where future controls would occur. These changes to the IPM results primarily involved state and local agency addition or subtraction of future emission controls based on the best available data from state rules, enforcement agreements, compliance plans, permits, and discussions/commitments from individual companies.

Mississippi approved the use of emissions projections from Mississippi Power for its facilities rather than the IPM outputs. These projections included the addition of NO_x and SO_2 controls at Plant Watson in Gulfport and Plant Daniel in Escatapwa. The Emissions for South Mississippi Electric Power Association were also revised to include greater SO_2 control. Several of Entergy's units were proposed to be shut down by the IPM. There are no plans to remove the units in question from operation so the emissions were put back into the inventory at 2002 emission levels.

The following bar charts show expected decreases in emissions of SO_2 and NO_x across the VISTAS states from 2002 through 2018. Note that for SO_2 emissions in particular, which are the largest contributors to haze, emissions from electric generating facilities are expected to decrease dramatically (70 percent) between 2002 and 2018. However, even after implementation of CAIR, EGU emissions are projected to remain the largest contributor to haze, comprising more than half of remaining SO_2 emissions in most states.

7.2.2.2 Non-Electric Generating Units (Non-EGU)

The general approach for assembling future year data was to use recently updated growth and control data consistent with the data used in USEPA's CAIR analyses, supplement these data with available stakeholder input, and provide the results for stakeholder review to ensure credibility.

MACTEC (MACTEC, 2006) used the same control programs for both the 2009 and 2018 non-EGU point inventory. Two control scenarios were developed: on-the-books (OTB) controls and on-the-way (OTW) controls. The OTB control scenario accounts for post-2002 emission reductions from recently promulgated federal, state, local, and site-specific control programs. The OTW control scenario accounts for proposed (but not final) control programs that are reasonably anticipated to result in post-2002 emission reductions.

Maximum achievable control technology (MACT) requirements were also applied, as documented in the report entitled *Control Packet Development and Data Sources*, dated July 14, 2004. The point source MACTs and associated emission reductions were designed from Federal Register (FR) notices and discussions with USEPA's Emission Standards Division (ESD) staff. MDEQ did not apply reductions for MACT standards with an initial compliance date of 2001 or earlier, assuming that the effects of these controls are already accounted for in the 2002 inventories supplied by the States. Emission reductions were applied only for MACT standards with an initial compliance date of 2002 or greater.

The final Phase II NO_x SIP call rule was finalized on April 21, 2004. States had until April 21, 2005, to submit SIPs meeting the Phase II NO_x budget requirements. The Phase II rule applies to large internal combustion (IC) engines, which are primarily used in pipeline transmission service at compressor stations. MDEQ identified affected units using the same methodology as was used by USEPA in the proposed Phase II rule (i.e., a large IC engine is one that emitted, on average, more than 1 ton per day during 2002). The final rule reflects a control level of eighty-two (82) percent for natural gas-fired IC engines and ninety (90) percent for diesel or dual fuel categories. Several state and local agencies provided more specific information on the anticipated controls at the compressor stations. This information was used instead of the default approach used by USEPA in the proposed Phase II rule.

A summary of Non-EGU point source control programs included in 2009/2018 projection inventories include:

- Atlanta / Northern Kentucky / Birmingham 1-hr SIPs

- Industrial Boiler/Process Heater/RICE MACT. The applied MACT control efficiencies were four (4) percent for SO_2 and forty (40) percent for PM_{10} and PM2.5 to account for the co-benefit from installation of acid gas scrubbers and other control equipment to reduce HAPs.

- NO_x SIP Call (Phase I- except where States have adopted Phase II already) Phase I of the NO_x SIP call applies to certain large non-EGUs, including large industrial boilers and turbines, and cement kilns. States in the VISTAS region affected by the NO_x SIP call have developed rules for the control of NO_x emissions that have been approved by USEPA.

- Petroleum Refinery Initiative (October 1, 2003 notice; Mississippi & West Virginia). This initiative addresses the most significant Clean Air Act compliance concerns affecting the petroleum refinery industry. Since December 2000, 17 global refinery settlements have been reached with refiners representing nearly seventy-seven (77) percent of domestic refining capacity. Three refineries in the VISTAS region are affected by two October 2003 Clean Air Act settlements under the USEPA Petroleum Refinery Initiative. The refineries are: (1) the Chevron refinery in Pascagoula, Mississippi; (2) the Ergon refinery in Vicksburg, Mississippi; and (3) the Ergon refinery in Newell, West Virginia. The emission reductions required by the Consent decree for Chevron are significant and addressed to a greater degree in Appendix L.10.

- Reasonable Further Progress three (3) percent plans where in place for one-hour ozone plans (Metropolitan Washington, DC, and Atlanta, Georgia).

- VOC 2-, 4-, 7-, and 10-year MACT Standards. The point source MACTs and associated emission reductions were designed from Federal Register (FR) notices and discussions with USEPA's ESD staff. MDEQ did not apply reductions for MACT standards with an initial compliance date of 2001 or earlier, assuming that the effects of these controls are already accounted for in the 2002 inventories supplied by the States.

- Combustion Turbine MACT. The projection inventories do not include the NO_x co-benefit effects of the MACT regulations for Gas Turbines or stationary Reciprocating Internal Combustion Engines, which USEPA estimates to be small compared to the overall inventory.

- NOx SIP Call (Phase II – remaining states & IC engines).

For more information on the development of point source inventories, see Appendix D.

7.2.3 Area Source Controls

Controls (including control efficiency, rule effectiveness and rule penetration) provided by the States or originally developed for use in estimating projected emissions for USEPA's Heavy Duty Diesel (HDD) rulemaking emission projections and used in the CAIR projections were used to calculate controlled emissions.

The controls obtained by MACTEC (MACTEC, 2006) for the HDD rulemaking were controls for the years 2007, 2020, and 2030. Since MACTEC was preparing 2009 and 2018 projections, control values for intermediate years were prepared using a straight-line interpolation of control level between 2007 and 2020. State submitted controls had precedence over the U.S. EPA developed controls. For more information on the development of area source inventories, see Appendix D.

7.2.4 Mobile Sources

The assumptions used for the 2002 initial base year inventory vary across the VISTAS region, but our presumption is that these data accurately reflected each State's situation as it existed in 2002. If a State had no plans to change program requirements between 2002 and 2018, VISTAS proposed to maintain the 2002 program descriptions without change. However, if a State planned changes, information on those plans was requested and used to develop the 2018 inventory.
For more information on the development of mobile source inventories, see Appendix D.

7.2.5 Non-Road

Using the 2002 base year emissions inventory for aircraft, locomotives, and commercial marine vessels (CMV) prepared as described earlier in this document, corresponding emission projections for 2009 and 2018 were developed. Detailed inventory data (both before and after controls) for these same emission sources for 1996, 2010, 2015, and 2020 were obtained from the USEPA's CAIR Technical Support Document. Using these data, combined growth and control factors for the period 2002-2009 and 2002-2018 were estimated using straight-line interpolation between 1996 and 2010 (for 2009) and 2015 and 2020 (for 2018). This is done at the State-county-SCC-pollutant level of detail. According to USEPA documentation, the CAIR baseline emissions include the impacts of the Tier 4 (T4) non-road diesel rulemaking, which implements a low sulfur fuel requirement that affects both future CMV and locomotive emissions. For more information on the development of non-road source inventories, see Appendix D.

7.2.6 Conclusion

In conclusion of this discussion on source sector controls, *Figures 7.2.6-1 and 7.2.6-2* depict pollutant totals for NO_x and SO_2 for the various sectors by state for 2002, 2009, and 2018 modeling. Due to emissions control requirements already in place, both SO_2 and NO_x emissions will be significantly lower in 2018 than in 2002. This will result in significant visibility improvement in 2018 over 2002.

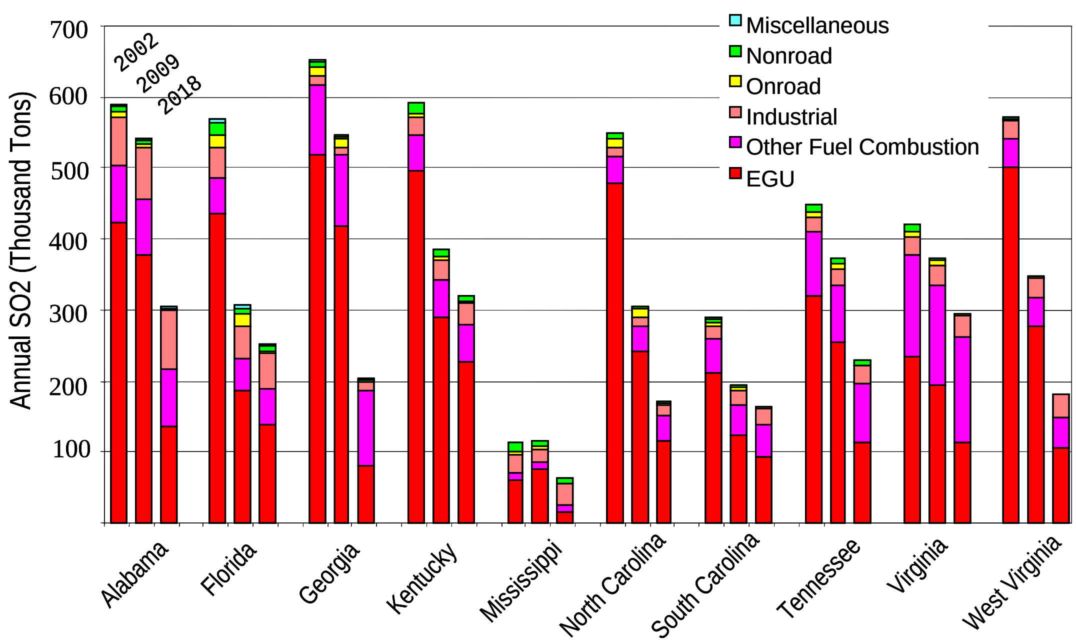


Figure 7.2.6-1. Base G2 Annual SO_2 emissions for 2002, 2009, and 2018 in the VISTAS states.

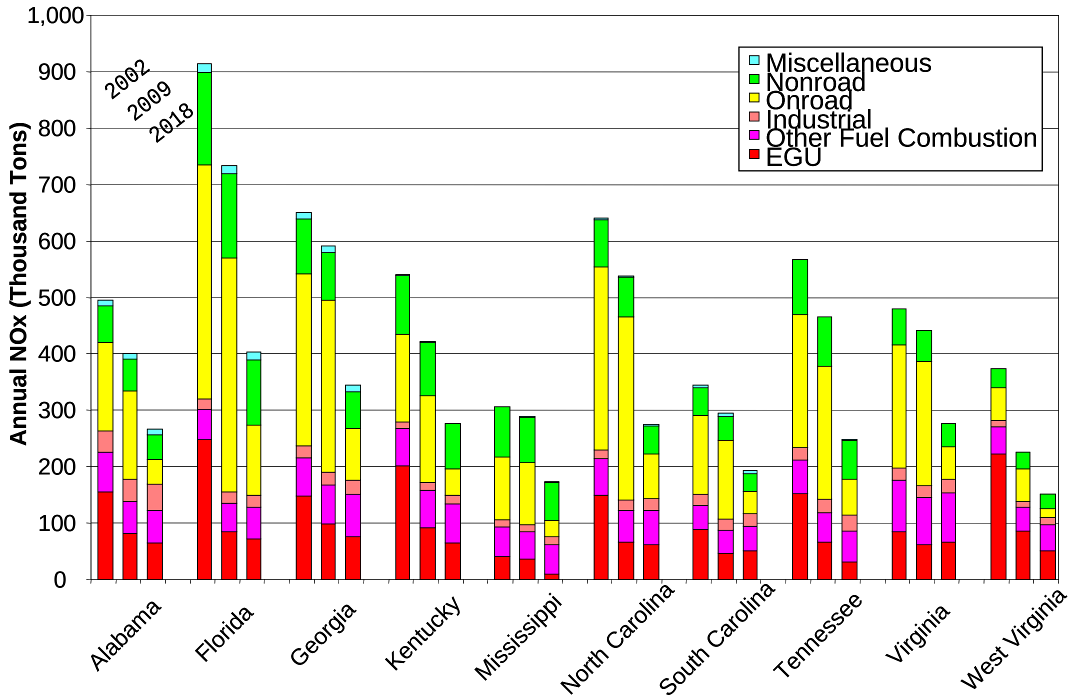


Figure 7.2.6-2. Base G2 Annual NO_x emissions in 2002, 2009, and 2018 in the VISTAS States.

Summary of Final Emissions Inventories for 2009 and 2018

Table 7.2.6-1 is a summary of the 2009 final emission inventory for Mississippi. The complete inventory and discussion of the methodology is contained in Appendix D.

	VOC	NO_x	PM2.5	PM10	NH_3	SO_2
Point	38,151	92,409	13,976	24,202	1,001	102,143
Area	124,997	4,249	51,661	356,324	63,708	753
On-Road Mobile	51,600	69,952	1,491	2,250	3,995	532
Non-Road Mobile	36,197	80,567	3,985	4,270	25	7,191
Biogenics	1,544,646	20,304				
TOTAL	1,795,571	267,482	71,113	387,046	68,729	110,619

Table 7.2.6-1. Mississippi 2009 Emissions Inventory Summary in tons.

Table 7.2.6-2 is a summary of the 2018 final emission inventory for Mississippi. The complete inventory and discussion of the methodology is contained in Appendix D.

	VOC	**NO_x**	**PM2.5**	**PM10**	**NH_3**	**SO_2**
Point	46,452	71,804	17,172	30,046	1,591	54,367
Area	140,134	4,483	53,222	375,495	69,910	746
On-Road Mobile	31,306	30,259	810	1,607	4,520	435
Non-Road Mobile	28,842	68,252	3,203	3,452	29	6,683
Biogenics	1,544,646	20,305				
TOTAL	1,791,381	195,103	75,008	410,600	76,050	62,186

Table 7.2.6-2. Mississippi 2018 Emissions Inventory Summary in tons.

7.3 What Control Determinations Represent Best Available Retrofit Technology (BART) for Individual Sources?

Section 169A of the CAA directs States to assess certain large, older emission sources for additional controls in order to address visibility impacts. States are directed to conduct BART determinations for such sources in specific source categories, and which contribute to visibility impairment in Class I areas. The 1999 regional haze rule includes the BART requirement, and directs States to include BART in their regional haze SIPs. On July 6, 2005, USEPA published a revised final rule, including Appendix Y to 40 CFR Part 51, the *Guidelines for BART Determinations Under the Regional Haze Rule* (hereinafter referred to as the “BART Guidelines”) that provides direction to states on determining which of these sources should be subject to BART, and how to determine BART for each source.

A BART-eligible source is one which has the potential to emit 250 tons or more of a visibility-impairing air pollutant, was put in place between August 7, 1962 and August 7, 1977, and whose operations fall within one or more of 26 specifically listed source categories. Under the CAA, 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.’’

For those sources subject to BART, Section 169A(g)(7) of the CAA requires that States must consider the following factors in making BART determinations: (1) the costs 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 improvement in visibility which may reasonably be anticipated to result from the use of such technology.

7.3.1 BART-Eligible Sources in Mississippi

Table 7.3.1-1 is a list of facilities with BART-eligible sources in Mississippi. See Appendix L for a detailed description of each BART-eligible emission unit.

Facility Name	City, County
Chevron Products Company, Pascagoula Refinery	Pascagoula, Jackson County
Entergy Mississippi Inc, Baxter Wilson Plant	Vicksburg, Warren County
Entergy Mississippi Inc, Gerald Andrus Plant	Greenville, Washington County
Georgia Pacific Corp, Monticello Mill	Monticello, Lawrence County
Greenwood Utilities, Henderson Station	Greenwood, Leflore County
Holcim US Inc	Artesia, Lowndes County
International Paper Company, Vicksburg Mill	Vicksburg, Warren County
Terra Mississippi Nitrogen Inc	Yazoo City, Yazoo County
Mississippi Phosphates Corporation	Pascagoula, Jackson County
Mississippi Power Company, Chevron Cogenerating Plant	Pascagoula, Jackson County
Mississippi Power Company, Plant Jack Watson	Gulfport. Harrison County
Mississippi Power Company, Plant Victor J Daniel	Ecatawpa, Jackson County
Pursue Energy Corp, Thomasville Gas Plant	Thomasville, Rankin County
South Mississippi Electric Power Association, Moselle Plant	Moselle, Jones County
South Mississippi Electric Power Association, R D Morrow Plant	Purvis, Lamar County

Table 7.3.1-1. BART-eligible sources in Mississippi.

The BART-eligible sources were identified using the methodology in the BART Guidelines:

- One or more emissions units at the facility fit within one of the 26 categories listed in the BART Guidelines;
- The emission unit(s) were in existence on August 7, 1977 and began operation at some point on or after August 7, 1962; and
- The limited potential emissions from all emission units identified in the previous two bullets emission units were greater than 250 tons or more per year of any of these visibility-impairing pollutants: SO_2, NO_x, and PM10.

The BART Guidelines recommend addressing these visibility-impairing pollutants: SO_2, NO_x, and particulate matter, and suggest that States use their best judgment in determining whether to address VOC or ammonia emissions. MDEQ addressed SO_2 and NO_x, and used particulate matter less than 10 microns in diameter (PM_{10}) as an indicator for particulate matter to identify BART-eligible units, as the BART Guidelines recommend. VISTAS modeling demonstrated that VOCs are not significant emissions for this planning period. Point-source impacts from VOC emissions are below a significance level that the emissions will not be evaluated. VISTAS modeled several large ammonia sources whose potential emissions exceeded 250 tons per year and demonstrated an impact on visibility at Class I areas. However, Mississippi doesn't have any large point sources of ammonia near Class I areas. For these reasons, MDEQ did not evaluate emissions of VOCs and ammonia in BART determinations.

7.3.2 Determination of Sources Subject to BART in Mississippi

Under the BART Guidelines, MDEQ may consider exempting some sources from BART if MDEQ finds that the emissions do not cause or contribute to visibility impairment in a Class I area. In accordance with the BART guidelines, MDEQ chose to perform source-specific analyses to determine which sources cause or contribute to visibility impairment using the CALPUFF model. The CALPUFF modeling protocol used for determining which facilities are subject to BART is included in Appendix L. A contribution threshold of 0.5 deciviews was used for determining which sources were subject to BART. This is the level suggested in the BART guidelines and the threshold used by the surrounding states with the Class 1 areas that sources in Mississippi could impact. A complete discussion of the suitability of the 0.5 deciview threshold can be found in Appendix L.

Mississippi's BART-eligible sources were screened to determine subjectivity in three different ways. Ten performed and submitted exemption modeling analysis. Two had the exemption analysis performed by TRC under VISTAS Contract. Three were exempted based on the model plant provision (Option 2 in the Guidelines).

For the facilities that performed modeling for exemption, the IMPROVE (Interagency Monitoring of Protected Visual Environments) equation was used to determine the impact of a facility's emissions on visibility at Class 1 areas. This equation determines light extinction (b_{ext}) in inverse megameters. Originally, the IMPROVE equation was set forth in "Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Program", EPA-454/B-03-005, September 2003. In 2005, the IMPROVE Steering Committee made recommendations for a refined equation that modifies the terms of the original equation to account for the most recent data. . Among other improvements, the new equation allows for the use of site specific Raleigh Scattering factors and sea-salt values. Raleigh Scattering is the light scattering effect that the molecules exert and is greater at sea level. Sea-salt also has a light scattering effect and is important at coastal sites, such at Breton. There were no sea-salt values available for Breton, so the values for St. Marks, a gulf coastal site in Florida, were used.

The choice between use of the old or the new equation for calculating the visibility metrics for each Class I area is made by the state in which the Class I area is located. Mississippi allowed the use of the new IMPROVE equation in performing the screening analysis. The states of Alabama, Arkansas, and Louisiana whose Class 1 areas were potentially impacted also allowed the use of the new IMPROVE equation. However, since the old IMPROVE equation was considered the default, gave more conservative results, and the new IMPROVE equation required additional processing to implement, only three facilities (Mississippi Power- Plant Watson, Mississippi Power-Plant Daniel, and Mississippi Power-Chevron Cogeneration Station) used the new IMPROVE equation for the screening analysis. Appendix L.12 discusses the IMPROVE Equation in greater detail.

Three facilities used the Model Plant rule as given in Part III, Option 2 of the BART Guidelines to be exempted. The model plant criteria for exemption states that potential emissions of SO_2 or NO_x or $SO_2 + NO_x$ should be less than 500 tons for facilities greater than 50 kilometers (km) from the nearest class I area or potential emissions should be less than 1000 tons for facilities greater than 100 km from the nearest class I area. The model plant criteria proposed by the EPA does not consider the contribution from PM. Logic to appropriately include PM in the model plant exemption process was developed by Jim Boylan of Georgia DNR. This rationale determines a “PM factor” to relate primary PM to secondary sulfate PM from SO_2. The three facilities that were exempted based on the model plant rule are South Mississippi Electric Power Association (SMEPA)-Moselle Plant, SMEPA- R D Morrow Plant, and Terra Mississippi Nitrogen. Further detail on this exemption process is found in Appendices L.8 and L.9.

Thirteen of the fifteen sources were able to demonstrate exemption. Results of these demonstrations are summarized in *Table 7.3.2-1*. Additional details are available in Appendix L. Facilities found to be subject to BART completed a BART analysis.

Seven (7) of the BART eligible sources are EGUs subject to CAIR. USEPA has determined that, as a whole, the CAIR cap-and-trade program improves visibility more than implementing BART for individual sources in states affected by CAIR. A State that opts to participate in the CAIR program under part 96 AAA-EEE need not require affected BART-eligible EGUs to install, operate, and maintain BART for SO_2 or NO_x emissions. Since Mississippi is participating in CAIR and accepts USEPA’s overall finding that CAIR “substitutes” for BART for NO_x and SO_2, Mississippi’s EGUs were allowed to submit BART exemption modeling demonstrations for PM emissions only. All EGUs demonstrated that each facility’s emissions do not contribute to visibility impairment in any Class I area.

Facility Name	Class I area	Results/ Impact
Chevron Products Company, Pascagoula Refinery	Breton National Wildlife Refuge	Subject 3.89dv
Mississippi Phosphates Corporation	Breton National Wildlife Refuge	Subject 0.81dv
Entergy Mississippi Inc, Baxter Wilson Plant	Breton National Wildlife Refuge	Exempt 0.35dv
Entergy Mississippi Inc, Gerald Andrus Plant	Caney Creek Wilderness Area	Exempt 0.27dv
Georgia Pacific Corp, Monticello Mill	Breton National Wildlife Refuge	Exempt 0.33dv
Greenwood Utilities, Henderson Station	Sipsey Wilderness Area	Exempt 0.22dv
Holcim US Inc	Sipsey Wilderness Area	Exempt 0.34dv
International Paper Company, Vicksburg Mill	Breton National Wildlife Refuge	Exempt 0.32
Mississippi Power Company, Chevron Cogenerating Plant	Breton National Wildlife Refuge	Exempt 0.02dv
Mississippi Power Company, Plant Jack Watson	Breton National Wildlife Refuge	Exempt 0.42dv
Mississippi Power Company, Plant Victor J Daniel	Breton National Wildlife Refuge	Exempt 0.23dv
Pursue Energy Corp, Thomasville Gas Plant	Breton National Wildlife Refuge	Exempt 0.17dv
Terra Mississippi Nitrogen Inc	Sipsey Wilderness Area	Exempt (model plant)
South Mississippi Electric Power Association, Moselle Plant	Breton National Wildlife Refuge	Exempt (model plant)
South Mississippi Electric Power Association, R D Morrow Plant	Breton National Wildlife Refuge	Exempt (model plant)

Table 7.3.2-1. BART Exemption Modeling Results.

7.3.3 Determination of BART Requirements for Subject-to-BART Sources

After the Screening analysis, two sources were determined to be “subject to BART” and were required to perform an engineering analysis containing their evaluation of potential BART options and proposed BART determinations. The two (2) “subject to BART” facilities are the Chevron Pascagoula Refinery in Pascagoula, Mississippi and Mississippi Phosphates in Pascagoula, Mississippi.

The modeled visibility impact resulting from Chevron Refinery’s emissions was 3.89dv, which exceeds the threshold of 0.5 dv. Chevron has significant emissions reductions planned due to permitted projects that are currently or will soon be underway and an enforcement consent decree issued June 7, 2005. This will result in emission reductions of 2900 lbs/hr of SO_2, 960 lbs/hr, of NOx and 40 lbs/hr of PM10 with a modeled visibility improvement of 2.99dv at Breton. See Table 7.3.3-1 below for a detailed account of the units, involved in Chevron’s consent decree, that contribute to 96% of the SO_2 emissions for Chevron’s BART-eligible sources. Further reductions would be very costly without significant visibility improvement. Mississippi has determined that the emissions controls and resulting reductions from the consent decree constitute BART. The Complete BART analysis for Chevron can be found in appendix L.10.

	Max Daily Averages (2001-2003)			**Future Planned Emissions / Consent Decree**			
	NOx	**SO_2**	**VOC**	**NOx**	**SO_2**	**VOC**	
BART Eligible Unit	*lb/hr*	*lb/hr*	*lb/hr*	*lb/hr*	*lb/hr*	*lb/hr*	**Controls**
F-1603/FCC Regenerator	374.000	841.000	111.000	80.000	60.000	99.000	NOx reducing catalyst
F-2101/Boiler No.1	86.000	4.300	1.800	0.000	0.000	0.000	Boilers being replaced by ULNB boilers
F-2102/Boiler No.2	82.000	4.300	1.700	0.000	0.000	0.000	
F-2103/Boiler No.3	84.000	4.600	1.800	0.000	0.000	0.000	
F-2745/SRU 2 w/Thermal Oxidizer	2.300	870.000	0.400	2.300	36.000	0.360	SCOT tail gas treatment systems
F-2765/SRU 3 w/Thermal Oxidizer	10.500	730.000	1.400	10.500	36.000	1.360	
F-3801/Flare No. 1	8.700	110.800	3.900	0.690	0.003	0.007	Flare gas recovery system
F-3801/Flare No. 2	15.600	213.800	7.000	0.690	0.003	0.007	
F-3801/Flare No. 3	7.300	174.200	3.300	0.690	0.003	0.007	
F-3801/Flare No. 4	4.100	63.300	1.800	0.690	0.003	0.007	
F-6101/6102 Crude Unit No.2 Heaters	282.000	16.400	5.300	28.160	16.410	5.350	ULNB will be installed
Total Reductions*	NOx	832.78	SO_2	2884.28	VOC	33.30	
*This table represents 96% of the SO2 emissions from BART-eligible units							

Table 7.3.3-1. Major BART-eligible Units Involved in the Consent Decree

The modeled visibility impact resulting from Mississippi Phosphate's emissions was 0.81dv, which exceeds the threshold of 0.5 dv. The primary emissions at Mississippi Phosphates are SO_2 from the facility's two Sulfuric Acid Plants. The existing control equipment on the Acid Plants are a Dual Absorption System and Acid-Mist demisters. This results in emissions of 4 lbs SO_2 per ton of Sulfuric Acid. The BART analysis finds that there may be available alternatives that are technically feasible at the facility and could further reduce emissions. However, Mississippi Phosphates is planning to modify the acid plants at the facility over the next several years. Mississippi Phosphates is currently in the design phase for the new units which will include better emission controls for the acid plants. They are planning to perform a combined BART and BACT analysis to determine the appropriate future controls at the facility. This will take several months to complete and several more months to evaluate and issue permits. Mississippi will submit a supplemental SIP with the control determination one year after the initial Regional Haze SIP submittal. The complete BART Analysis and accompanying details for Mississippi Phosphates can be found in appendix L.11.

7.4 Relative Contributions to Visibility Impairment: Pollutants, Source Categories, and Geographic Areas

An important step toward determining the long term strategy measures is to identify the key pollutants contributing to visibility impairment at each Class I area. To understand the relative benefit of further reducing emissions from different pollutants, source sectors, and geographic areas, VISTAS engaged the Georgia Institute of Technology to perform emission sensitivity model runs using CMAQ. Emissions sensitivities were initially performed for three episodes representing winter and summer conditions: Jan 2002, July 2001, and July 2002. These runs used the initial 2018 projections inventory and considered thirty (30) percent reductions from specific pollutants, source categories, and geographic areas. A thirty (30) percent emission reduction was chosen for the sensitivity runs because it is large enough to obtain results and represents a reasonable expectation of reductions from various source categories. Emissions sensitivities were repeated using the 2009 Base D projection inventory and two month-long episodes from 2002: Jun 1-Jul 10 and Nov 19 – Dec 19. Emissions in 2009 were reduced by thirty (30) percent for each pollutant sensitivity run. The pollutant contributions that were evaluated were:

- SO_2 from EGU sources in each VISTAS state, other RPOs in the VISTAS 12 km grid, and Boundary Conditions from outside the 12 km domain.
- SO_2 from non-EGU point sources in each VISTAS state, other RPOs, and Boundary Conditions
- NO_x from ground level (on-road plus non-road plus area) sources in each VISTAS state and other RPOs
- NO_x from point (EGU plus non-EGU) sources in each VISTAS state and other RPOs
- NH_3 from all sources in VISTAS and other RPOs
- Volatile Organic Compounds from anthropogenic and biogenic sources in the 12 km modeling domain
- Primary Carbon from all ground level sources in each VISTAS state and other RPOs

- Primary Carbon from all point sources in each VISTAS state and other RPOs
- Primary Carbon from all fires in each VISTAS state and other RPOs

Results are shown in *Figures 7.4-1 through 7.4-3* below for a thirty percent reduction in emissions for each of the three Class I areas near Mississippi. Responses for twenty (20) percent worst days were calculated by averaging the responses of the twenty (20) percent worst days that were modeled in the two episodes for Sipsey and Caney Creek. Complete data was not available to determine the 20 percent worst days for Breton so chart depicts the response to the full summer episode.

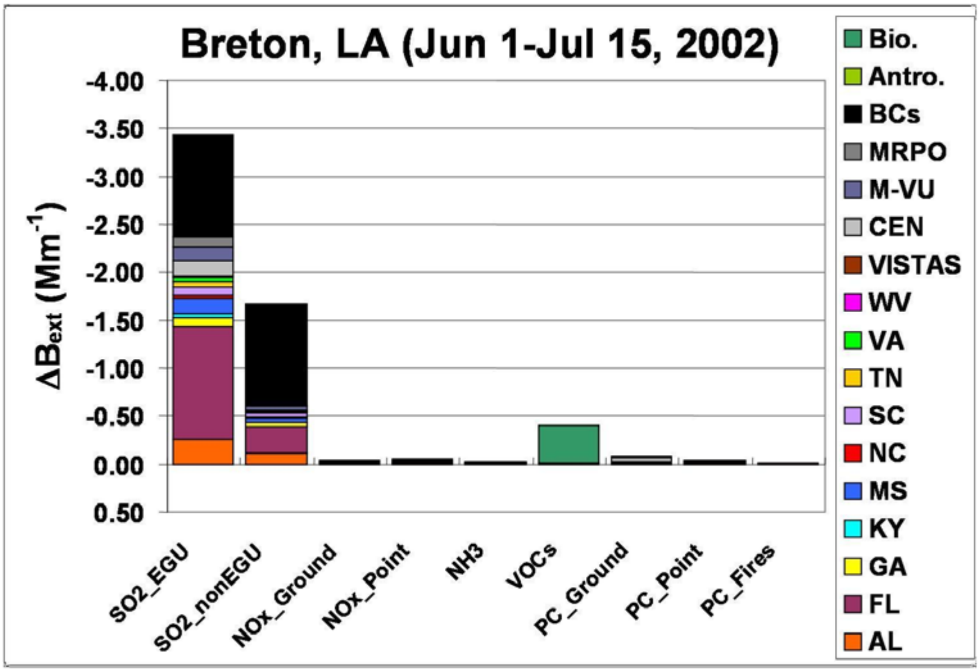


Figure 7.4-1. CMAQ projections of visibility responses on to 30 percent reductions from the 2009 Base D inventory for visibility-reducing pollutants in different source categories and geographic areas.

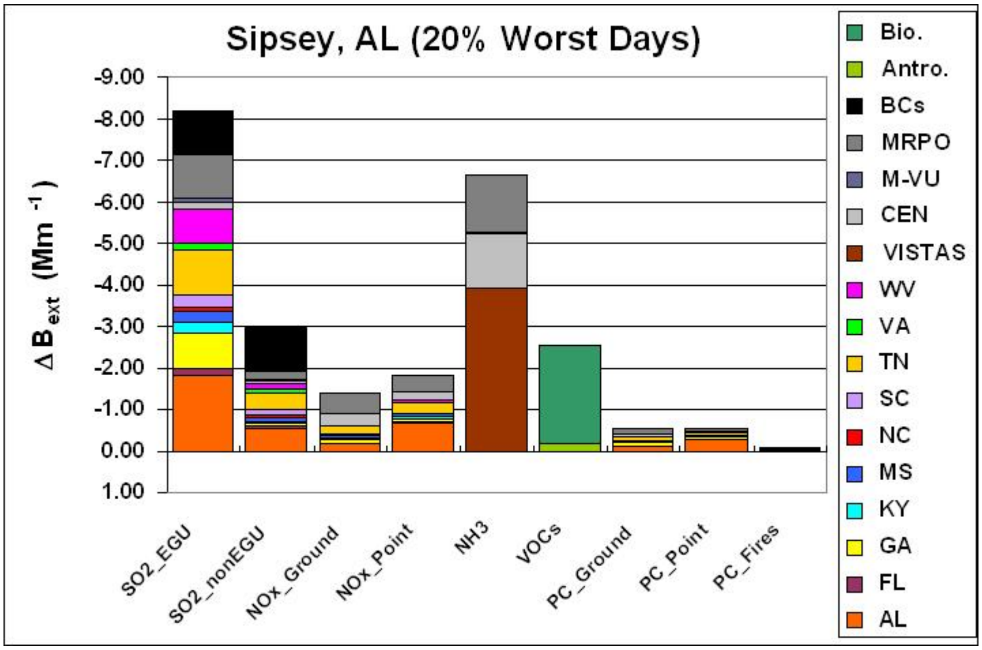


Figure 7.4-2. CMAQ projections of visibility responses on 20 percent worst days at Sipsey, AL to 30 percent reductions from the 2009 Base D inventory for visibility-reducing pollutants in different source categories and geographic areas.

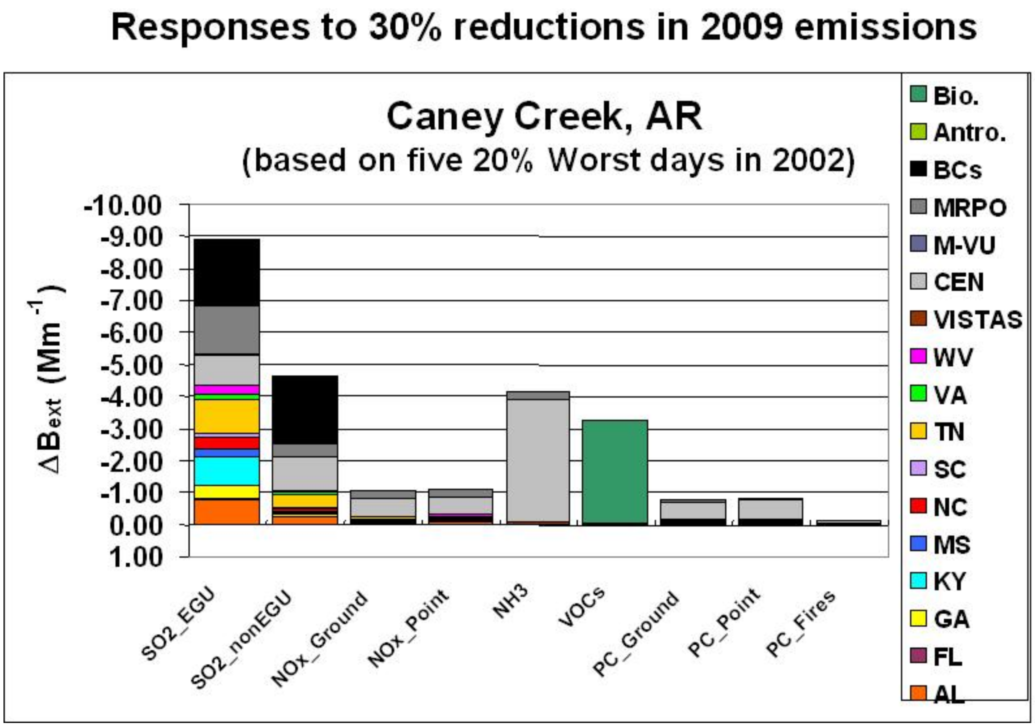


Figure 7.4-3. CMAQ projections of visibility responses on 20 percent worst days at Caney Creek, AR to 30 percent reductions from the 2009 Base D inventory for visibility-reducing pollutants in different source categories and geographic areas.

As *Figures 7.4-1 through 7.4-3* illustrate, the greatest visibility benefits for these Class I areas are projected to result from reducing SO_2 from EGUs. Additionally, smaller benefits are projected from SO_2 emission reductions from non-utility, industrial point sources. The pattern of relative SO_2 contributions from non-EGUs among the various VISTAS states is similar to the pattern of relative SO_2 contributions from EGUs.

Figures 7.4-1 through 7.4-3 also indicate that Mississippi has minor impacts on all three (3) neighboring Class I sites. Mississippi has more significant impacts on Breton than Sipsey or Caney Creek. The Area of Impacts analysis in Section 7.5.4 further illustrates Mississippi's impact on the neighboring Class I areas.

Because ammonium nitrate is a small contributor to PM2.5 mass and visibility impairment on the twenty (20) percent worst days, the benefits of reducing NO_x and NH_3 emissions in Mississippi are small.

VOCs do contribute to visibility impairment, but as shown in the *Figures 7.4-1 through 7.4-3* above, this contribution is from biogenic sources such as vegetative emissions. Controlling anthropogenic sources of VOC emissions has little if any visibility benefit at the Class I areas. Reducing primary carbon from point sources, ground level sources or fires are projected to have small to no visibility benefit. This is consistent with the monitoring data that shows that most of measured organic carbon is secondary in origin and primary carbon is only a small fraction of the total measured carbon (Appendix B). Reducing carbon from fires was not found to be effective because there was little fire activity at these sites on the days modeled in the sensitivity analyses.

The results indicate that sulfate is the dominant contributor to visibility impairment on the twenty (20) percent worst days at all sites, and that ammonium nitrate may be important for sites where the twenty (20) percent worst days occur in the winter. MDEQ concludes that reducing SO_2 emissions from EGU and non-EGU point sources would have the greatest visibility benefits. Contributions from outside the VISTAS 12-km modeling domain are more important for the coastal Class I areas. These results are consistent with the CMAQ model results indicating that contributions from international emissions to visibility impairment at VISTAS Class I areas are greater closer to the boundaries of the modeling domain (see summary in section 7.3).

7.5 Relative Contributions to Visibility Impairment: Geographic Areas of Influence for Neighboring Class I Areas

Once it was determined that SO_2 emission reductions from EGU and non-EGU point sources in the VISTAS states would be the most effective sources to control to improve visibility at neighboring Class I areas, the next step was to identify the specific geographic areas that most likely influence visibility in each Class I area, and then to identify the major SO_2 point sources located in those geographic areas. Mississippi, along with the other VISTAS states, developed an Area of Influence (AoI) for each Class I area to represent the geographic area containing sources that would likely have the greatest impact on visibility at that Class I area. All SO_2 point sources within these Areas of Influence were identified and ranked by their 2018 emissions.

Mississippi used this AoI analysis to determine the sources that need to be evaluated to meet the reasonable progress goals for neighboring Class 1 areas. The following sections contain an overview of the steps in the Area of Influence analyses.

7.5.1 Back Trajectory Analyses

The first step was to generate meteorological back trajectories for IMPROVE monitoring sites in neighboring Class I areas for the 2000-2004 baseline period. Back trajectory analyses use interpolated measured or modeled meteorological fields to estimate the most likely central path of air masses that arrive at a receptor at a given time. The method essentially follows a parcel of air backward in hourly steps for a specified length of time. *Figure 7.5.1* is an example of a back trajectory analysis for Breton for the twenty (20) percent worst days in 2002.

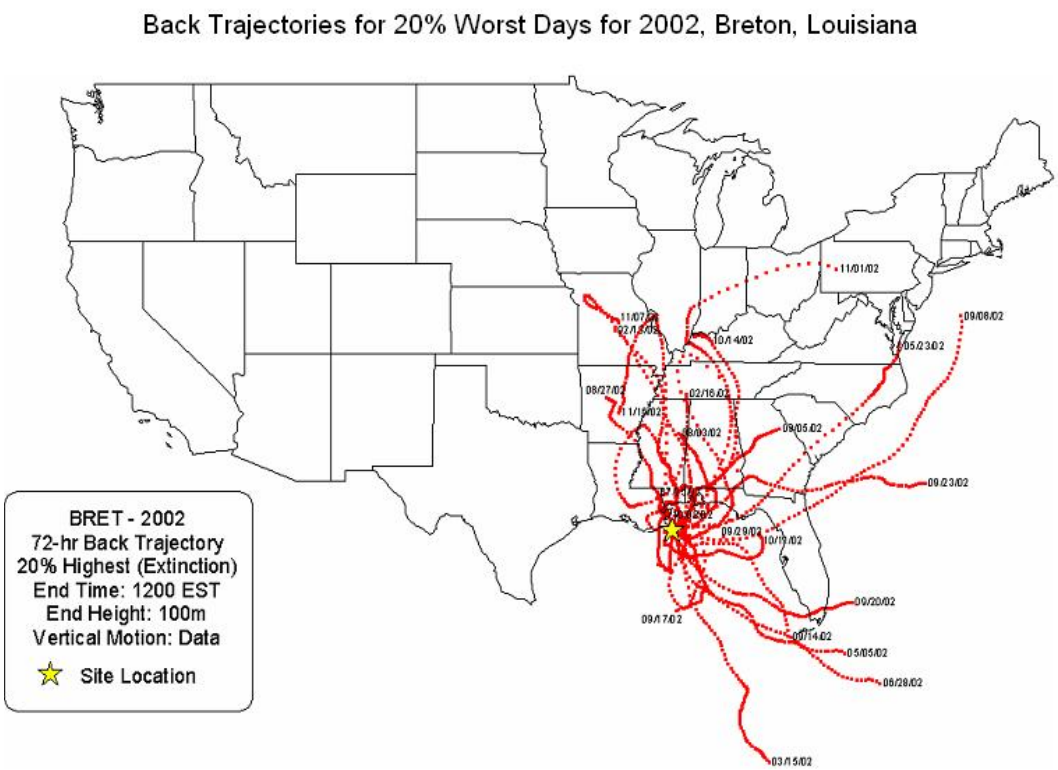


Figure 7.5.1. Example back trajectories for 20 percent worst visibility days in 2002 for Breton.

Trajectories were started at 100 meters and 500 meters above the surface and run backward from the site for 72-hours. These individual back trajectories for twenty (20) percent worst days in 2002 were also useful in evaluating model performance for individual days at the Class I areas.

7.5.2 Residence Time Plots

The next step was to plot residence time for each Class I area using five years of back trajectories for the twenty (20) percent worst visibility days in 2000-2004. Residence time is the frequency that winds pass over a specific geographic area on the path to a Class I area. Separate residence time plots were generated using trajectories with 100m start height. As illustrated in *Figure 7.5.2*, winds influencing Breton on the twenty (20) percent worst days come from several directions with no single predominant wind direction influencing the twenty (20) percent worst visibility days.

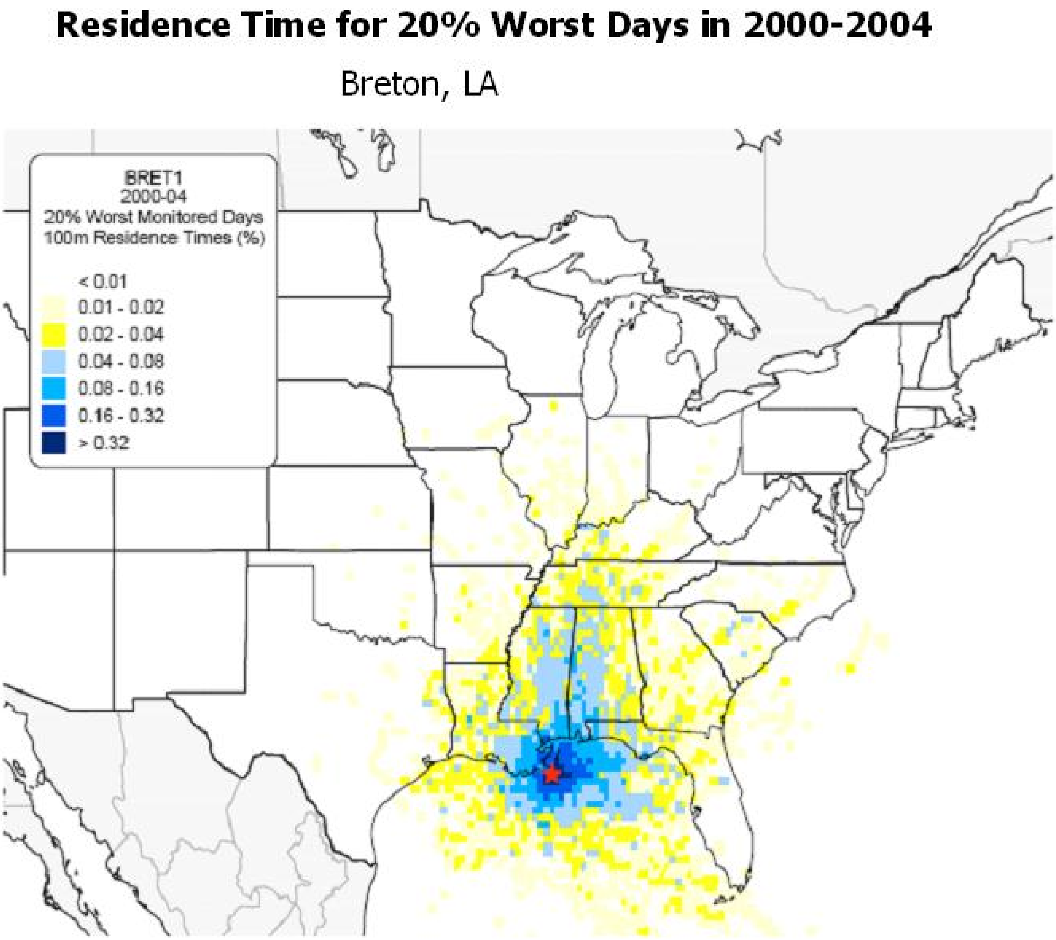


Figure 7.5.2. Example residence time plot for 20 percent worst visibility days in 2000-2004 for Breton, Louisiana. Based on trajectories with 100m start height.

7.5.3 SO_2 Areas of Influence

The next step was to develop sulfate extinction weighted residence time plots to define the geographic area with highest probability of influencing the receptor on the twenty (20) percent worst days in 2000-2004 that were dominated by sulfate. Each back trajectory was weighted by sulfate extinction for that day. This allows us to focus on the twenty (20) percent worst days that are influenced by sulfate and place less importance on days influenced by organic carbon from fires. Sulfate-weighted back trajectories for the twenty (20) percent worst days were combined for 5 years of data. The resulting sulfate extinction-weighted residence time plots were used to define the geographic Area of Influence for sources of SO_2 emissions. In *Figure 7.5.3* the area representing ten (10) percent or greater residence time is outlined in red and the area representing five (5) percent or greater residence time is outlined in gray. The VISTAS states focused their analyses on the Area of Influence defined by five (5) percent or greater sulfate extinction-weighted residence time.

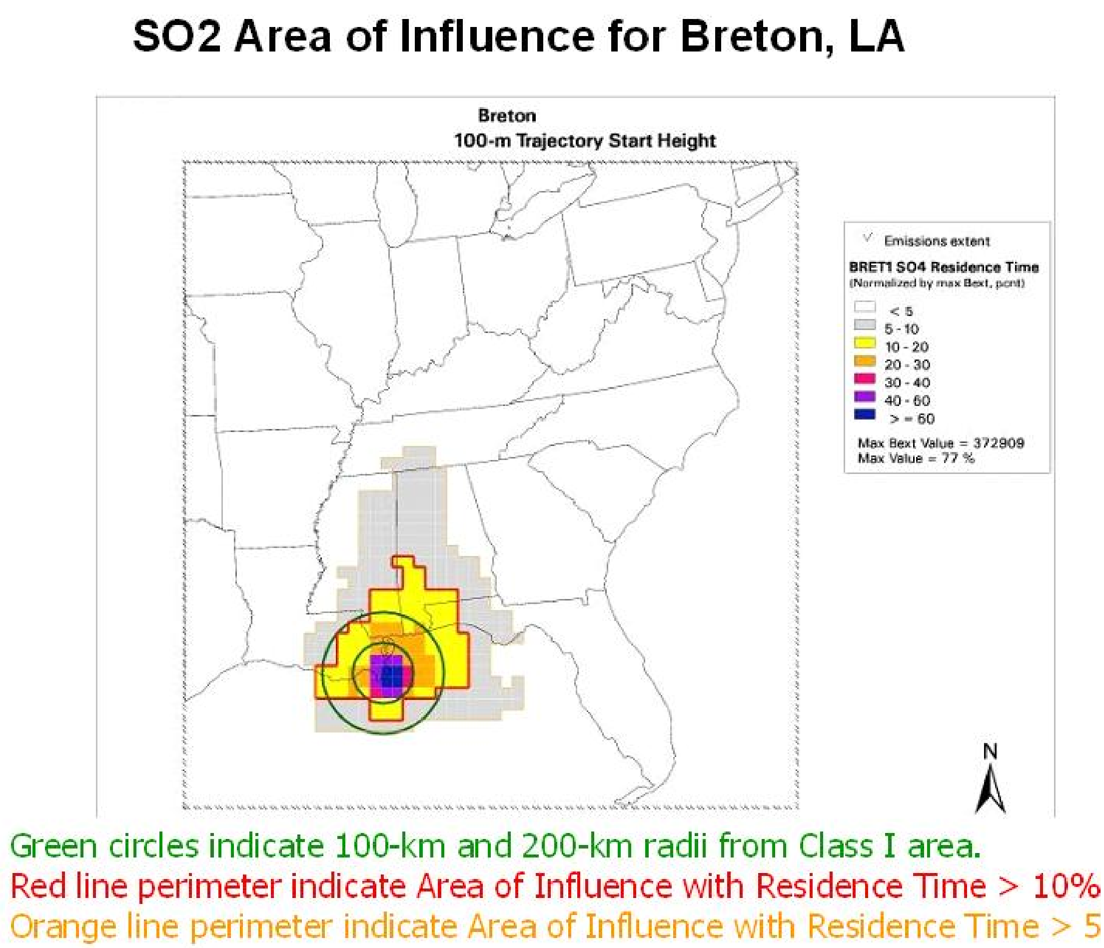


Figure 7.5.3. Example SO_2 Area of Influence plot for sulfate extinction weighted residence time for 20 percent worst visibility days in 2000-2004 for Breton, Louisiana. Based on trajectories with 100m start height.

7.5.4 Emissions Sources within SO_2 Areas of Influence

Residence time plots were then combined with geographically-gridded emission data based on the 2002 baseline and 2018 BaseG emissions inventories. Plots were generated for the Areas of Influence (AOI) defined by trajectories with 100m and 500 m start heights. As a way of incorporating the effects of transport, deposition, and chemical transformation of point source emissions along the path of the trajectories, these data were weighted by 1/d, where d was calculated as the distance, in kilometers, between the center of the grid cell in which a source is located and the center of the grid cell in which the IMPROVE monitor is located. The distance-weighted point source SO_2 emissions are then combined with the gridded extinction-weighted back-trajectory residence times at a spatial resolution of 36-km.

The final step was to combine the residence times and gridded emissions data in plots and data sets. The distance weighted (1/d) gridded point source SO_2 emissions were multiplied by the total extinction-weighted back-trajectory residence times on a grid cell by grid cell basis. These results were then normalized by the domain-wide total and displayed as a percentage. The analysis was done using both the 2002 and 2018 base year inventories.

Figures 7.5.4-1 through 7.5.4-3 illustrate 2018 distance weighted gridded emissions sulfate extinction weighted residence time plots for Breton, Sipsey and Caney Creek. For Breton, the Area of Influence only includes sources in south Mississippi, primarily, in coastal counties. The AOI plots for Sipsey and Caney Creek do not indicate any sources in Mississippi. By examining these maps, the focus narrows to only working with sources in south Mississippi with potential impacts on Breton.

These analyses are serving as the basis for consultation among the VISTAS states.

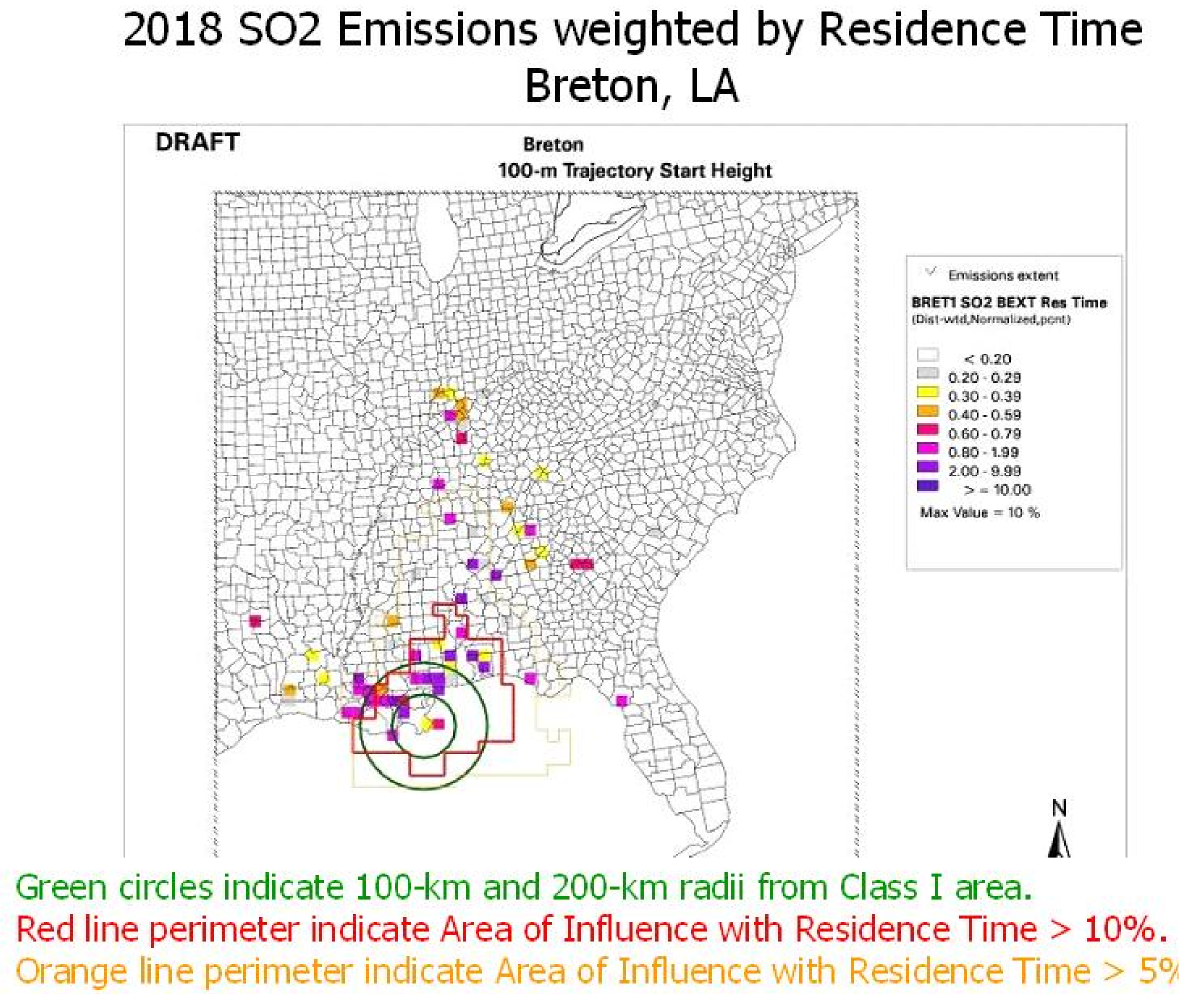


Figure 7.5.4-1. Breton, Louisiana 2018 SO_2 distance weighted emissions * SO4 extinction-weighted residence time plots.

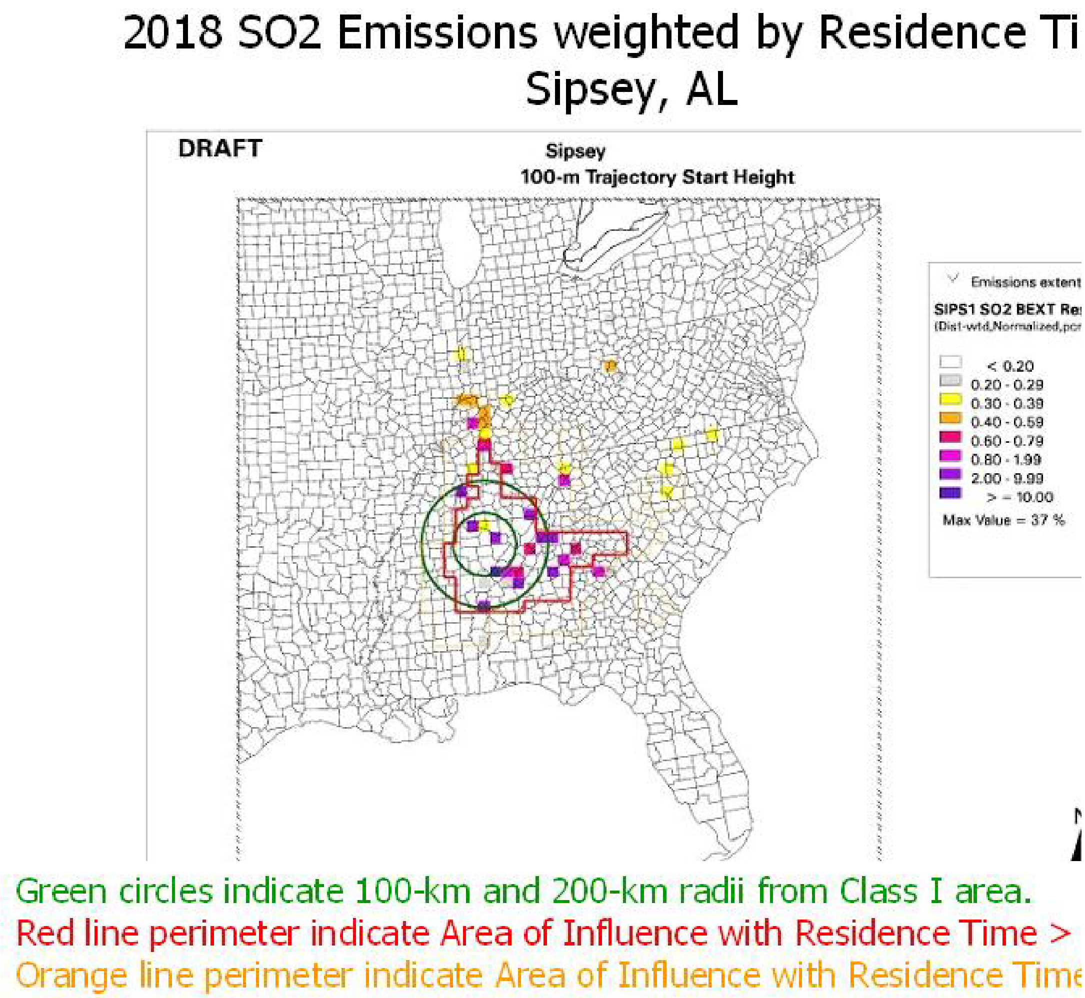


Figure 7.5.4-2. 2018 SO_2 distance weighted emissions * SO4 extinction-weighted residence time plot for Sipsey, Alabama.

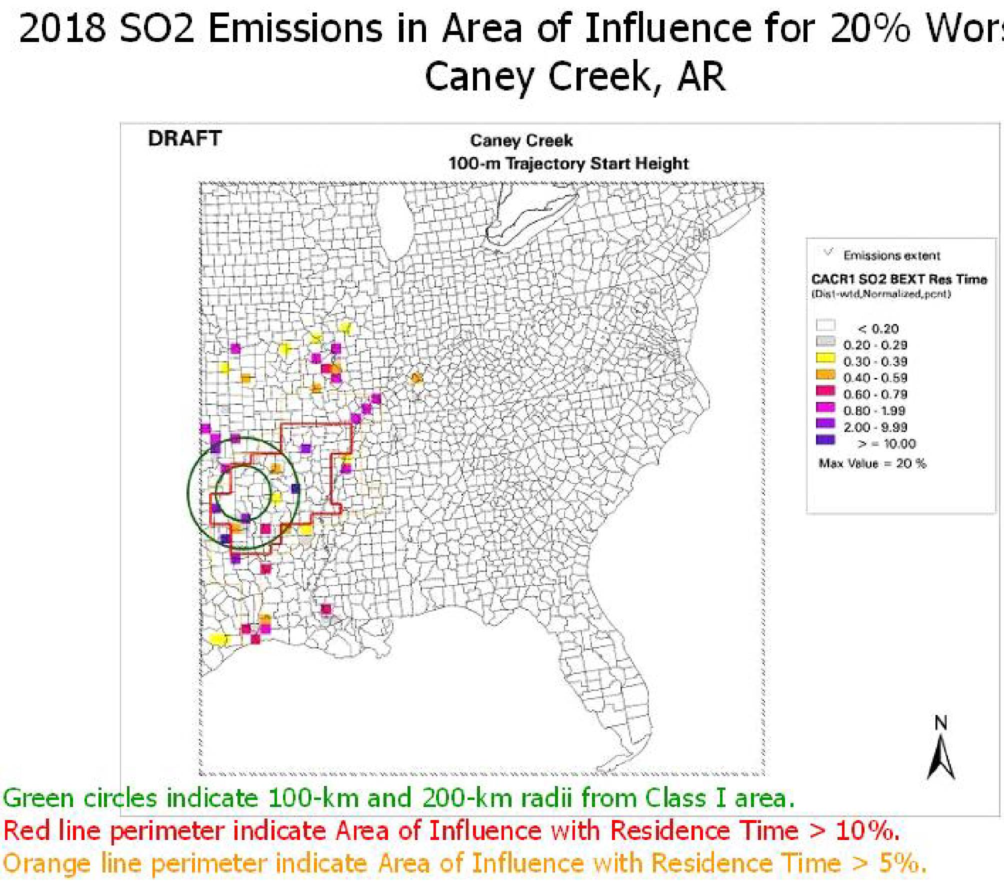


Figure 7.5.4-3. 2018 SO_2 distance weighted emissions * SO4 extinction-weighted residence time plot for Caney Creek, Arkansas.

7.5.5 Specific Sources in the Areas of Influence

The next step in the analysis was to review the emissions inventories to determine the specific sources found to have the greatest impact on visibility at Breton. Lists of SO_2 point sources within the Areas of Influence for each Class I areas were developed using the most current (BaseG) VISTAS 2002 base year and 2018 future year emissions. For this purpose the Area of Influence was defined as the counties with maximum sulfate extinction weighted residence time greater than 5. For SO_2 sources within each Area of Influence, the following attributes were defined for each individual unit:

- State, county, and source (plant), and industry identification codes
- SO_2 emissions for 2002 and 2018
- 2018 control efficiency
- Distance to Class I areas (defined by centroid of the Class I area)
- Emissions divided by distance (Q/d), a metric that accounts for the dispersion of emissions over distance
- Maximum sulfate extinction weighted residence time (RTmax)

Looking specifically at the Breton Class I area, MDEQ multiplied the RT_{Max} by Q/d, added the RT_{Max} * Q/d terms for all facilities, and then divided this term for each unit by that for all sources to get a percent (%) contribution. *Table 7.5.5-1* shows this approach for Mississippi facilities and limited data. The complete spreadsheet can be found in Appendix M. The percent contribution is based on all facilities in all states in the 2018 inventory.

After developing the percent contribution values, MDEQ used a one percent (1%) per unit cut point to determine the facilities and units to further analyze. MDEQ chose to adopt 1% as the contribution threshold used to consider a source for a four factor analysis of reasonable further controls based on the precedence established in other Federal programs as follows:

- The BART rule specified that a maximum impact of 0.5 dv is an acceptable threshold for establishing significance. This threshold is representative of a 5 percent change in extinction.
- The NO_x SIP call established a significance level for 126 petitions (the level at which a state's contribution to another state's ozone was considered significant) at 4 parts per billion. This threshold is representative of approximately 3.75 percent of the 1 hour ozone standard of 125 parts per billion, which was the standard at the time.
- The CAIR rule established a PM contribution threshold of 0.2 $\mu g/m^3$ as significant. This threshold represents 1.3 percent of the Annual $PM_{2.5}$ standard of 15 $\mu g/m^3$.
- The NAAQS assign significant impact levels for human health standards based on a sources' contribution to air quality. These significance levels represent a percentage of the NAAQS. Those facilities able to demonstrate that a new or modified sources' contribution is less than a particular significance level is relieved of further modeling. MDEQ examined all the averaging periods for the criteria pollutants and determined that the 1 percent threshold contribution chosen for reasonable further progress was as stringent as any significant impact level, the most restrictive being NO_2 at 1 $\mu g/m^3$ or 1 percent. (NO_2 NAAQS 100 $\mu g/m^3$)

Based on the above, a 1% threshold is reasonable to determine emissions units to be further evaluated to help meet the Reasonable Progress Goals. It is also the threshold that surrounding VISTAS states have adopted.

Table 7.5.5-1 lists the significant facilities and units that may impact Breton. The units that meet a 1.0 % contribution test are highlighted in yellow in *Table 7.5.5-1*. As can be seen in *Table 7.5.5-1*, the 1.0 % contribution test yields only a few sources that need to be examined further.

Facility	Point ID	SO_2 (tons)	Dist	Q/d	RT Max**	Qd* RTmax	% cont
Mississippi Power Company, Plant Watson	004	7,640	148.07	51.60	28.09	1449.31	5.4%
DuPont DeLisle Facility	024	1,645	137.98	11.92	28.09	334.80	1.2%
DuPont DeLisle Facility	025	1,627	137.98	11.79	28.09	331.21	1.2%
Mississippi Phosphates Corporation	006	918	140.83	6.52	28.09	183.02	0.7%
Mississippi Phosphates Corporation	008	786	140.83	5.58	28.09	156.83	0.6%
Mississippi Power Company, Plant Watson	005	759	148.07	5.13	28.09	144.03	0.5%
Mississippi Power Company, Plant Daniel	002	847	169.42	5.00	28.09	140.45	0.5%
Mississippi Power Company, Plant Daniel	001	799	169.42	4.71	28.09	132.42	0.5%
Chevron Pascagoula Refinery	017	262.8	123.85	2.12	28.09	59.60	0.2%
Chevron Pascagoula Refinery	052	157	123.85	1.27	28.09	35.61	0.1%
Chevron Pascagoula Refinery	051	157	123.85	1.27	28.09	35.61	0.1%
Holcim Inc, Artesia	002	3,991	475.57	8.39	8.93	74.93	0.3%
Pursue Energy Corporation, Thomasville G	001	3,303	346.74	9.53	6.44	61.35	0.2%
Choctaw Generation LLP, Red Hills Genera	001A	3,758	473.82	7.93	7.27	57.66	0.2%
Georgia Pacific Corporation, Monticello	002	1,765	291.74	6.05	6.72	40.65	0.2%
Georgia Pacific Corporation, Monticello	001	1,652	291.74	5.66	6.72	38.06	0.1%
CII Carbon LLC	001	670	230.26	2.91	11.24	32.72	0.1%
SMEPA , Plant Morrow	001	670	234.48	2.86	11.24	32.12	0.1%
SMEPA, Plant Morrow	002	670	234.48	2.86	11.24	32.12	0.1%

Table 7.5.5-1. Percent Contributions to Breton

7.6 Evaluating the Specific SO_2 Emissions Sources

Mississippi used the Area of Impact (AOI) analysis described in the preceding sections to determine sources that need further evaluation to help meet reasonable progress goals. The sources identified by the Area of Impact analysis will be evaluated to determine if there are reasonable controls that can be applied to meet the reasonable progress goals for the impacted Class 1 area. The neighboring state of Alabama uses the same methodology. Louisiana is in a different planning organization and used different methods to for reasonable progress determinations; however, as noted in the Section 10, Mississippi and Louisiana have met several times and there were no issues with the AOI methodology.

The Regional Haze Rule states that the cost of controls, time necessary for compliance, energy and non-air environmental impacts, and the remaining useful life of any potentially affected sources should be considered in setting the reasonable progress goals.

From *Table 7.5.5-1*, there are only two facilities that meet the 1.0 % test and need to be evaluated for reasonable progress. Those facilities are:

- Mississippi Power Company, Plant Watson, Harrison County, and

- DuPont Delisle Facility, Harrison County.

Mississippi Power Company, Plant Watson

Mississippi Power Company, Plant Watson is a coal fired Electricity Generating Facility. Plant Watson is subject to the Clean Air Interstate Rule (CAIR) which requires significant reductions of NO_x and SO_2 in the eastern United States. The CAIR results in reductions of over seventy (70) percent for SO_2 emissions and by over sixty (60) percent NO_x emissions from 2003 levels. The CAIR is a cap and trade program that does not require specific emissions reductions from any specific facilities, but the utility companies will have to reduce emissions from a significant number of EGU's to meet the emissions cap. Plant Watson has two Coal fired units. Controls for NO_x and SO_2 are proposed for unit 5 which is the larger unit with more emissions. This will result in significant emissions reductions from this facility. The facility being subject to CAIR is deemed sufficient for reasonable progress.

To further support EGUs subject to CAIR is sufficient for reasonable progress, a discussion in the CAIR rule highlighted below (70 FR 25197) addresses the reasonable progress factors of cost and time necessary for compliance for these EGUs, and provide the necessary support for a State's four factor reasonable progress analysis that must accompany a State's assertion that CAIR is sufficient for reasonable progress for subject EGU's during the first planning period.

> *From past experience in examining multi-pollutant emissions trading programs for SO2 and NOX, EPA recognized that the air pollution control retrofits that result from a program to achieve highly cost-effective reductions are quite significant and can not be immediately installed. Such retrofits require a large pool of specialized labor resources, in particular, boilermakers, the availability of which will be a major limiting factor in the amount and timing of reductions*
>
> *Also, EPA recognized that the regulated industry will need to secure large amounts of capital to meet the control requirements while managing an already large debt load, and is facing other large capital requirements to improve the transmission system. Furthermore, allowing pollution control retrofits to be installed over time enables the industry to take advantage of planned outages at power plants (unplanned outages can lead to lost revenue) and to enable project management to learn from early installations how to deal with some of the engineering challenges that will exist, especially for the smaller units that often present space limitations*
>
> *Based on these and other considerations, EPA determined in the NPR that the earliest reasonable deadline for compliance with the final highly cost-effective control levels for reducing emissions was 2015 (taking into consideration the existing bank of title IV SO2 allowances). First, the Agency confirmed that the levels of SO2 and NOX emissions it believed were reasonable to set as annual emissions caps for 2015 lead to highly cost-effective controls for the CAIR region.*
>
> *Once EPA determined the 2015 emissions reductions levels, the Agency determined a proposed first (interim) phase control level that would commence January 1, 2010, the earliest the Agency believed initial pollution controls could be fully operational (in today's final action, the first NOX control phase commences in 2009 instead of in 2010, as explained in detail in section IV.C). The first phase would be the initial step on the slope of emissions reductions (the glide-path) leading to the final (second) control phase to commence in 2015. The EPA determined the first phase*

based on the feasibility of installing the necessary emission control retrofits, as described in section IV.C.

Although EPA's primary cost-effectiveness determination is for the 2015 emissions reductions levels, the Agency also evaluated the cost effectiveness of the first phase control levels to ensure that they were also highly cost effective. Throughout this preamble section, EPA reports both the 2015 and 2010 (and 2009 for NOX) cost-effectiveness results, although the first phase levels were determined based on feasibility rather than cost effectiveness. The 2015 emissions reductions include the 2010 (and 2009 for NOX) emissions reductions as a subset of the more stringent requirements that EPA is imposing in the second phase.

Conclusion

It is Mississippi's determination that Mississippi Power, Plant Watson being subject to CAIR and participating in the CAIR trading program meets the reasonable progress requirements of the Regional Haze Rule.

DuPont DeLisle Facility

DuPont DeLisle Facility is a Titanium Dioxide pigment plant located in DeLisle, Mississippi. The facility has two 209 MM BTU/hr coal fired process boilers that are of concern. The four factors listed in the Regional Haze Rule (40 CFR 51.308(d)(1)(i)(A)) will be applied to potential SO2 controls for these units. Dupont has submitted a document (see appendix N) that addresses the potential controls and cost. Potential controls for SO2 reduction would include switching to a lower sulfur fuel, and post combustion scrubbers. The facility is currently permitted to burn 3% sulfur coal but uses 2.5% sulfur coal. Dupont evaluated switching to 1.05%, 1.5% and 2.0% sulfur coal and using spray dry absorbers and sodium wet scrubbers in conjunction with lower sulfur fuel.

Cost of Controls

Compared to the current coal used, the SO_2 reduction would be 998 TPY with an incremental cost effectiveness vs Baseline of $738/ton SO_2 removed for the 2.0% coal; and the SO_2 reduction would be 1996 TPY with an incremental cost effectiveness vs Baseline of $527/ton SO_2 removed for the 1.5% coal. The 1.05% sulfur coal would not be an option due to adverse impacts on the facilities recently upgraded electrostatic precipitators. In addition, significant testing and evaluation would need to be conducted to determine if any of the lower sulfur coal could be utilized and the boilers be able to meet the Subpart DDDDD Boiler MACT standards.

The additional SO2 reduction of using a scrubber in conjunction with a lower sulfur fuel compared to using the lower sulfur coal (1.5%) ranged from 2700 to 2900 TPY with a cost of $3000 to $4000/ton.

Time Necessary for Compliance

Options utilizing lower sulfur coal would require time for finding and evaluating alternative coal supplies that not only provide lower sulfur levels, but also that can provide required combustion performance and compliance with the Subpart DDDDD Boiler MACT regulations. In addition, as noted above, the effects of lower sulfur coal use on the performance of the hot side ESP and resultant emissions and opacity impact need to be assessed. The evaluation of the coal type and sources necessary to meet the lower sulfur standards and securing necessary contracts will take several years. It is likely that conversion to alternative coal would not be possible prior to 2013.

Options utilizing scrubbing would require extended time for compliance due to the need for detailed design and project implementation as well as capital planning. The high level of emissions control system installations in the future planning period in response to CAIR and BART will put a significant strain on resource availability and costs. Therefore, if scrubbing was required, it is likely that compliance would not be attainable until the 2013 time frame.

Energy and Non-Air Environmental Impacts

Use of lower sulfur alone coal would not entail any significant changes to energy use or non-air quality environmental impacts.

Use of a spray dry scrubber would require use of lime as the reagent. Solid waste disposal would increase over the current coal ash-only condition by the quantity of calcium sulfate formed in the scrubber. This can be estimated based on removal percent and expected calcium/sulfur stoichiometric ratio. Costs for that disposal are included within the estimated O&M cost estimates. As indicated above, the additional waste would be dry, so it would likely be disposed of in a landfill. Additional purchased electricity would be required for operation of the scrubber and baghouse, including, for example, lime transport, slurry preparation and injection, baghouse pulse air, ash and spent sorbent handling, and increased fan power to compensate for increased flue gas pressure drop. Water would also be consumed for slurry preparation.

Use of a sodium wet scrubber would require use of caustic as the reagent. Liquid waste disposal would increase for disposal of the scrubber blowdown stream. The existing plant waste water treatment facility does not have adequate capacity for that waste stream directly, but some form of neutralization and oxidation would be required prior to transfer to the waste treatment system. Costs for that disposal are included within the estimated O&M cost estimates. Additional purchased electricity would be required for operation of the scrubber, including, for example, liquid pumping power and increased fan power to compensate for increased flue gas pressure drop. Water would also be consumed for the scrubber solution.

The use of scrubbers would also result in increased energy use. Increased purchased electricity would result in increased emissions of SO_2, NO_x, CO_2, and other emissions from the electric utility generators providing that power, which could in fact, be units that themselves impact Breton with their SO_2 and NO_x emissions.

Remaining Useful Life

There is no indication that these units are near the end of their useful life.

Conclusion

Given the potential impact that the DuPont DeLisle plant has on Breton, Mississippi has determined that SO2 reductions are in order to help meet the Reasonable Progress Goals for Breton. DuPont is currently working with Mississippi to determine the level of reduction that is reasonable during this planning period. Mississippi will make the final determinations, issue a permit and submit a supplemental SIP within one year of the initial Regional Haze SIP submittal to EPA.

7.7 What Additional Emissions Controls Were Considered as part of the Long-Term Strategy for Visibility Improvement by 2018?

Class 1 areas are sensitive visibility receptors and Section 308(d)(3)(v) of the regional haze rule lists several factors that could impact visibility to be addressed in each SIP. These factors include the role of fire at Class I areas and status of state planning for smoke management, the role of dust and fine soil at Class I areas and status of state plans to mitigate emissions from construction activities and the role of NH_3 and potential benefits if emissions from agricultural sources were mitigated.

Since there are no Class I areas in Mississippi and the Class I area that is closest and of greatest concern, Breton, is over 45 km offshore, these factors will have little impact. As can be seen in *Figures 7.4-1 through 7.4-3,* elemental carbon (sources include agriculture, prescribed wildland fires, and wildfires) is a relatively minor contributor to visibility impairment at the Class I areas surrounding Mississippi. Mississippi has drafted but not finalized a Smoke Management Plan. Under current smoke management practices, the Mississippi Forestry Commission, in conjunction with the Mississippi Department of Environmental Quality, issues burning permits based on daily weather forecasts. A permit is required for any fire set for a recognized agricultural or forestry purpose.

Mississippi has no particular provisions to mitigate dust emissions from construction activities. However, there are nuisance provisions in state regulations that would apply if construction or other activities were generating significant emissions. Given the distance of the closest Class 1 area to Mississippi, this would provide adequate control from these activities.

7.8 Long Term Strategy Summary

For this first planning period, the emissions controls from existing federal standards, such as CAIR and the Heavy Duty Diesel Rule, will be significant and result in significant reductions of visibility impairing pollutants from sources in Mississippi. There are two facilities in Mississippi that were identified by BART or the reasonable progress analysis that appear to need additional controls. Evaluations are still underway for these facilities. The appropriate determinations will be made for these sources over the next year and a supplemental SIP will be submitted within a year of the initial SIP submittal.

In the future, the impacts of new sources will need to be addressed. This will be done as part of the permitting process. The appropriate FLM for class 1 areas within 300km of a source requiring new source review will be contacted and coordinated with to address visibility impacts on the Class 1 area.

8.0 REASONABLE PROGRESS GOALS

Since there are no Class 1 areas in Mississippi, there are no reasonable progress goals for Mississippi to set. The goals for the Class 1 areas in neighboring states will be set by those states. Mississippi has worked collaboratively with all of the VISTAS states by meetings, conference calls and sharing Regional Haze SIP Pre-hearing Drafts. Because the state of Mississippi has no Class I areas in Mississippi, MDEQ worked with neighboring states on emissions contributions to Class I areas in neighboring states. Mississippi is in agreement with the Reasonable Progress Goals for the Class I areas in the neighboring states.

9.0 MONITORING STRATEGY

The State Implementation Plan is to be accompanied by a strategy for monitoring regional haze visibility impairment. Specifically, the Regional Haze Rule states at 40 CFR 51.308(d)(4):

"(4) *Monitoring strategy and other implementation plan requirements.* The State must submit with the implementation plan a monitoring strategy for measuring, characterizing, and reporting of regional haze visibility impairment that is representative of all mandatory Class I Federal areas within the State. There are no Class 1 areas in Mississippi; therefore, no monitoring strategy is necessary.

10.0 INTERSTATE CONSULTATION

The VISTAS states have jointly developed the technical analyses to define the visibility improvement by 2018 under existing federal and state regulations compared to the uniform rate of progress, SO_2 Areas of Influence for each Class I area, and methods to prioritize contributions from individual sources within the Areas of Influence. The states collectively accept the conclusions of these analyses.

In December 2006 the VISTAS State Air Directors held their first formal consultation meeting to review the Base G modeling results and the SO_2 Areas of Influence analyses. The Air Directors agreed to look at reasonable control measures for sources on the lists for the SO_2 Areas of Influence. Each state would consider sources within their state and would identify sources in neighboring states that each state would like to have that neighboring state consider. States acknowledged that the review process would differ among states since some Class I areas are projected to see visibility improvements near the uniform rate of progress while most Class I areas are projected to have greater improvements than uniform rate of progress.

In January 2007, the States of Alabama, Florida, Louisiana, and Mississippi had a meeting to discuss the Breton Class 1 area. Since Louisiana is not part of VISTAS, this was the first meeting between all of the States surrounding Breton. The purpose was to better understand the conditions at Breton. There were no formal decisions made at the meeting.

In May 2007 the VISTAS State Air Directors met for their second formal interstate consultation. States shared their lists of sources in their state and neighboring states for each Class I area. The State Air Directors also shared their criteria for listing sources and their plans for further interstate consultation.

In June 2007, there was a VISTAS meeting between the VISTAS states, USEPA, and the Federal Land Managers to discuss the expectations the various states, USEPA, and the FLMs with regard to the Class 1 areas and the Implementation Plans. Louisiana also attended this meeting.

In October 2007, there was a consultation conference call that was called by Louisiana to Discuss Breton. The surrounding states, USEPA, and FLMs were on the call.

The MDEQ has evaluated the impact of Mississippi sources on Class I areas in neighboring states and determined that there are no additional reasonable control measures that should be implemented to mitigate impacts in Class I areas in neighboring states. The MDEQ has consulted with the responsible states regarding its evaluation showing no cost-effective controls available for those units contributing at least one (1) percent to visibility impairment at Class I areas. Consultation documents may be found in Appendix J.

11.0 COMPREHENSIVE PERIODIC IMPLEMENTATION PLAN REVISIONS

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

In addition, Section 51.308(g) requires periodic reports evaluating progress towards the reasonable progress goals established for each mandatory Class I area. In accordance with the requirements listed in Section 51.308(g) of the federal rule for regional haze, the MDEQ commits to submitting a report on reasonable progress to USEPA 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 I area located outside Mississippi which may be affected by emissions from within Mississippi**.**

The requirements listed in 51.308(g) include the following:

1. Description of the status of implementation;
2. Summary of emission reductions achieved thus far, including especially the status of implementation of the CAIR compliance plans for EGUs compared to the control assumed in the modeling. [The MDEQ recognizes that the 2018 projections of EGU controls from the IPM runs represent one solution to how the CAIR requirements will be met. By the time of the first periodic report, the MDEQ anticipates that the actual compliance strategy for the various utility companies will be much more defined. An assessment of those actual compliance plans will be done for the first periodic report.]
3. Assessment of changes in visibility conditions at each class I area (current vs. baseline), expressed as 5-year averages of annual values for twenty (20) percent best and worst days;
4. Analysis of emission changes over the 5-year period, identified by source or activity;
5. Analysis of any siginificant changes in or out of the State which have impeded progress;
6. Assessment of the sufficiency of the implementation plan to meet RPGs;
7. Review and any modifications to our visibility monitoring plan.

All requirements listed in 51.308(g) shall be addressed in the progress report.

Since there are no Class 1 areas in Mississippi, also commits to ongoing consultation with the FLMs throughout the implementation process, including annual discussion of the implementation process and the most recent IMPROVE monitoring data and VIEWS data.

There are several technical improvements that are recommended in the emissions inventory and air quality models that are used to support regulatory decisions for regional haze. These improvements recommended, as funding is available, to support the next long term strategy. The following is an overall summary; Appendix K contains a fuller discussion of possible technical improvements.

First and foremost, continued improvements are needed in the integrated one-atmosphere air quality models that are used to project air quality responses to emissions reductions. As our understanding of partitioning between gaseous and aerosol phases improves, this understanding needs to be reflected in the models. Improvements can also be made in how the models handle individual pollutants. Sulfate performance for the CMAQ regional air quality model is good overall. However sulfate deposition is frequently overestimated in the models, particularly in the summer months. At the coastal sites, when winds are blowing from the Gulf of Mexico or Atlantic Ocean, CMAQ underestimates measured sulfate at the monitors. CMAQ's processes also should be reviewed for sulfate formation over water. Nitrate is overestimated by the model in the winter and underestimated in the summer, although summer monitored values of nitrate are very low. Additional improvements in seasonal allocation of ammonia emissions would improve model estimates of ammonium nitrate formation. Organic carbon is generally underestimated in the summer months. Improvements are needed in the characterization of both primary carbon emissions and formation of secondary organic carbon.

Other improvements needed include better tools for organic carbon source apportionment, and more consistent measurement techniques between rural and urban monitoring networks. To improve our understanding of the contribution of fire from natural forest fires, prescribed burning, land clearing, and agricultural burning, states need improved record keeping. Additional improvements to international emissions inventory are also needed, to improve our understanding of boundary conditions for our modeling domain and of the contributions from international emissions to pollutant concentrations at the VISTAS Class I areas.

12.0 DETERMINATION OF ADEQUACY OF THE EXISTING PLAN

Depending on the findings of the five-year progress report, Mississippi commits to taking one of the actions listed in 40 CFR section 51.308(h). The findings of the five-year progress report will determine which action is appropriate and necessary. There are four options listed in the rule, but since there are no Class 1 areas in Mississippi, only the two listed below potentially apply.

List of Possible Actions from 40 CFR section 51.308(h)

1) MDEQ determines that the existing SIP requires no further substantive revision in order to achieve established goals MDEQ provides to the Administrator a negative declaration that further revision of the SIP is not needed at this time.

2) MDEQ determines that the existing SIP is inadequate to ensure reasonable progress due to emissions within the state. MDEQ will revise its SIP to address the plan's deficiencies within one year.

Since there are no Class 1 areas in Mississippi, the determination of adequacy will have to be done in consultation with the States that the Class 1 areas are in and the FLMs.