STATE OF NEW MEXICO
BEFORE THE ENVIRONMENTAL IMPROVEMENT BOARD

IN THE MATTER OF PROPOSED REVISIONS
TO THE STATE IMPLEMENTATION PLAN
FOR THE NEW MEXICO REGIONAL HAZE
PLAN: PROGRESS REPORT

No. EIB 13-08(R)

PETITION FOR REGULATORY CHANGE

The New Mexico Environment Department ("Department"), pursuant to 20.1.1 NMAC - Rulemaking Procedures, petitions the Environmental Improvement Board ("Board") to approve a revision to the New Mexico State Implementation Plan ("SIP") for regional haze, to incorporate a five-year progress report for the period ending in 2013. The Board is authorized to adopt the proposed revisions by the Air Quality Control Act, NMSA 1978, §§ 74-2-2 et seq., and specifically by NMSA 1978 § 74-2-5.C (1). A statement of the reasons for adoption of the revision follows, and the proposed SIP revision (i.e., the progress report) is included as Attachment 1.

The Department requests that the Board schedule the hearing for during its regular meeting in December, 2013. The Department anticipates that the time necessary to conduct the hearing will be approximately one hour.

Respectfully submitted,

NEW MEXICO ENVIRONMENT DEPARTMENT
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IN THE MATTER OF PROPOSED REVISIONS TO THE STATE IMPLEMENTATION PLAN FOR THE NEW MEXICO REGIONAL HAZE PLAN: PROGRESS REPORT

No. EIB 13-08(R)

STATEMENT OF REASONS

The New Mexico Environment Department proposes revisions to New Mexico's Regional Haze State Implementation Plan (SIP) to adopt a 2013 Progress Report. 40 CFR § 51.309 requires states to develop regional haze progress report SIPs in 2013 and 2018 to evaluate the state's progress towards the reasonable progress goal for each Class I area located within the state and in each Class I area located outside the state which may be affected by emissions from within the state.

The United States Environmental Protection Agency's (EPA's) 1999 Regional Haze rule was designed to address visibility impairment in Class I areas, which include many of the nation's largest National Parks and Wilderness Areas. The rule mandates that each Class I area make progress towards natural conditions, (that is, conditions without any visibility impairment from man-made pollution), by the year 2064. Each state is required to periodically assess that progress at each Class I area in the state, and at each Class I areas affected by transport from that state.

On December 31, 2003 and June 29, 2011, the State of New Mexico submitted regional haze SIPs to meet the requirements of 40 CFR § 51.309 (the "Section 309 SIP") and 51.309(g) (the "Section 309(g) SIP"). The Section 309 SIP addresses the first phase of regional haze requirements, with an emphasis on stationary source sulfur dioxide (SO_2) emission reductions and a focus on improving visibility on the Colorado Plateau. The Section 309(g) SIP addresses the visibility requirements and improvements in New Mexico's remaining eight Class I areas.

Provisions of the Regional Haze rule at 40 CFR § 51.309(d)(10) require that the progress report must be in the form of a SIP revision and must include a determination regarding the adequacy of the existing regional haze SIP. This report has been prepared to fulfill all applicable requirements pertaining to the 2013 progress report for the Section 309 and 309(g) SIPs. The report concludes that the current Section 309 and 309(g) regional haze SIPs are sufficient to address the reasonable progress goals of the state's nine Class I areas. Based on the progress made over the five year period reviewed, no revisions to the New Mexico Regional Haze SIPs are needed at this time.

Proposed New Mexico Regional Haze Progress Report

1.0 INTRODUCTION

Regional haze (RH) is pollution that impairs visibility over a large region, including national parks, forests, and wilderness 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 New Mexico, the most important sources of haze-forming emissions are coal-fired power plants, oil and gas development, wildland fires, and windblown dust.

Visibility impairment is tracked using a Haze Index (HI) in units of deciviews (dv), which is related to the cumulative sum of visibility impairment from individual aerosol species as measured by monitors in the Interagency Monitoring of Protective Visual Environments (IMPROVE) network. Emissions which affect regional haze include a wide variety of natural (e.g., wildland fires) and anthropogenic, or man-made, sources (e.g., industry sources and vehicles).

In Section 169A of the 1977 Amendments to the Clean Air Act (CAA), Congress established a program for protecting visibility in 156 mandatory Federal "Class I" areas. Class I areas consist of national parks exceeding 6000 acres, wilderness areas and national memorial parks exceeding 5000 acres, and all international parks that were in existence on August 7, 1977. In the 1990 Amendments to the CAA, Congress added Section 169B and called on the U.S. Environmental Protection Agency (EPA) to issue rules addressing regional haze impairment from manmade air pollution and establishing a comprehensive visibility protection program for Class I areas.

The EPA promulgated the Regional Haze (RH) rule on July 1, 1999 (64 FR 35713). States are required under 40 CFR § 51.308 to submit state implementation plans (SIPs) to the EPA that set out each states' plan for complying with the RH rule. States must demonstrate reasonable progress toward meeting the national goal of a return to natural visibility conditions by 2064. The rule directs states 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 and certain ones outside the State.

Under 40 CFR § 51.309, the rule also provides an optional approach to nine western states to incorporate emission reduction strategies developed by the Grand Canyon Visibility Transport Commission (GCVTC), that were designed primarily to improve visibility in 16 Class I areas on the Colorado Plateau, including San Pedro Parks Wilderness Area in New Mexico.

On December 31, 2003, the State of New Mexico submitted a visibility SIP to meet the requirements of 40 CFR § 51.309 (309 SIP). The 2003 Section 309 SIP and subsequent revisions to the Section 309 SIP address the first phase of requirements, with an emphasis on stationary source sulfur dioxide (SO_2) emission reductions and a focus on improving visibility on the

Colorado Plateau. In the 2003 submittal, New Mexico committed to addressing the next phase of visibility requirements and additional visibility improvement in New Mexico's remaining eight Class I areas by means of a SIP meeting the requirements in 40 CFR § 51.309(g).

On June 29, 2011, a supplement to New Mexico's Section 309 SIP was submitted to EPA to satisfy the requirements of Section 309(g). Pursuant to 40 CFR § 51.309(g), the State of New Mexico SIP included a demonstration of expected visibility conditions for the most impaired (20% worst) and least impaired (20% best) days at the additional mandatory Class I areas; provisions for establishing reasonable progress goals for New Mexico's eight (8) Class I areas complying with 51.308(d)(1)-(4); long-term strategies that build upon emission reduction strategies developed in the first Section 309 SIP submittal; and provisions to address long-term strategies and Best Available Retrofit Technology (BART) requirements for stationary source Particulate Matter (PM) and Nitrogen Oxide (NOx) emissions pursuant to 40 CFR § 51.308(e).

On November 27, 2012, EPA published final approval of New Mexico's 2003 and 2011 SIP submittals with the exception of the BART determination for nitrogen oxides for San Juan Generating Station. (77 Fed. Reg. 70,693) EPA had previously issued a federal implementation plan (FIP) containing a different NOx BART determination for San Juan. 76 Fed. Reg. 52,388 (Aug. 22, 2011).

In an attempt to resolve litigation arising from New Mexico's and EPA's incompatible San Juan NOx BART determinations, New Mexico, the EPA, and PNM reached a tentative agreement on an alternative plan to address pollution control requirements for the San Juan Generating Station under the Clean Air Act's requirements for regional haze and interstate transport for visibility. The agreement calls for a new BART determination based on the retirement of two of the four units at the facility; the installation of selective non-catalytic reduction technology at the remaining two units; and further reductions in sulfur dioxide emissions. The New Mexico Environment Department has scheduled a hearing before the New Mexico Environmental Improvement Board (Board) on September 5, 2013 requesting adoption of the terms of the tentative agreement. If adopted by the Board and subsequently approved by EPA, the agreement will satisfy all of New Mexico's obligations with respect to regional haze BART.

1.1 State Implementation Plan Requirements for the 5-Year Progress Report

Provisions of the RH rule contained in 40 CFR § 51.308(g) and (h) and 40 CFR § 51.309(d)(10) require that each state submit a progress report five years after the submittal of their initial RH SIP. The progress report must be in the form of a SIP revision and must include a determination regarding the adequacy of the existing regional haze SIP. This report has been prepared to fulfill all applicable requirements pertaining to the five year progress report of the initial regional haze SIP. The State of New Mexico concludes the current Section 309 and 309(g) RH SIPs are sufficient to address the reasonable progress goals of the state's nine (9) Class I areas. Based on the progress made over the five year period reviewed, no revisions to the New Mexico Regional Haze SIP are needed at this time.

The progress report SIP must include 1) the status of implementation of control measures included in the original regional haze SIP, 2) a summary of emission reductions achieved through the implementation of control measures, 3) an assessment of visibility conditions, 4) an analysis of the changes in emission pollutants, 5) an assessment of significant changes in emissions that may have limited or impeded progress in improving visibility, 6) an assessment of whether the current SIP elements and strategies are sufficient to meet reasonable progress goals and 7) a review of the state's visibility monitoring strategy.

The technical data included in this progress report is from the *"Western Regional Air Partnership Regional Haze Rule Reasonable Progress Summary Report"* (Appendix A) developed by the Western Regional Air Partnership (WRAP) [1] in June of 2013 and the WRAP Technical Support System (TSS). The WRAP progress report technical support document has been prepared on behalf of the 15 western state members in the WRAP region to provide the technical basis for use by States to develop the first of their individual reasonable progress reports for the 116 Federal Class I areas located in the western states. Data are presented in this report on a regional, state, and Class I area specific basis that characterize the difference between 2000-2004 baseline conditions and current conditions, represented here by the most recent successive 5-year average, that is, the 2005-2009 period. Changes in visibility impairment are characterized using aerosol measurements from the IMPROVE network, and the differences between emissions inventory years represent both the baseline and current progress period.

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 (FLMs) 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 Federal Class I area within the State. The State of New Mexico reconfirms its committal to participate in a Regional Planning Process with Alaska, Arizona, California, Colorado, Idaho, Montana, North Dakota, Oregon, South Dakota, Utah, Washington, Wyoming, the United States Department of Interior (USDI) Fish and Wildlife Service (FWS) and National Park Service (NPS), and the United States Department of Agriculture (USDA) Forest Service (FS).

Pursuant to the Tribal Authority Rule, any Tribe whose lands are within the boundaries of the State of New Mexico has the option to develop a RH Tribal Implementation Plan (TIP) for their lands to assure reasonable progress in the nine (9) Class I areas in New Mexico. Accordingly, no provisions of this periodic report shall be construed as being applicable to Indian Country.

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[1] The WRAP is a collaborative effort of tribal governments, state governments and various federal agencies representing the western states that provides technical and policy tools for the western states and tribes to comply with the EPA's RHR regulations. Detailed information regarding WRAP support of air quality management issues for western states is provided on the WRAP website (www.wrapair2.org) and data summary descriptions and tools specific to RHR support are available on the WRAP Technical Support System website (http://vista.cira.colostate.edu/tss/).

2.0 NEW MEXICO CLASS I AREAS

New Mexico has nine (9) Class I areas within its borders: Bandelier Wilderness, Bosque del Apache National Wildlife Refuge, Carlsbad Caverns National Park, Gila Wilderness, Pecos Wilderness, Salt Creek Wilderness, Wheeler Peak Wilderness, White Mountain Wilderness, and San Pedro Parks Wilderness (Figure 2.1). San Pedro Parks Wilderness is the only Class I area in New Mexico that is located on the Colorado Plateau. The Section 309 SIP submitted by the State of New Mexico in December of 2003 addresses only San Pedro Parks Wilderness Area. All of the other Class I areas are addressed under the Section 309(g) SIP submitted by the State of New Mexico in June of 2011.

The Air Quality Bureau (AQB) in the New Mexico Environment Department is responsible for developing the RH progress report. This progress report compares the current visibility conditions at each of these Class I areas to the 2018 reasonable progress goals to determine if New Mexico is on track with reaching these goals. The progress report also reviews the long-term strategy to determine if there have been any changes that need to be addressed.

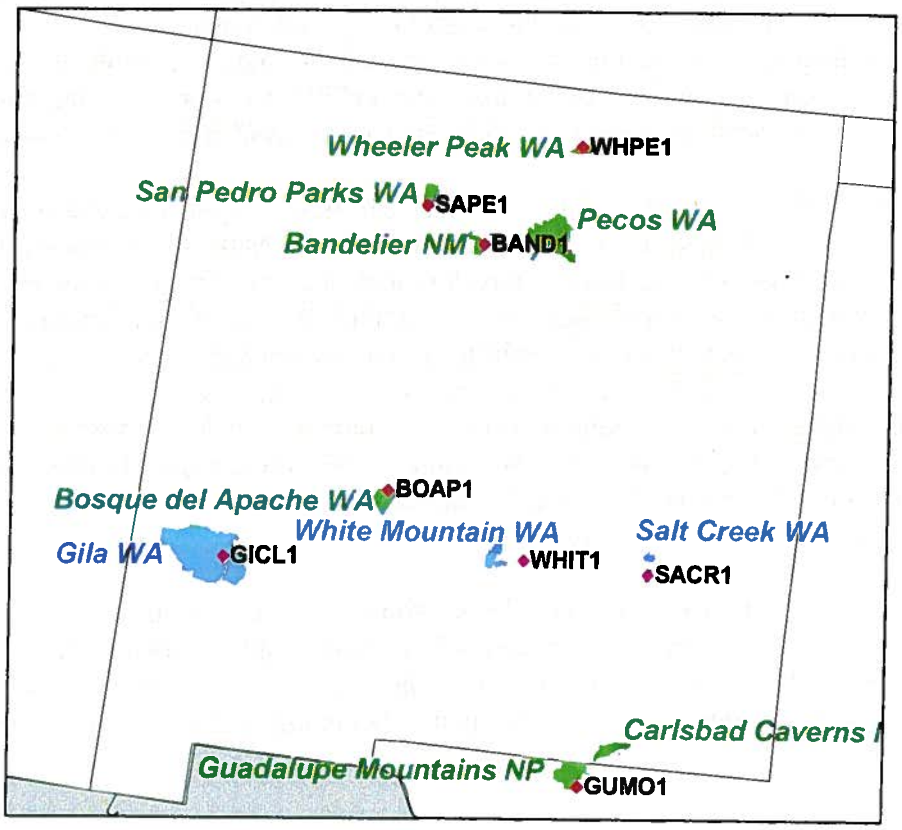

Figure 2.1. Map Depicting Federal Class I Areas and Representative IMPROVE Monitors in New Mexico

In developing the initial RH SIP, AQB also considered that emission sources outside of New Mexico may affect the visibility at New Mexico's Class I areas, and that emission sources within New Mexico may affect the visibility at Class I areas in neighboring states. Through WRAP, the western states worked together to assess state-by-state contributions to visibility impairment in specific Class I areas, including those in New Mexico and those affected by emissions from New Mexico. The sources identified in the initial RH SIP either impacting New Mexico's Class I areas or Class I areas outside New Mexico will be reviewed as part of this progress report.

2.1 Progress Towards Reasonable Progress Goals (40 CFR § 51.309(d)(10)(i))

Based on IMPROVE monitoring data, all of New Mexico's Class I areas show visibility improvement on the 20% worst and best days. All but two of the Class I areas, San Pedro Parks and Salt Creek wilderness areas, have surpassed the 2018 Reasonable Progress Goal established in the state's initial Section 309 and 309(g) RH SIPs for the 20% worst days.

The baseline and current visibility conditions as well as the reasonable progress goals for 2018 for the 20% worst and 20% best days are displayed in the table below.

Table 2.1
New Mexico Class I Area IMPROVE Sites
Visibility Conditions
20% Most and Least Impaired Days

Class I Area	Baseline (2000-2004) (dv)	Current (2005-2009) (dv)	2018 Reasonable Progress Goal (dv)
20% Worst Days			
Bandelier National Monument (BAND1)	12.2	11.8	11.9
Bosque del Apache Wilderness Area (BOAP1)	13.8	13.4	13.59
Gila Wilderness Area (GILA1)	13.1	12.5	12.99
Carlsbad Caverns National Monument (GUMO1)	17.2	15.9	16.93
Salt Creek Wilderness Area (SACR1)	18.0	17.5	17.33
San Pedro Parks Wilderness Area (SAPE1)	10.2	9.9	9.8
Wheeler Park Wilderness Area (WHPE1)	10.4	9.1	10.23
White Mountain Wilderness Area (WHIT1)	13.7	13.2	13.27
20% Best Days			
Bandelier National Monument (BAND1)	5	4.2	4.89
Bosque del Apache Wilderness Area (BOAP1)	6.3	5.8	6.1
Gila Wilderness Area (GILA1)	3.3	2.7	3.2
Carlsbad Caverns National Monument (GUMO1)	5.9	5.4	6.14
Salt Creek Wilderness Area (SACR1)	7.8	7.3	7.43
San Pedro Parks Wilderness Area (SAPE1)	1.5	1.0	1.2
Wheeler Park Wilderness Area (WHPE1)	1.2	0.9	1.13
White Mountain Wilderness Area (WHIT1)	3.6	3.3	3.42

3.0 REGIONAL HAZE PROGRESS REPORT

The requirements for the progress report are outlined in 40 CFR § 51.308(g) and 51.309(d)(10)(i). For those states that have Section 309 RH SIPs, the state must submit a report to the EPA in 2013 and 2018 evaluating progress towards the reasonable progress goal for each Class I area located within the state and in each Class I area located outside the state which may be affected by emissions from within the state. The progress report for Section 309 RH SIPs must be in the form of a formal SIP submittal and at a minimum, must contain the following elements:

3.1 40 CFR § 51.309(d)(10)(i) Progress Report Requirements

(1) A description of the status of implementation of all measures included in the SIP for achieving reasonable progress goals for Class I areas both within and outside the state. Including the status of mobile source emissions (40 CFR § 51.309(d)(5)(ii)) and progress towards renewable energy goals (40 CFR § 51.309(d)(8)(vi)).

(2) A summary of the emission reductions achieved throughout the state through implementation of the measures described in (1) above.

(3) Assess the following visibility conditions and changes, with values for most impaired and least impaired days expressed in terms of 5-year averages of these annual values

(i) The current visibility conditions for the most impaired and least impaired days;

(ii) The difference between current visibility conditions for the most impaired and least impaired days and baseline visibility conditions; and

(iii) The change in visibility impairment for the most impaired and least impaired days over the past 5 years.

(4) An analysis tracking the change over the past 5 years in emissions of pollutants contributing to visibility impairment from all sources and activities with the state.

(5) An assessment of any significant changes in anthropogenic emissions within or outside the state that have occurred over the past 5 years that have limited or impeded progress in reducing pollutant emissions and improving visibility.

(6) An assessment of whether the current SIP elements and strategies are sufficient to enable the state, or other states with Class I areas affected by emissions from the state, to meet all established reasonable progress goals.

(7) A review of the state's visibility monitoring strategy and any modifications to the strategy as necessary.

In the sections to follow, the NMED will address the various periodic review requirements as outlined above.

3.2 Status of Implementation Control Measures: 40 CFR § 51.309(d)(10)(i)(A)

40 CFR § 51.308(g)(1) requires *"a description of the status of implementation of all measures included in the implementation plan for achieving reasonable progress goals for Class I areas both within and outside the State."*

This section provides a description of the emission reduction measures that were included in the State of New Mexico's Section 309 and 309(g) RH SIPs. A summary is provided below of those emission sources and the status of controls that were identified to impact Class I areas in New Mexico.

As determined in the initial RH SIPs, ammonium sulfate, particulate organic matter, and coarse mass are the largest contributors to visibility impairment at New Mexico's Class I areas. Many of the contributing sources to visibility impairment in New Mexico are natural, rather than anthropogenic, in nature, and are not controllable. The primary sources of ammonium sulfate are point sources and on- and off-road mobile source emissions. For particulate organic matter, the primary sources of emissions are from natural and anthropogenic fire. The primary sources of coarse mass emissions in New Mexico are windblown and fugitive dust. For this report, AQB will focus only on those emission sources that are anthropogenic in nature.

New Mexico is currently implementing the long-term strategies adopted into the state's Section 309 and 309(g) RH SIPs. Since adoption of New Mexico's Section 309(g) SIP in June of 2011, the only long-term strategy that is no-longer being implemented is the State Mobile Source Regulation (20.2.88 NMAC - Emission Standards for New Motor Vehicles). This regulation was first adopted in 2007 to apply the California motor vehicle emissions standards, or "California standards," within New Mexico beginning with model year 2011. The start date was later revised to 2016. When the Clean Cars regulation was adopted, the California standards were more stringent than the federal motor vehicle emissions standards. However, since that time the federal programs have been revised to achieve the same emissions reduction as the California standards. As a result, the administrative burdens of implementing the Clean Cars regulation now outweigh the potential benefits of having a State program.

New Mexico has been and will continue to be committed to implementing the long-term strategies adopted into the state's Section 309 and 309(g) RH SIPs. As shown in Table 2.1, New Mexico is on track, if not exceeding, the visibility impairment emission reductions needed to achieve the state's reasonable progress goals for 2018.

Enforceability of New Mexico's Measures

40 CFR § 51.309(d)(9) of the RH rule requires states to ensure that emission limitations and control measures used to meet reasonable progress goals are enforceable.

New Mexico has ensured that all existing emission limitations and control measures for which the State of New Mexico is responsible, used to meet reasonable progress goals, are enforceable either through New Mexico Administrative Code (NMAC), or SIP measures previously approved by EPA. Enforceability of future emission limitations and control measures, for which the State of New Mexico is responsible, will be enforceable through permit conditions (BART) or SIP measures to be approved in the future by EPA.

3.3 Summary of Emission Reduction Achieved 40 CFR § 51.309(d)(10)(i)(B)

40 CFR § 51.309(d)(10)(i)(B) requires *"a summary of the emissions reductions achieved throughout the state through implementation of the measures in paragraph (g)(1)."*

This section provides a summary of emissions reduced as a result of implementation measures discussed in Section 3.2. Since the submittal of New Mexico's Section 309(g) RH SIP revision in June of 2011, the most significant decrease in emissions has been from SO_2 in accordance with the state's SO_2 Milestone and Backstop Trading Program. Although New Mexico has not inventoried emissions reduction for other visibility impairment pollutants, the state has seen an overall improvement in visibility at all of New Mexico's Class I areas for both the 20% worst and best visibility days between 2000 and 2009 (See Figures 3.1 and 3.2).

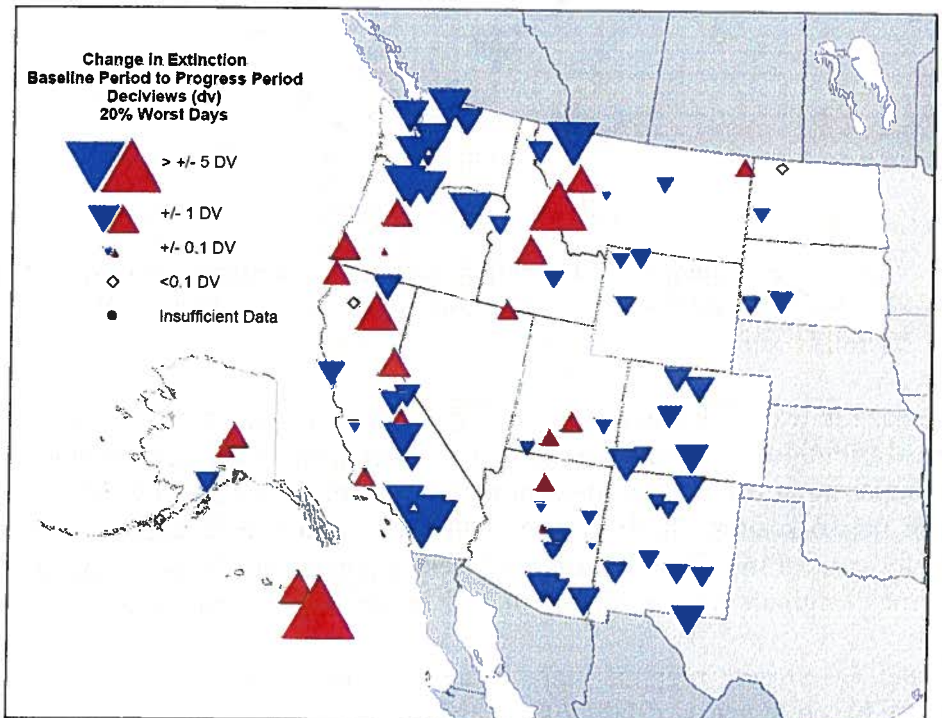

Figure 3.1. Change in Deciview Extinction between Baseline Period Average (2000-2004) and the First Progress Period Average (2005-2009) for the 20% Worst Visibility Days.

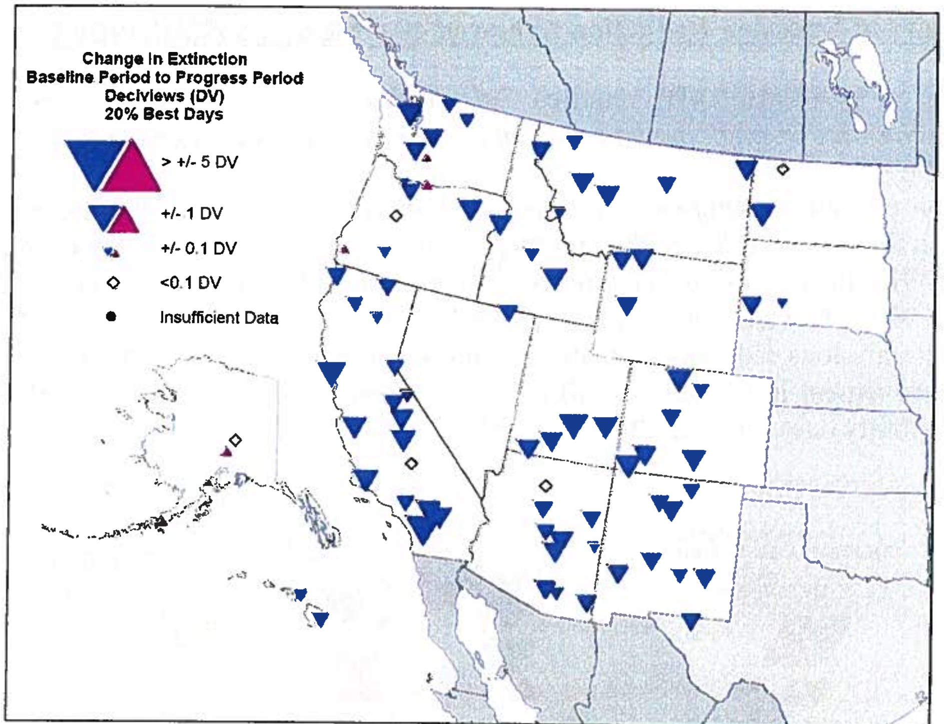

Figure 3.2. Change in Deciview Extinction between Baseline Period Average (2000-2004) and the First Progress Period Average (2005-2009) for the 20% Best Visibility Days.

The RH rule haze index, as defined using deciview units, does not provide information regarding the relative contributions of specific pollutants to overall visibility impairment. The calculation of visibility impairment is based on the cumulative impacts of several different species measured at IMPROVE network sites. Analyzing the behavior of each individual species has important implications for control measures, as some species originate from largely anthropogenic sources, while others may originate from a mixture of both anthropogenic and natural sources.

Figures 3.3 and 3.4 present regional maps of average aerosol extinction for the most impaired days during the baseline period (2000-2004), and the first progress period average (2005-2009), respectively, for the IMPROVE monitors representing Federal Class I areas in the WRAP region. The size of the pie chart is related to the magnitude of visibility impairment, and colors represent the relative contribution of the pollutants measured by the IMPROVE network.

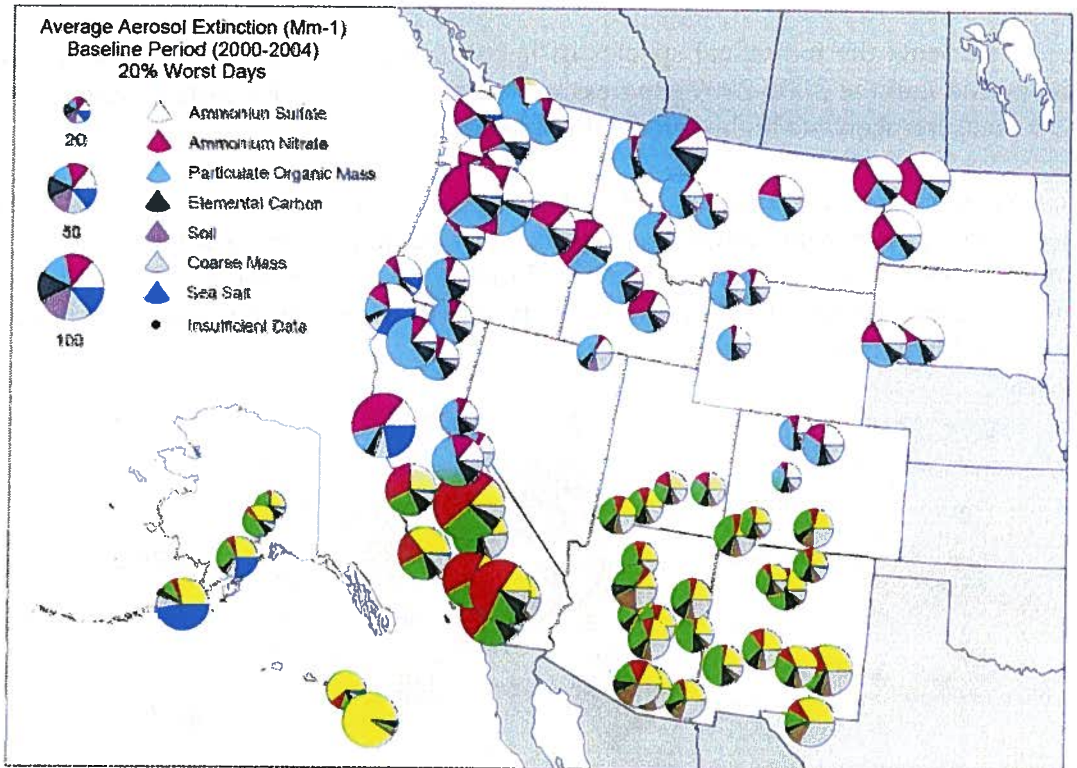

Figure 3.3. Regional Average of Aerosol Extinction by Pollutant for Baseline Period Average (2000-2004) for 20% Worst Days.

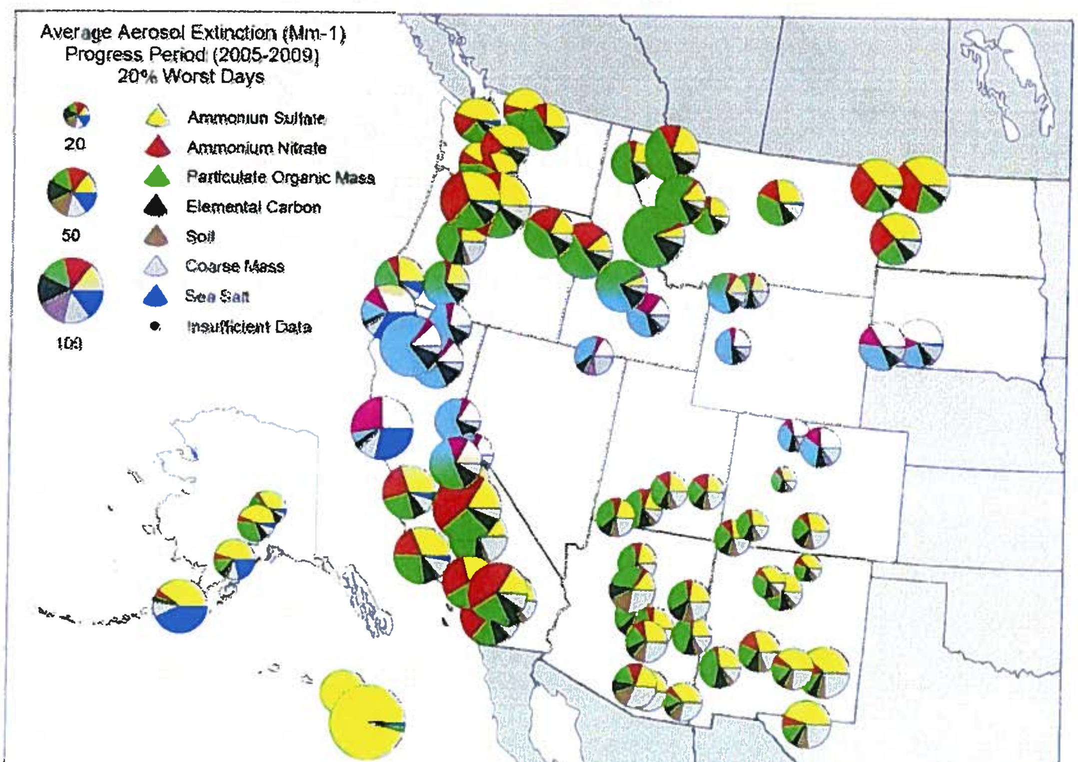

Figure 3.4. Regional Average of Aerosol Extinction by Pollutant for the First Progress Period Average (2005-2009) for 20% Worst Days.

Figure 3.5 presents the individual species of haze that have decreased between the 2000-2004 baseline period and the 2005-2009 progress period, where sites with corresponding decreases in deciview measurements are highlighted with blue circles.

For New Mexico, Figure 3.5 depicts most of the decreases in deciview averages were associated with decreases in ammonium nitrate, coarse mass and particulate organic matter. The decrease in ammonium nitrate is most likely due to federal mobile source regulations. For coarse mass and particulate organic matter, the decrease is likely due to the decreasing effect of natural events, such as windblown dust storms and wild fires.

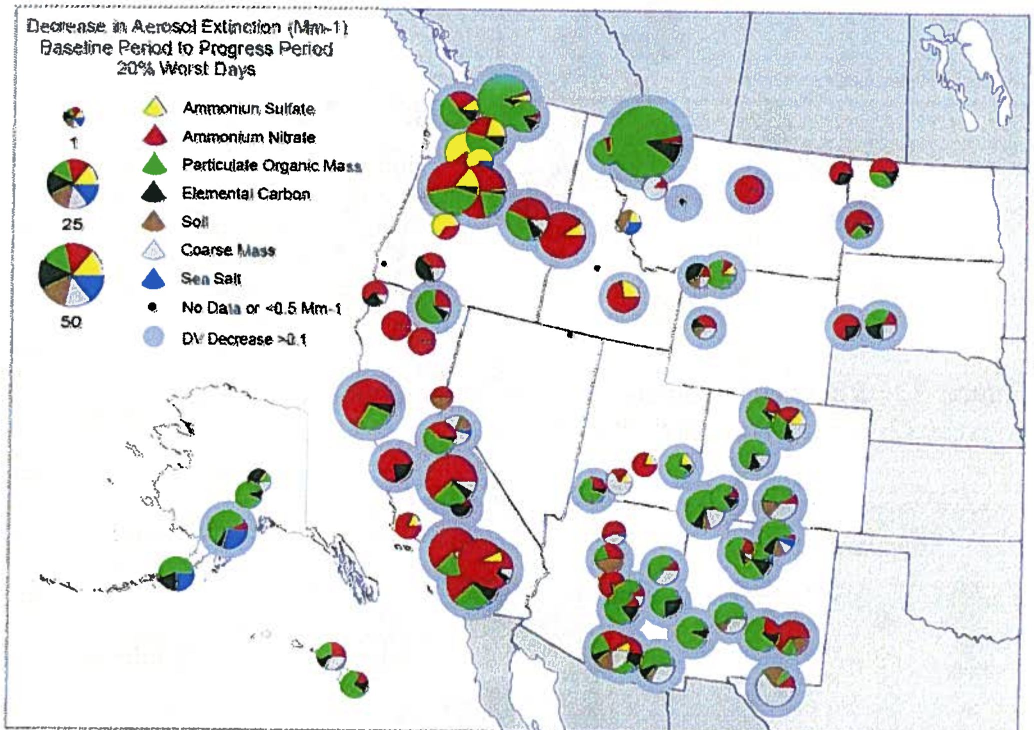

Figure 3.5. Magnitude of Aerosol Extinction Species That Have Decreased Between the Baseline Average (2000-2004) and the First Progress Period Average (2005-2009) for the 20% Worst Days.

3.4 Assessment of Visibility Conditions: 40 CFR § 51.309(d)(10)(i)(C)

40 CFR § 51.309(d)(10)(i)(C) requires *"for each mandatory Class I Federal area within the State, the state must assess the following visibility conditions and changes, with values for most impaired and least impaired days expressed in terms of 5-year averages of these annual values*

(i) The current visibility conditions for the most impaired and least impaired days;

(ii) The difference between current visibility conditions for the most impaired and least days and baseline visibility conditions;

(iii) The changes in visibility impairment for the most impaired and least impaired days over the past 5-years.

This section addresses RH rule regulatory requirements for monitored data as measured by IMPROVE monitors representing Federal Class I areas in New Mexico. These summaries are supported by regional data presented in more detailed site specific tables and charts in Appendix C.

Regional haze progress in Federal Class I areas is tracked using calculations based on speciated aerosol mass as collected by IMPROVE monitors. The RH rule calls for tracking haze in units of deciviews, where the deciview metric was designed to be linearly associated with human perception of visibility. In a pristine atmosphere, the deciview metric is near zero, and a one deciview change is approximately equivalent to a 10% change in cumulative species extinction. To better understand visibility conditions, summaries here include both the deciview metric, and the apportionment of haze into extinction due to the various measured species in units of inverse megameters (Mm^{-1}).

3.4.1 Current Visibility Conditions for the Most and Least Impaired Days

RH rule 2003 guidance specifies that 5-year averages be calculated over successive 5-year periods; i.e., 2000-2004, 2005-2009, 2010-2014, etc.[2] Current visibility conditions are represented here as the most recent successive 5-year average period available, the 2005-2009 period average, although the most recent IMPROVE monitoring data currently available includes 2010 data. The information and data presented in this section are from the *"Western Regional Air Partnership Regional Haze Rule Reasonable Progress Summary Report"* (Appendix A).

Tables 3.1 and 3.2 present the calculated deciview values for current conditions at each site, along with the percent contribution to extinction from each aerosol species for the 20% worst and best days for each of the Federal Class I area IMPROVE monitors in New Mexico. Figure 3.6 presents 5-year average extinction for the current progress period for both the 20% worst and best days. Note that the percentages in the tables consider only the aerosol species which

[2] EPA's September 2003 *Guidance for Tracking Progress Under the Regional Haze Rule* specifies that progress is tracked against the 2000-2004 baseline period using corresponding averages over successive 5-year periods; i.e., 2005-2009, 2010-2014, etc. (see page 4-2 in the Guidance document).

contribute to extinction, while the charts also show Rayleigh, or scattering due to background gases in the atmosphere.

Specific observations for the current visibility conditions on the 20% most impaired days are as follows:

- The largest contributors to aerosol extinction at New Mexico sites were ammonium sulfate and particulate organic matter.
- The highest aerosol extinction (17.5 dv) was measured at the SACR1 site, where ammonium sulfate was the largest contributor to aerosol extinction, followed by coarse mass. The lowest aerosol extinction (9.1 dv) was measured at the WHPE1 site.

Specific observations for the current visibility conditions on the 20% least impaired days are as follows:

- The aerosol contribution to total extinction on the best days was less than Rayleigh, or the background scattering that would occur in clear air. Average extinction (including Rayleigh) ranged from 0.9 dv (WHPE1) to 7.3 deciview (SACR1).
- For all sites, ammonium sulfate was the largest contributor to the non-Rayleigh aerosol component of extinction.

Table 3.1
New Mexico Class I Area IMPROVE Sites
Current Visibility Conditions
2005-2009 Progress Period, 20% Most Impaired Days

Site	**Deciviews (dv)**	**Percent Contribution to Aerosol Extinction by Species (Excludes Rayleigh) (% of Mm^{-1}) and Rank***						
		Ammonium Sulfate	**Ammonium Nitrate**	**Particulate Organic Matter**	**Elemental Carbon**	**Soil**	**Coarse Mass**	**Sea Salt**
BAND1	11.8	**34% (1)**	10% (4)	31% (2)	8% (5)	5% (6)	13% (3)	0% (7)
BOAP1	13.4	**30% (1)**	14% (4)	22% (2)	10% (5)	5% (6)	19% (3)	1% (7)
GICL1	12.5	27% (2)	3% (6)	**42% (1)**	10% (4)	5% (5)	12% (3)	0% (7)
GUMO1	15.9	**45% (1)**	7% (4)	14% (3)	4% (6)	6% (5)	24% (2)	0% (7)
SACR1	17.5	**38% (1)**	15% (3)	13% (4)	5% (5)	5% (6)	23% (2)	1% (7)
WHIT1	13.2	**40% (1)**	6% (4)	18% (3)	5% (6)	6% (5)	25% (2)	1% (7)
WHPE1	9.1	**36% (1)**	8% (5)	27% (2)	9% (4)	7% (6)	12% (3)	0% (7)

*Highest contribution per site is highlighted in bold.

Table 3.2
New Mexico Class I Area IMPROVE Sites
Current Visibility Conditions
2005-2009 Progress Period, 20% Least Impaired Days

Site	Deciviews (dv)	Percent Contribution to Aerosol Extinction by Species (Excludes Rayleigh) (% of Mm^{-1}) and Rank						
		Ammonium Sulfate	Ammonium Nitrate	Particulate Organic Matter	Elemental Carbon	Soil	Coarse Mass	Sea Salt
BAND1	4.2	**34% (1)**	9% (5)	28% (2)	13% (3)	4% (6)	13% (4)	0% (7)
BOAP1	5.8	**33% (1)**	8% (5)	22% (2)	12% (4)	5% (6)	18% (3)	2% (7)
GICL1	2.7	**41% (1)**	6% (5)	25% (2)	10% (4)	5% (6)	12% (3)	1% (7)
GUMO1	5.4	**37% (1)**	11% (4)	18% (3)	8% (5)	5% (6)	21% (2)	0% (7)
SACR1	7.3	**31% (1)**	12% (4)	18% (3)	8% (5)	5% (6)	25% (2)	1% (7)
WHIT1	3.3	**36% (1)**	8% (5)	22% (2)	9% (4)	5% (6)	20% (3)	0% (7)
WHPE1	0.9	**43% (1)**	9% (5)	23% (2)	10% (4)	4% (6)	12% (3)	0% (7)

*Highest contribution per site is highlighted in bold.

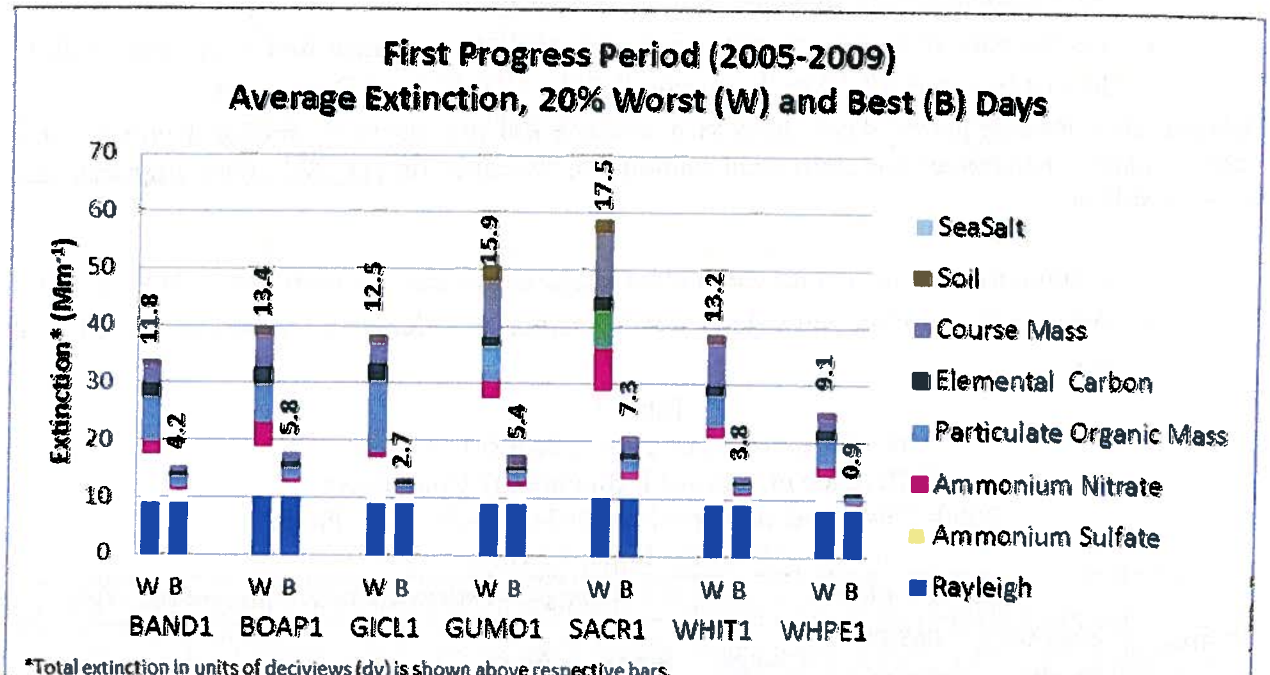

Figure 3.6. Average Extinction for Current Progress Period (2005-2009) for the Worst (Most Impaired) and Best (Least Impaired) Days Measured at New Mexico Class I Area IMPROVE Sites.

3.4.2 Differences Between Current Visibility Conditions for the Most and Least Impaired Days and Baseline Visibility Conditions

Included here are comparisons between the 5-year average baseline conditions (2000-2004) and the current progress period extinction (2005-2009).

Table 3.3 presents the differences between the 2000-2004 baseline period average extinction and the 2005-2009 progress period average for each site in New Mexico for the 20% most impaired days, and Table 3.4 presents similar data for the least impaired days. Averages that increased are depicted in red text and averages that decreased in blue.

Figure 3.7 presents the 5-year average extinction for the baseline and current progress period averages for the worst days and Figure 3.8 presents the differences in averages by aerosol species, with increases represented above the zero line and decreases below the zero line. Figures 3.9 and 3.10 present similar plots for the best days.

For the 20% most impaired days, the 5-year average RH rule deciview metric decreased at all New Mexico sites. Notable differences for individual component averages were as follows:

- All sites except BOAP1 measured a decrease in ammonium nitrate. The largest decrease in ammonium nitrate (3.8 Mm-1) was measured at the SACR1 site.
- All sites measured a decrease in particulate organic matter.
- An increase in 5-year average ammonium sulfate was measured at all sites, with the largest increases (2.1 Mm^{-1}) measured at the GUMO1 and SACR1 sites.

For the 20% least impaired days, the 5-year average RH rule deciview metric decreased at all sites. Notable differences for individual component averages on the 20% least impaired days were as follows:

- Ammonium sulfate decreased at most sites, but increased slightly at the WHPE1 site.
- Ammonium nitrate, particulate organic matter and elemental carbon decreased at all sites.

Table 3.3
New Mexico Class I Area IMPROVE Sites
Difference in Aerosol Extinction by Component
2000-2004 Baseline Period to 2005-2009 Progress Period
20% Most Impaired Days

Site	Deciview (dv)			Change in Extinction by Component (Mm^{-1})*						
	2000-04 Baseline Period	2005-09 Progress Period	Change in dv*	Amm. Sulfate	Amm. Nitrate	POM	EC	Soil	CM	Sea Salt
BAND1	12.2	11.8	-0.4	+1.5	-0.1	-6.6	-1.0	+0.1	+0.3	-0.2
BOAP1	13.8	13.4	-0.4	+1.4	+1.0	-2.2	+0.2	-0.3	-1.2	0.0

GICL1	13.1	12.5	-0.6	+1.2	-0.1	-3.5	-0.2	0.0	+0.8	0.0
GUMO1	17.2	15.9	-1.3	+2.1	-0.9	-0.8	+0.2	-1.7	-6.1	0.0
SACR1	18.0	17.5	-0.5	+2.1	-3.8	-1.1	0.0	-1.0	-0.1	+0.3
WHIT1	13.7	13.2	-0.5	+1.4	-1.2	-3.6	-0.4	-0.1	+0.8	+0.1
WHPE1	10.4	9.1	-1.3	+0.9	-0.2	-3.6	-0.6	-0.6	-0.6	-0.4

*Change is calculated as progress period average minus baseline period average. Values in red indicate increases in extinction, values in blue indicate decreases.

Table 3.4
New Mexico Class I Area IMPROVE Sites
Difference in Aerosol Extinction by Component
2000-2004 Baseline Period to 2005-2009 Progress Period
20% Least Impaired Days

Site	Deciview (dv)			Change in Extinction by Component (Mm^{-1})*						
	2000-2004 Baseline Period	2005-2009 Progress Period	Change in dv*	Amm. Sulfate	Amm. Nitrate	POM	EC	Soil	CM	Sea Salt
BAND1	5.0	4.2	-0.8	-0.3	-0.2	-0.4	-0.1	-0.1	-0.2	0.0
BOAP1	6.3	5.8	-0.5	-0.2	-0.2	-0.4	-0.2	0.0	-0.1	0.0
GICL1	3.3	2.7	-0.6	-0.1	-0.1	-0.5	-0.2	0.0	+0.1	0.0
GUMO1	5.9	5.4	-0.5	-0.3	-0.3	-0.1	0.0	0.0	-0.3	0.0
SACR1	7.8	7.3	-0.5	0.0	-0.7	-0.3	-0.2	-0.2	+0.2	0.0
WHIT1	3.6	3.3	-0.3	-0.1	-0.1	-0.2	-0.1	+0.1	+0.1	0.0
WHPE1	1.2	0.9	-0.3	+0.1	-0.1	-0.1	-0.1	0.0	-0.1	0.0

*Change is calculated as progress period average minus baseline period average. Values in red indicate increases in extinction, values in blue indicate decreases.

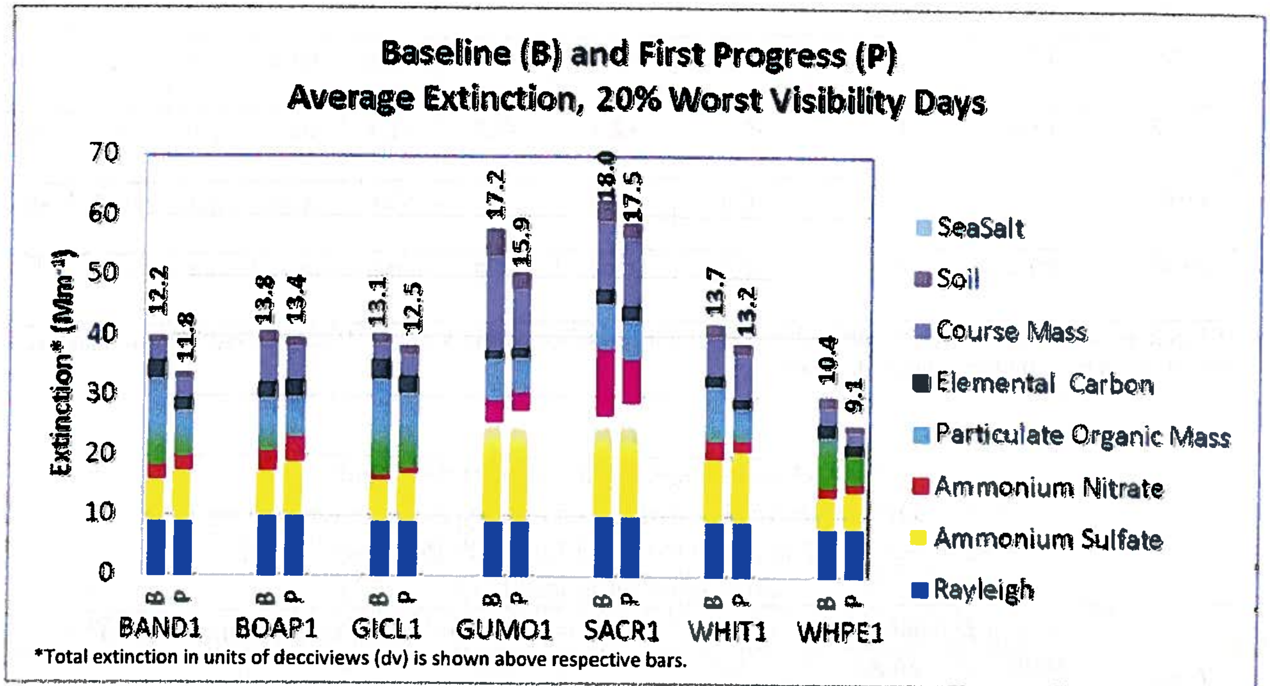

Figure 3.7. Average Extinction for Baseline and Progress Period Extinction for Worst (Most Impaired) Days Measured at New Mexico Class I Area IMPROVE Sites.

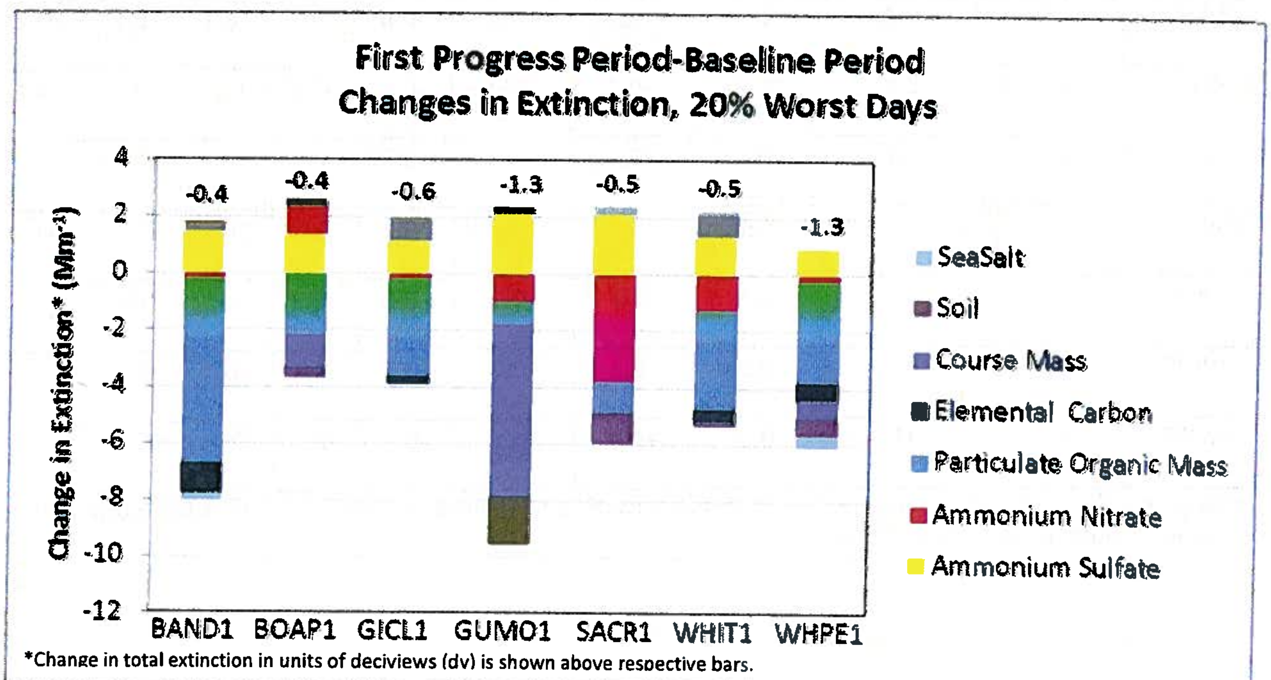

Figure 3.8. Difference Between Average Extinction for Current Progress Period (2005-2009) and Baseline Period (2000-2004) for the Worst (Most Impaired) Days Measured at New Mexico Class I Area IMPROVE Sites.

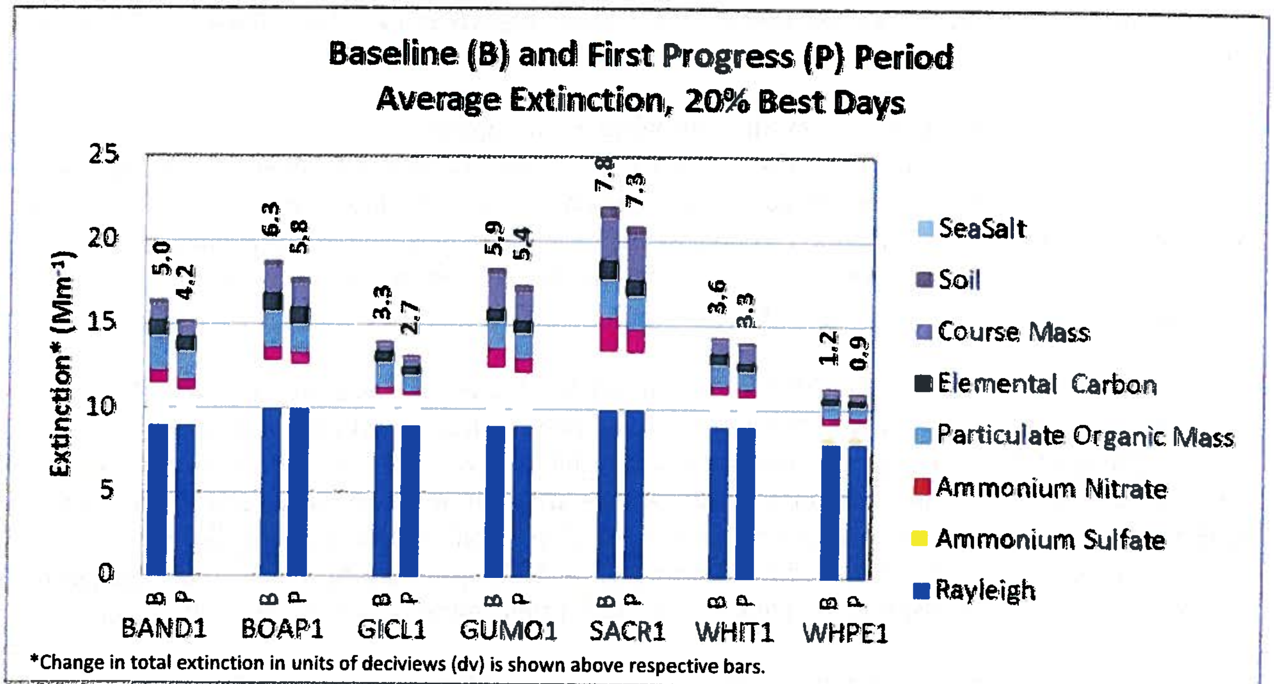

Figure 3.9. Average Extinction for Baseline and Progress Period Extinction for Best (Least Impaired) Days Measured at New Mexico Class I Area IMPROVE Sites.

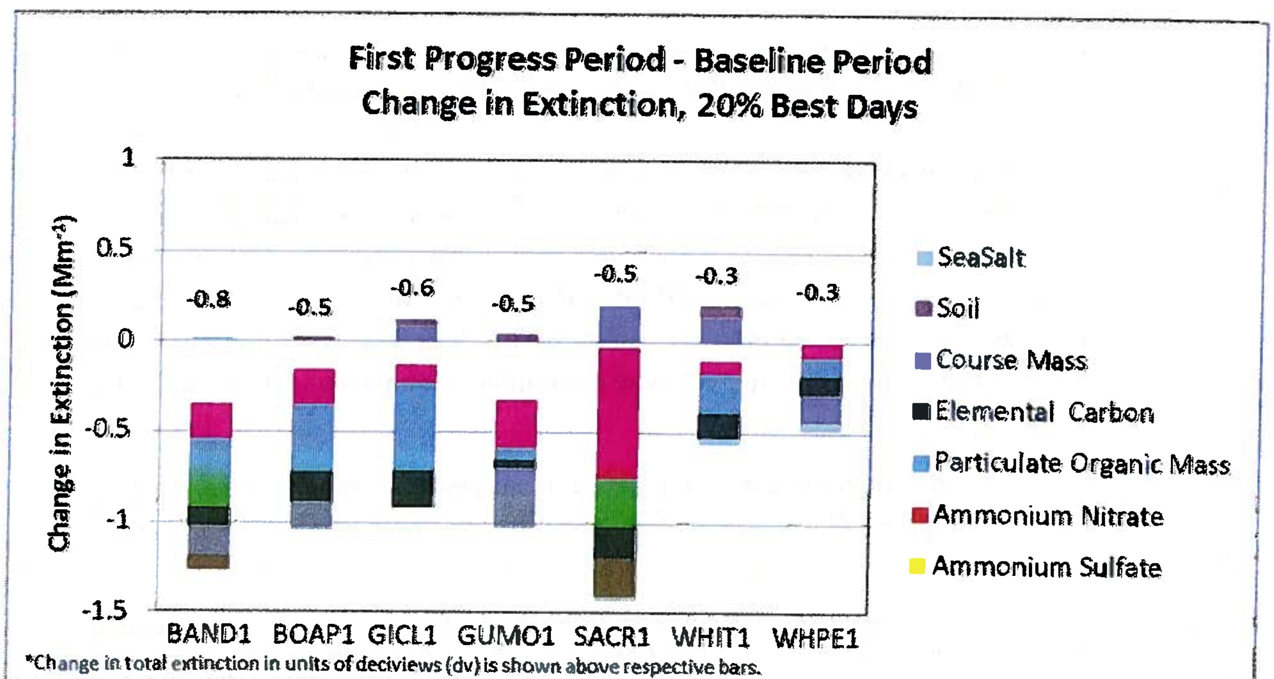

Figure 3.10. Difference Between Average Extinction for Current Progress Period (2005-2009) and Baseline Period (2000-2004) for the Best (Least Impaired) Days Measured at New Mexico Class I Area IMPROVE Sites.

3.4.3 Change in Visibility Impairment for the Most Impaired and Least Impaired Days Over the Past 5 Years

Included here are changes in visibility impairment as characterized by annual average trend statistics, and some general observations regarding local and regional events and outliers on a daily and annual basis that affected the current 5-year progress period. The regulatory requirement requires a description of changes over the past 5 year period. Because trend analysis is better suited to longer periods of time, trends for the entire 10 year planning period are presented here.

Trend statistics for the years 2000-2009 for each species at each site in New Mexico are summarized in Table 3.5.[3] Only trends for aerosol species trends with p-value statistics less than 0.15 (85% confidence level) are presented in the table here, with increasing slopes in red and decreasing slopes in blue.[4] In some cases, trends may show decreasing tendencies while the difference between the 5-year averages do not (or vice versa). In these cases, the 5-year average for the best and worst days is the important metric for RH regulatory purposes, but trend statistics may be of value to understand and address visibility impairment issues for planning purposes.

For each site, a more comprehensive list of all trends for all species, including the associated p-values, is provided in Appendix C. Additionally, the Appendix includes plots depicting 5-year, annual, monthly and daily average extinction for each site. Some general observations regarding changes in visibility impairment at sites in New Mexico are as follows:

- The largest decrease in 5-year averages was measured for particulate organic matter at the BAND1 site, where a high event in May 2000 influenced the baseline period average.

- For ammonium nitrate, decreases in 5-year averages on the worst days were measured at all sites except BOAP1, which was influenced by an unusually high ammonium nitrate event measured in January 2007. It is unclear what caused this event; it appears to be an anomaly and has not been repeated. Additionally, all sites measured either insignificant or decreasing annual average ammonium nitrate trends. The largest decrease was measured for the SACR1 site, but the year 2007 was incomplete for this site and not included in the 5-year average.

- For ammonium sulfate, increases in the 5-year averages were recorded for the worst days at all sites, but no increasing annual average trends were measured and statistically

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[3] Annual trends were calculated for the years 2000-2009, with a trend defined as the slope derived using Theil statistics. Trends derived from Theil statistics are useful in analyzing changes in air quality data because these statistics can show the overall tendency of measurements over long periods of time, while minimizing the effects of year-to-year fluctuations which are common in air quality data. Theil statistics are also used in EPA's National Air EPA's National Air Quality Trends Reports (http://www.epa.gov/airtrends/) and the IMPROVE program trend reports (http://vista.cira.colostate.edu/improve/Publications/improve_reports.htm)

[4] The significance of the trend is represented with p-values calculated using Mann-Kendall trend statistics. Determining a significance level helps to distinguish random variability in data from a real tendency to increase or decrease over time, where lower p-values indicate higher confidence levels in the computed slopes.

significant decreasing annual average trends were measured at the BAND1, GUMO1, and SACR1 sites. High 5-year averages for the worst days at these sites were influenced by anomalously high ammonium sulfate measurements in 2005. During September of 2005, a large sulfate transport event occurred over much of the eastern and mid-western U.S. reaching into New Mexico and Arizona (Figure 3.11). As shown in Appendix C, most of the increases in ammonium sulfate that occurred in New Mexico in 2005 took place during the month of September.

- Two sites, BAND1 and GICL1, showed increasing trends on the worst days for coarse mass, and increases in the 5-year average for coarse mass. Highest coarse mass events were measured during the spring, which is indicative of the high wind events that normally occur during the late winter and spring months in New Mexico.

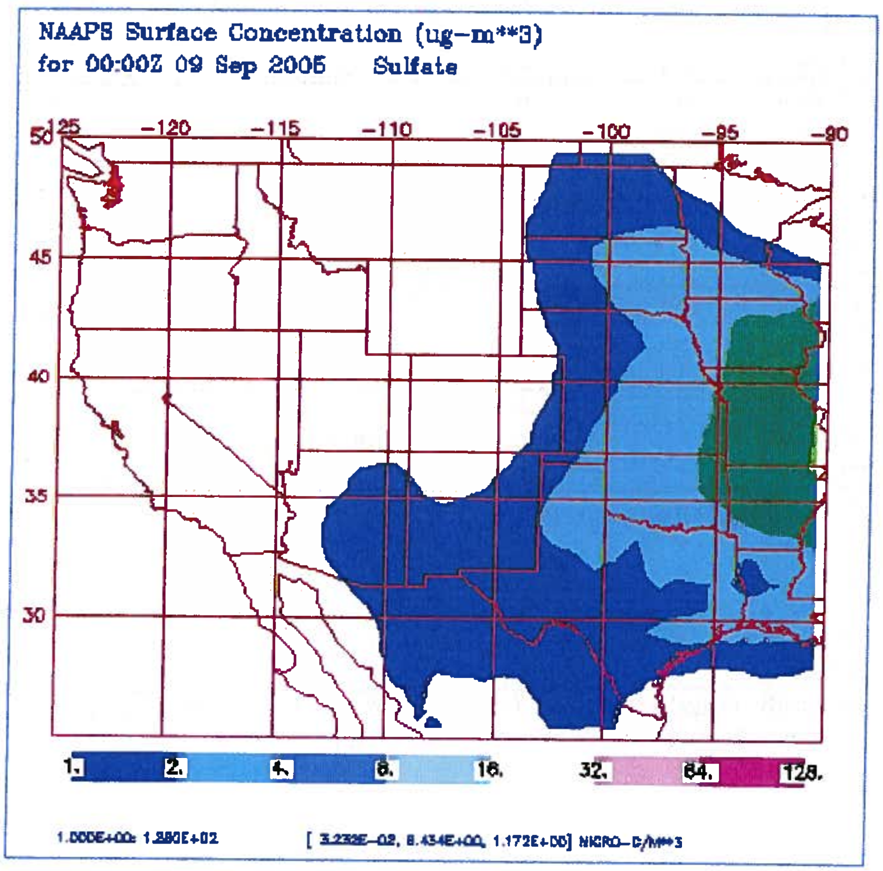

Figure 3.11. Naval Research Laboratory (NRL) Navy Aerosol Analysis and Prediction System (NAAPS) map of sulfate surface concentrations for September 9, 2005.

Table 3.5
New Mexico Class I Area IMPROVE Sites
Change in Aerosol Extinction by Species
2000-2009 Annual Average Trends

Site	Group	Annual Trend* (Mm^{-1}/year)						
		Ammonium Sulfate	Ammonium Nitrate	Particulate Organic Matter	Elemental Carbon	Soil	Coarse Mass	Sea Salt
BAND1	20% Best	-0.1	0.0	--	0.0	0.0	0.0	0.0
	20% Worst	--	--	-0.5	-0.1	--	0.1	0.0
	All Days	-0.1	0.0	-0.2	-0.1	--	--	--
BOAP1	20% Best	-0.1	0.0	-0.1	-0.1	--	-0.1	--
	20% Worst	--	--	-0.6	--	--	--	--
	All Days	--	--	-0.2	-0.1	--	--	--
GICL1	20% Best	-0.1	0.0	-0.1	0.0	--	--	0.0
	20% Worst	--	--	-1.0	--	--	0.2	0.0
	All Days	--	0.0	-0.3	-0.1	--	0.0	0.0
GUMO1	20% Best	-0.1	0.0	-0.1	0.0	--	0.0	--
	20% Worst	--	-0.2	-0.2	--	--	-0.8	--
	All Days	-0.2	-0.1	-0.1	--	--	-0.3	--
SACR1	20% Best	-0.1	-0.2	-0.1	0.0	--	--	--
	20% Worst	-0.5	-0.8	-0.3	--	--	--	0.0
	All Days	-0.2	-0.3	--	--	--	--	0.0
WHIT1	20% Best	--	--	0.0	0.0	--	--	0.0
	20% Worst	--	-0.3	-0.6	-0.2	--	--	0.0
	All Days	--	-0.1	-0.1	-0.1	--	--	--
WHPE1	20% Best	--	0.0	--	0.0	--	0.0	0.0
	20% Worst	--	--	-0.9	-0.1	-0.1	--	--
	All Days	--	0.0	-0.3	-0.1	0.0	-0.1	0.0

*(--) Indicates statistically insignificant trend (<85% confidence level). Annual averages and complete trend statistics for all significance levels are included for each site in Appendix I.

3.5 Analyses of Emissions: 40 CFR § 51.309(d)(10)(i)(C)

40 CFR § 51.309(d)(10)(i)(C) requires "*An analysis tracking the change over the past 5 years in emissions of pollutants contributing to visibility impairment from all sources and activities within the State. Emissions changes should be identified by type of source or activity. The analysis must be based on the most recent updated emissions inventory, with estimates projected forward as necessary and appropriate, to account for emissions changes during the applicable 5-year period.*"

Included here are summaries depicting differences between two emission inventory years that are used to represent the 5-year baseline and current progress periods. The baseline period is represented using a 2002 inventory developed by the WRAP for use in the initial WRAP state SIPs, and the progress period is represented by a 2008 inventory which leverages recent WRAP inventory work for modeling efforts. For reference, Table 3.6 lists the pollutants inventoried, the related aerosol species, some of the key sources for each pollutant, and some notes regarding implications of these pollutants. Differences between these baseline and progress period inventories, and a separate summary of annual emissions from electrical generating units (EGUs), are presented in this section.

Table 3.6
New Mexico
Pollutants, Aerosol Species, and Major Sources

Emitted Pollutant	Related Aerosol	Key Sources	Notes
Sulfur Dioxide (SO_2)	Ammonium Sulfate	Point sources; On- and off-road mobile sources	SO_2 emissions are generally associated with anthropogenic sources such as coal-burning power plants, other industrial sources such as refineries and cement plants, and both on- and off-road diesel engines.
Oxides of Nitrogen (NO_X)	Ammonium Nitrate	On- and off-road mobile sources; Point sources; Area sources	NO_X emissions are generally associated with anthropogenic sources. Common sources include virtually all combustion activities, especially those involving cars, trucks, power plants, and other industrial processes.
Ammonia (NH_3)	Amm. Sulfate and Amm. Nitrate	Area sources; On-road mobile sources	Gaseous NH_3 has implications in particle formation because it can form particulate ammonium. Ammonium is not directly measured by the IMPROVE program, but affects formation potential of ammonium sulfate and ammonium nitrate. All measured nitrate and sulfate is assumed to be associated with ammonium for IMPROVE reporting purposes.
Volatile Organic Compounds (VOCs)	Particulate Organic Matter (POM)	Biogenic emissions; vehicle emissions; area sources	VOCs are gaseous emissions of carbon compounds, which are often converted to POM through chemical reactions in the atmosphere. Estimates for biogenic emissions of VOCs have undergone significant updates since 2002, so changes reported here are more reflective of methodology changes than actual changes in emissions (see Section 3.2.1 of Appendix A).

Primary Organic Aerosol (POA)	POM	Wildfires; Area sources	POA represents organic aerosols that are emitted directly as particles, as opposed to gases. Wildfires in the west generally dominate POA emissions, and large wildfire events are generally sporadic and highly variable from year-to-year.
Elemental Carbon (EC)	EC	Wildfires; On- and off-road mobile sources	Large EC events are often associated with large POM events during wildfires. Other sources include both on- and off-road diesel engines.
Fine soil	Soil	Windblown dust; Fugitive dust; Road dust; Area sources	Fine soil is reported here as the crustal or soil components of $PM_{2.5}$.
Coarse Mass (PMC)	Coarse Mass	Windblown dust; Fugitive dust	Coarse mass is reported by the IMPROVE network as the difference between PM_{10} and $PM_{2.5}$ mass measurements. Coarse mass is not separated by species in the same way that $PM_{2.5}$ is speciated, but these measurements are generally associated with crustal components. Similar to crustal $PM_{2.5}$, natural windblown dust is often the largest contributor to PMC.

For these summaries, emissions during the baseline years are represented using a 2002 inventory, which was developed with support from the WRAP for use in the original RH SIP strategy development (termed plan02d). Differences between inventories are represented as the difference between the 2002 inventory, and a 2008 inventory which leverages recent inventory development work performed by the WRAP for the West-wide Jumpstart Air Quality Modeling Study (WestJumpAQMS) and the Deterministic & Empirical Assessment of Smoke's Contribution to Ozone ($DEASCO_3$) modeling projects (termed WestJump2008). Note that the comparison of differences between inventories does not necessarily reflect a change in emissions, as a number of methodology changes and enhancements have occurred between development of the individual inventories (see Appendix A). Inventories for all major visibility impairing pollutants are presented for major source categories, and categorized as either anthropogenic or natural emissions.

Table 3.7 and Figure 3.12 present the differences between the 2002 and 2008 sulfur dioxide (SO_2) inventories by source category. Tables 3.8 and Figure 3.13 present data for oxides of nitrogen (NO_X), and subsequent tables and figures (Tables 3.9 through 3.14 and Figures 3.14 through 3.19) present data for ammonia (NH_3), VOCs, primary organic aerosol (POA), elemental carbon (EC), fine soil and coarse mass. General observations regarding emissions inventory comparisons are listed below.

- The largest differences for point source inventories were decreases in SO_2, NO_X and VOCs. Note that this is consistent with the summary of annual EGU emissions as included in Figure 3.20, showing decreases in SO_2 and NO_X emissions.
- Area source inventories showed decreases in SO_2 and VOCs and increases in NO_X and NH_3. These changes may be due to a combination of population changes and differences in methodologies used to estimate these emissions (see Section 3.2.1 of Appendix A).

- On-road mobile source inventory comparisons showed decreases in SO_2, NH_3 and VOCs, but increases in most other parameters, including NO_X.
- Off-road mobile source inventories showed decreases in NO_X, SO_2, VOCs, and EC, and slight increases in fine soil and coarse mass, which was consistent with most contiguous WRAP states. These differences were likely due to a combination of actual changes in source contributions and methodology differences (see Section 3.2.1 of Appendix A).
- Inventory comparison results for area oil and gas showed decreases in NO_X and VOCs, but note that inventory methodologies for these sources may have evolved substantially between the baseline and 2008 inventories (see Section 3.2.1 of Appendix A).
- For all parameters, especially POAs, VOCs, and EC, natural fire emission inventory estimates decreased, and anthropogenic fire inventories increased. Note that these differences are not necessarily reflective of changes in monitored data, as the baseline period is represented by an average of 2000-2004 fire emissions, and the progress period is represented only by the fires that occurred in 2008 (see Section 3.2.1 of Appendix A).
- Comparisons between VOC inventories showed large decreases in biogenic emissions, which was consistent with other contiguous WRAP states. Estimates for biogenic emissions of VOCs have undergone significant updates since 2002, so changes reported here are more reflective of methodology changes than actual changes in emissions (see Section 3.2.1 of Appendix A).
- Fine soil and coarse mass increased for the windblown dust inventory comparisons and the combined fugitive/road dust inventories. Large variability in changes in windblown dust was observed for the contiguous WRAP states, which was likely due in large part to enhancements in dust inventory methodology (see Section 3.2.1 of Appendix A), rather than changes in actual emissions.

Table 3.7
Sulfur Dioxide Emissions by Category

Source Category	Sulfur Dioxide Emissions (tons/year)		
	2002 (Plan02d)	2008 (WestJump2008)	Difference (Percent Change)
Anthropogenic Sources			
Point	37,436	24,681	-12,754
Area	5,115	347	-4,768
On-Road Mobile	1,950	498	-1,452

Off-Road Mobile	3,525	167	-3,358
Area Oil and Gas	250	1,076	826
Fugitive and Road Dust	0	0	0
Anthropogenic Fire	78	622	544
Total Anthropogenic	**48,354**	**27,392**	**-20,962 (-43%)**
Natural Sources			
Natural Fire	2,313	154	-2,159
Biogenic	0	0	0
Wind Blown Dust	0	0	0
Total Natural	**2,313**	**154**	**-2,159 (-93%)**
All Sources			
Total Emissions	**50,667**	**27,545**	**-23,121 (-46%)**

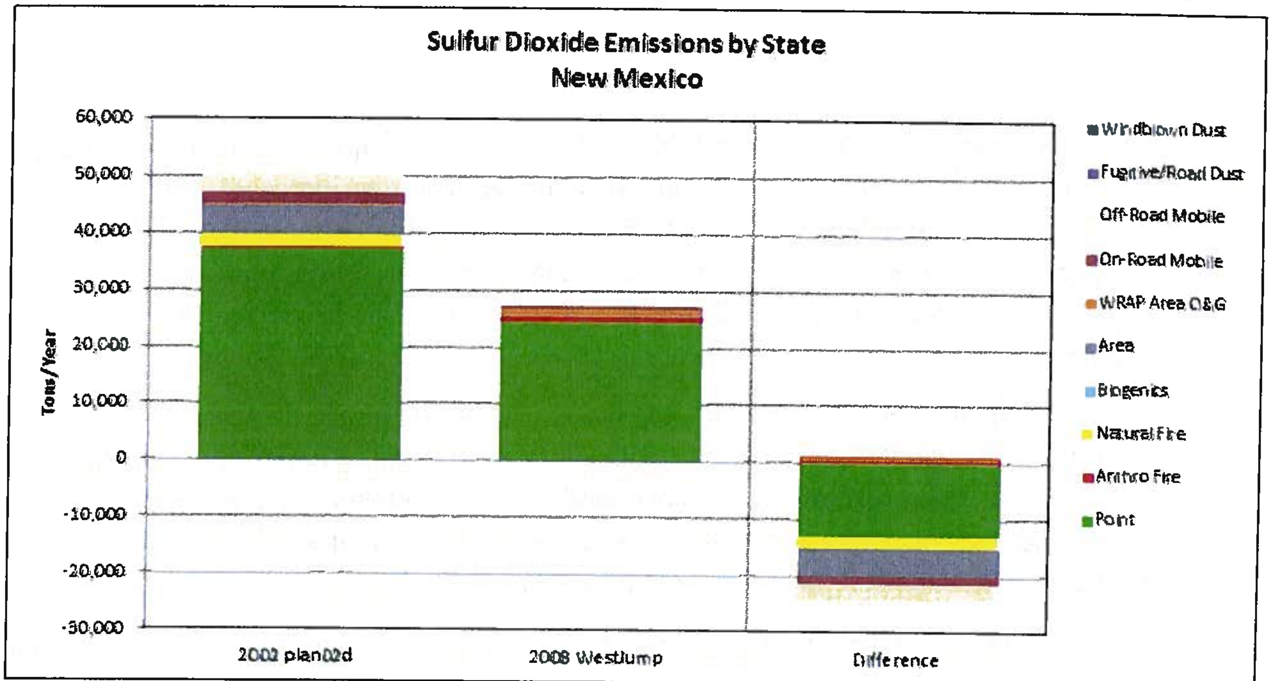

Figure 3.12. 2002 and 2008 Emission and Difference between Emissions Inventory Totals, for Sulfur Dioxide by Source Category for New Mexico.

Table 3.8
Oxides of Nitrogen Emissions by Category

Source Category	Oxides of Nitrogen Emissions (tons/year)		
	2002 (Plan02d)	**2008 (WestJump2008)**	**Difference (Percent Change)**
Anthropogenic Sources			
Point	100,387	62,502	-37,885
Area	25,130	27,754	2,624
On-Road Mobile	67,835	72,074	4,239
Off-Road Mobile	45,311	8,566	-36,745
Area Oil and Gas	56,210	35,838	-20,372
Fugitive and Road Dust	0	0	0
Anthropogenic Fire	394	4,397	4,004
Total Anthropogenic	**295,266**	**211,132**	**-84,135 (-28%)**
Natural Sources			
Natural Fire	8,570	1,085	-7,485
Biogenic	42,139	15,983	-26,156
Wind Blown Dust	0	0	0
Total Natural	**50,708**	**17,068**	**-33,641 (-66%)**
All Sources			
Total Emissions	**345,974**	**228,199**	**-117,775 (-34%)**

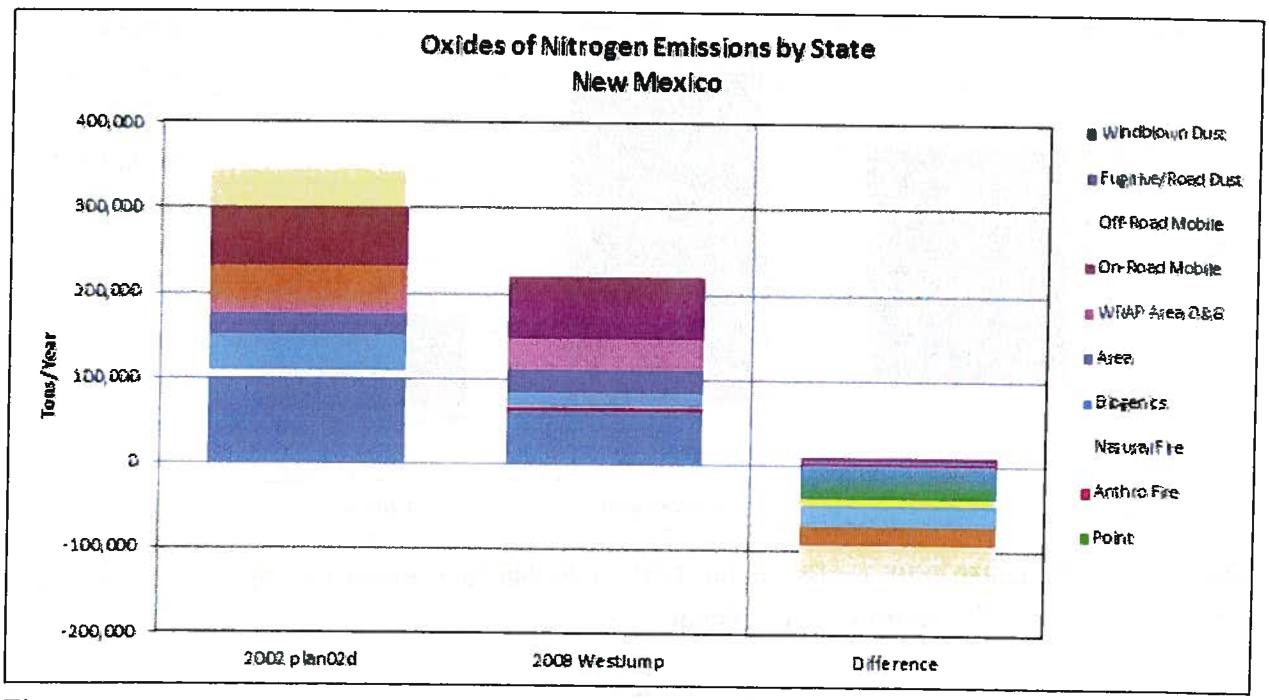

Figure 3.13. 2002 and 2008 Emission and Difference between Emissions Inventory Totals, for Oxides of Nitrogen by Source Category for New Mexico.

Table 3.9
Ammonia Emissions by Category

Source Category	Ammonia Emissions (tons/year)		
	2002 (Plan02d)	2008 (WestJump2008)	Difference (Percent Change)
Anthropogenic Sources			
Point	75	274	199
Area	29,959	39,399	9,440
On-Road Mobile	2,132	1,090	-1,042
Off-Road Mobile	26	10	-16
Area Oil and Gas	0	0	0
Fugitive and Road Dust	0	0	0
Anthropogenic Fire	75	3,067	2,992
Total Anthropogenic	**32,266**	**43,840**	**11,573 (36%)**
Natural Sources			
Natural Fire	1,875	754	-1,120
Biogenic	0	0	0
Wind Blown Dust	0	0	0
Total Natural	**1,875**	**754**	**-1,120 (-60%)**
All Sources			
Total Emissions	**34,141**	**44,594**	**10,453 (31%)**

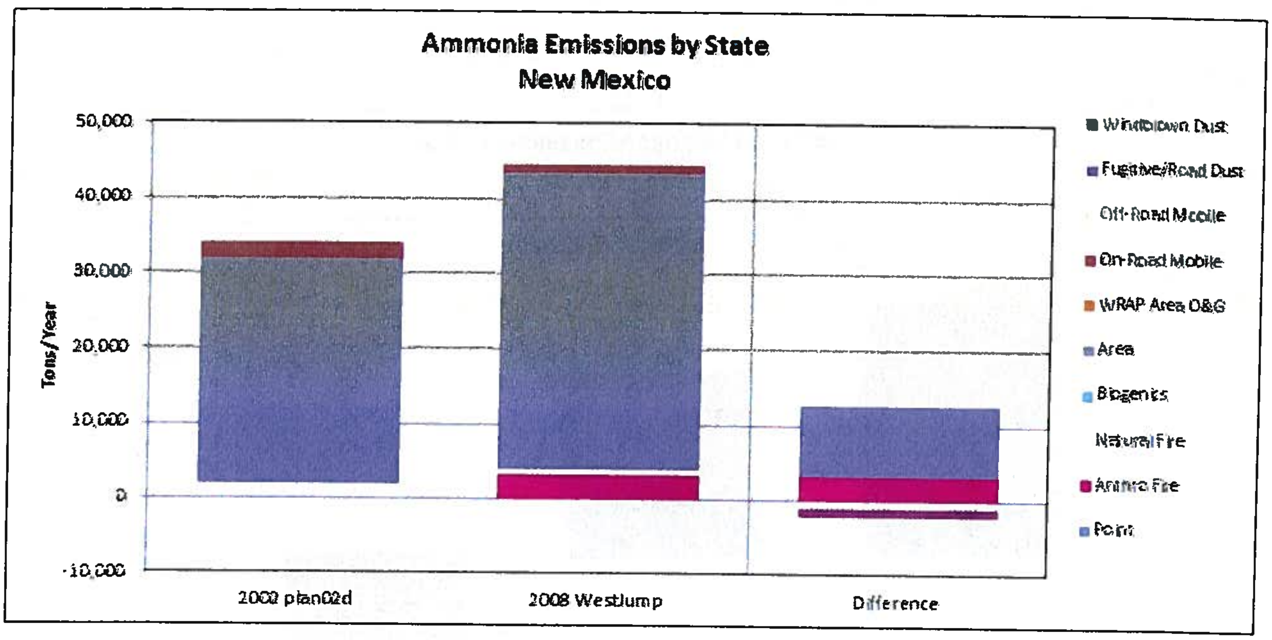

Figure 3.14. 2002 and 2008 Emission and Difference between Emissions Inventory Totals, for Ammonia by Source Category for New Mexico.

Table 3.10
New Mexico
Volatile Organic Compound Emissions by Category

Source Category	Volatile Organic Compound Emissions (tons/year)		
	2002	2008	Difference

	(Plan02d)	(WestJump2008)	(Percent Change)
Anthropogenic Sources			
Point	17,574	9,855	-7,719
Area	49,010	37,395	-11,614
On-Road Mobile	38,768	29,629	-9,138
Off-Road Mobile	13,850	11,383	-2,467
Area Oil and Gas	224,268	174,990	-49,278
Fugitive and Road Dust	0	0	0
Anthropogenic Fire	608	5,540	4,932
Total Anthropogenic	**344,077**	**268,792**	**-75,284 (-22%)**
Natural Sources			
Natural Fire	18,846	1,107	-17,740
Biogenic	1,016,487	468,258	-548,229
Wind Blown Dust	0	0	0
Total Natural	**1,035,333**	**469,365**	**-565,968 (-55%)**
All Sources			
Total Emissions	**1,379,410**	**734,166**	**-645,244 (-47%)**

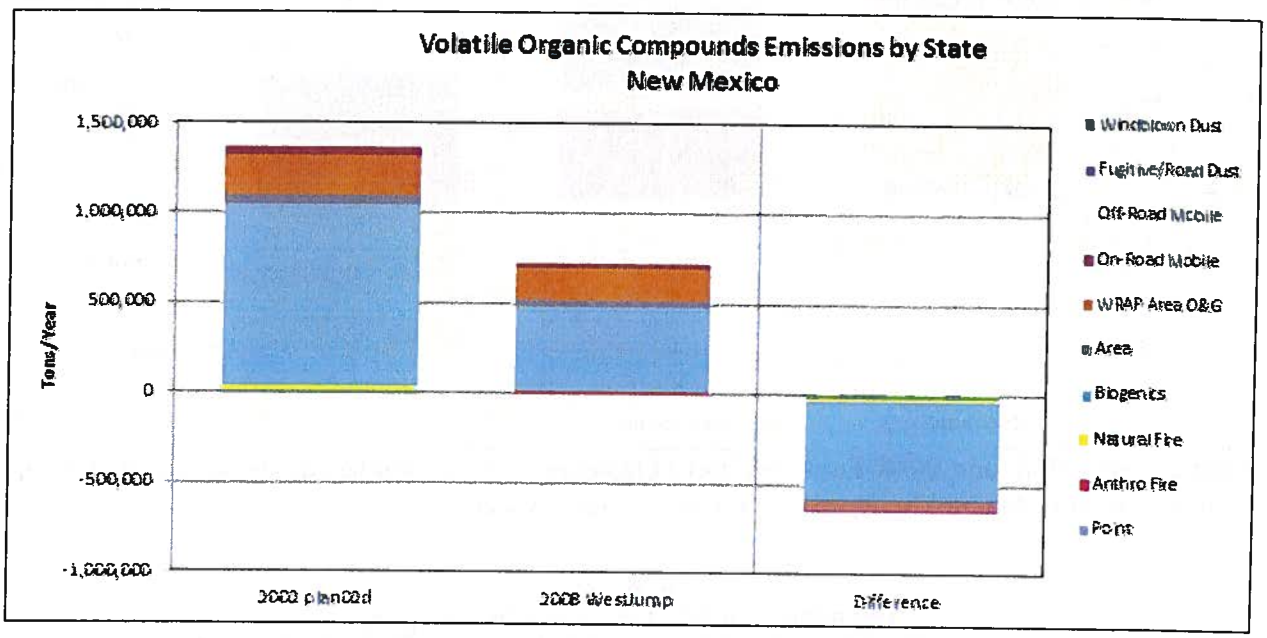

Figure 3.15. 2002 and 2008 Emission and Difference between Emissions Inventory Totals, for Volatile Organic Compounds by Source Category for New Mexico.

Table 3.11
Primary Organic Aerosol Emissions by Category

Source Category	Primary Organic Aerosol Emissions (tons/year)		
	2002 (Plan02d)	2008 (WestJump2008)	Difference (Percent Change)
Anthropogenic Sources			
Point	978	277	-701
Area	2,529	2,876	346
On-Road Mobile	653	1,506	852

Off-Road Mobile	563	349	-213
Area Oil and Gas	0	31	31
Fugitive and Road Dust	474	3,819	3,345
Anthropogenic Fire	682	8,821	8,139
Total Anthropogenic	**5,879**	**17,678**	**11,799 (>100%)**
Natural Sources			
Natural Fire	16,272	1,727	-14,545
Biogenic	0	0	0
Wind Blown Dust	0	0	0
Total Natural	**16,272**	**1,727**	**-14,545 (-89%)**
All Sources			
Total Emissions	**22,151**	**19,406**	**-2,745 (-12%)**

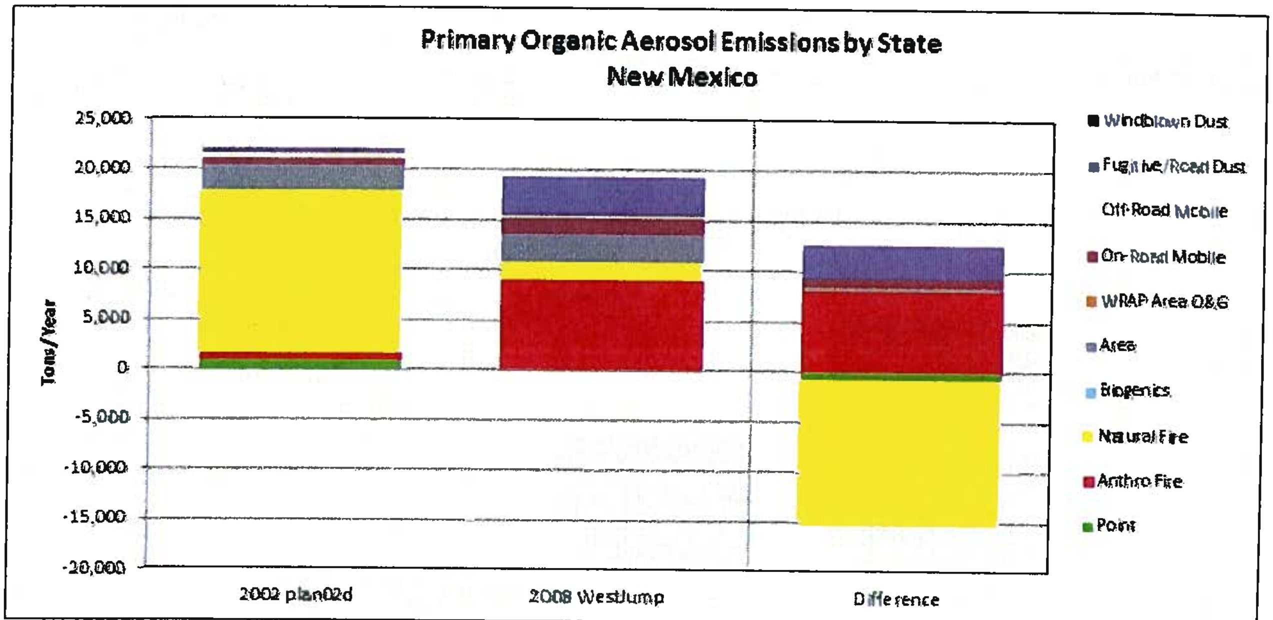

Figure 3.16. 2002 and 2008 Emission and Difference between Emissions Inventory Totals, for Primary Organic Aerosol by Source Category for New Mexico.

Table 3.12
Elemental Carbon Emissions by Category

Source Category	Elemental Carbon Emissions (tons/year)		
	2002 (Plan02d)	2008 (WestJump2008)	Difference (Percent Change)
Anthropogenic Sources			
Point	13	71	59
Area	301	945	644
On-Road Mobile	756	2,999	2,243
Off-Road Mobile	1,526	457	-1,070
Area Oil and Gas	0	0	0
Fugitive and Road Dust	34	74	40
Anthropogenic Fire	123	1,432	1,309
Total Anthropogenic	**2,753**	**5,979**	**3,226 (>100%)**
Natural Sources			
Natural Fire	3,293	417	-2,876

Biogenic	0	0	0
Wind Blown Dust	0	0	0
Total Natural	**3,293**	**417**	**-2,876 (-87%)**
	All Sources		
Total Emissions	**6,046**	**6,397**	**351 (6%)**

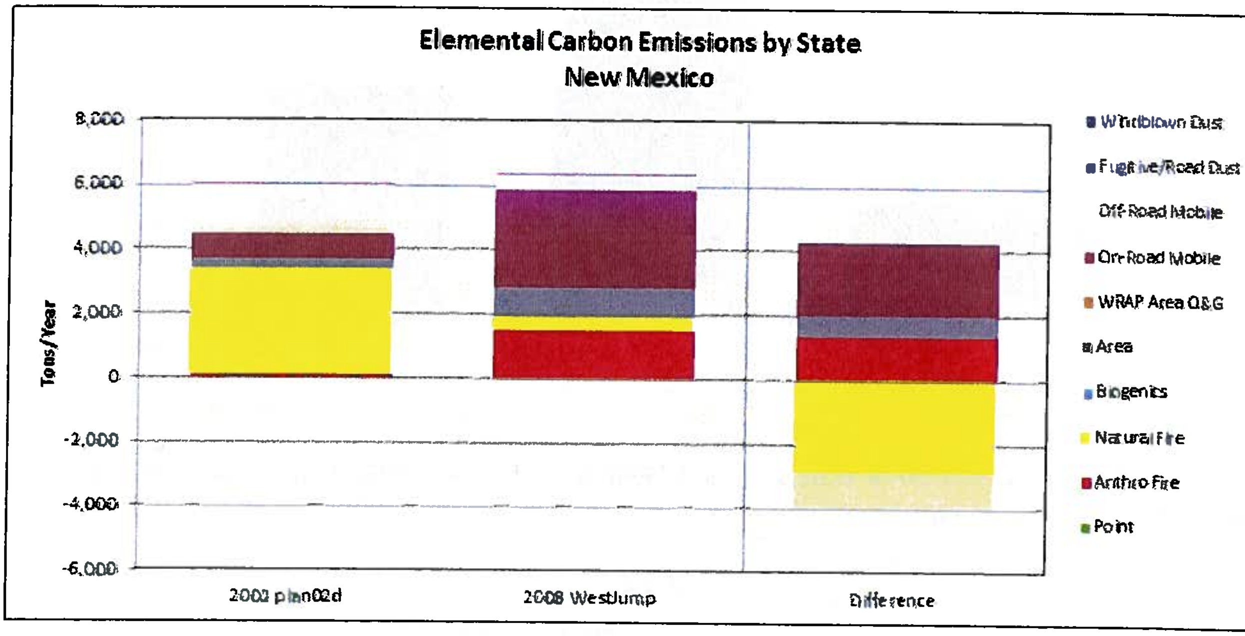

Figure 3.17. 2002 and 2008 Emission and Difference between Emissions Inventory Totals, for Elemental Carbon by Source Category for New Mexico.

Table 3.13
Fine Soil Emissions by Category

Source Category	**Fine Soil Emissions (tons/year)**		
	2002 (Plan02d)	**2008 (WestJump2008)**	**Difference (Percent Change)**
	Anthropogenic Sources		
Point	1,180	535	-645
Area	2,821	1,485	-1,336
On-Road Mobile	429	258	-172
Off-Road Mobile	0	25	25
Area Oil and Gas	0	540	540
Fugitive and Road Dust	8,056	55,506	47,451
Anthropogenic Fire	87	3,239	3,152
Total Anthropogenic	**12,573**	**61,587**	**49,014 (>100%)**
	Natural Sources		
Natural Fire	1,223	646	-577
Biogenic	0	0	0
Wind Blown Dust	16,399	28,151	11,752
Total Natural	**17,622**	**28,798**	**11,176 (63%)**
	All Sources		
Total Emissions	**30,194**	**87,702**	**57,507 (>100%)**

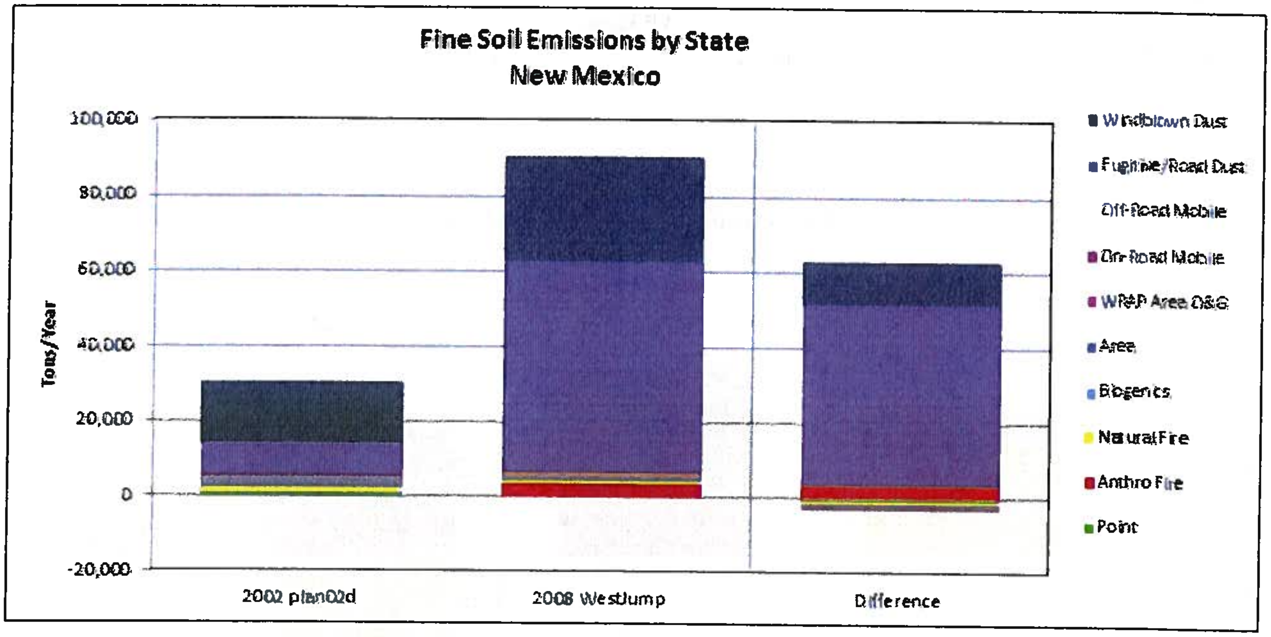

Figure 3.18. 2002 and 2008 Emission and Difference between Emissions Inventory Totals, for Fine Soil by Source Category for New Mexico.

Table 3.14
Coarse Mass Emissions by Category

Source Category	Coarse Mass Emissions (tons/year)		
	2002 (Plan02d)	**2008 (WestJump2008)**	**Difference (Percent Change)**
	Anthropogenic Sources		
Point	2,286	1,168	-1,117
Area	695	506	-189
On-Road Mobile	403	2,994	2,590
Off-Road Mobile	0	41	41
Area Oil and Gas	0	12	12
Fugitive and Road Dust	62,607	504,915	442,308
Anthropogenic Fire	105	1,691	1,586
Total Anthropogenic	**66,096**	**511,327**	**445,230 (>100%)**
	Natural Sources		
Natural Fire	5,400	330	-5,070
Biogenic	0	0	0
Wind Blown Dust	147,589	253,362	105,773
Total Natural	**152,989**	**253,692**	**100,703 (66%)**
	All Sources		
Total Emissions	**219,086**	**765,019**	**545,933 (>100%)**

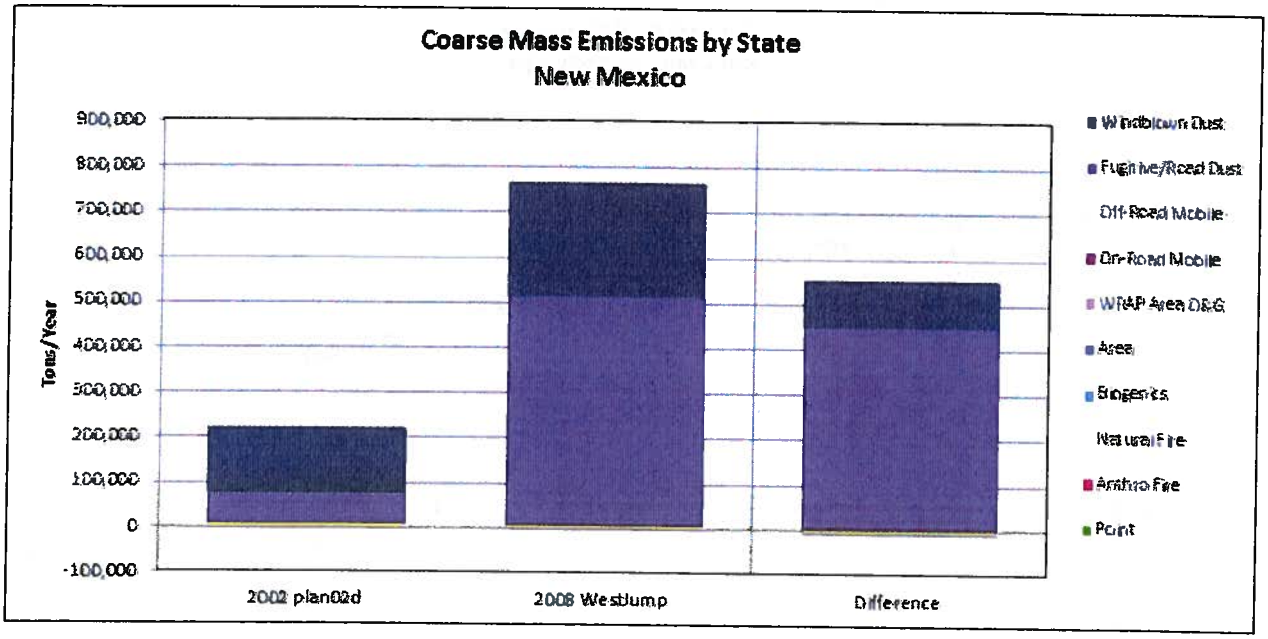

Figure 3.19. 2002 and 2008 Emission and Difference between Emissions Inventory Totals, for Coarse Mass by Source Category for New Mexico.

As described above, differences between the baseline and progress period inventories presented here do not necessarily represent changes in actual emissions because numerous updates in inventory methodologies have occurred between the development of the separate inventories. Also, the 2002 baseline and 2008 progress period inventories represent only annual snapshots of emissions estimates, which may not be representative of the entire 5-year monitoring periods compared. To better account for year-to-year changes in emissions, annual emission totals for New Mexico EGUs are presented here. EGU emissions are some of the more consistently reported emissions, as tracked in EPA's Air Markets Program Database for permitted Title V facilities in the state (http://ampd.epa.gov/ampd/). RH implementation plans are required to pay specific attention to certain major stationary sources, including EGUs, built between 1962 and 1977.

Figure 3.20 presents a sum of annual NO_X and SO_2 emissions as reported for New Mexico EGU sources between 1996 and 2010. While these types of facilities are targeted for controls in state RH SIPs, it should be noted that many of the controls planned for EGUs in New Mexico had not taken place yet in 2010, while other controls separate from the RH rule may have been implemented. The chart shows periods of decline for both SO_2 and NO_X emissions, with a steeper decline in SO_2

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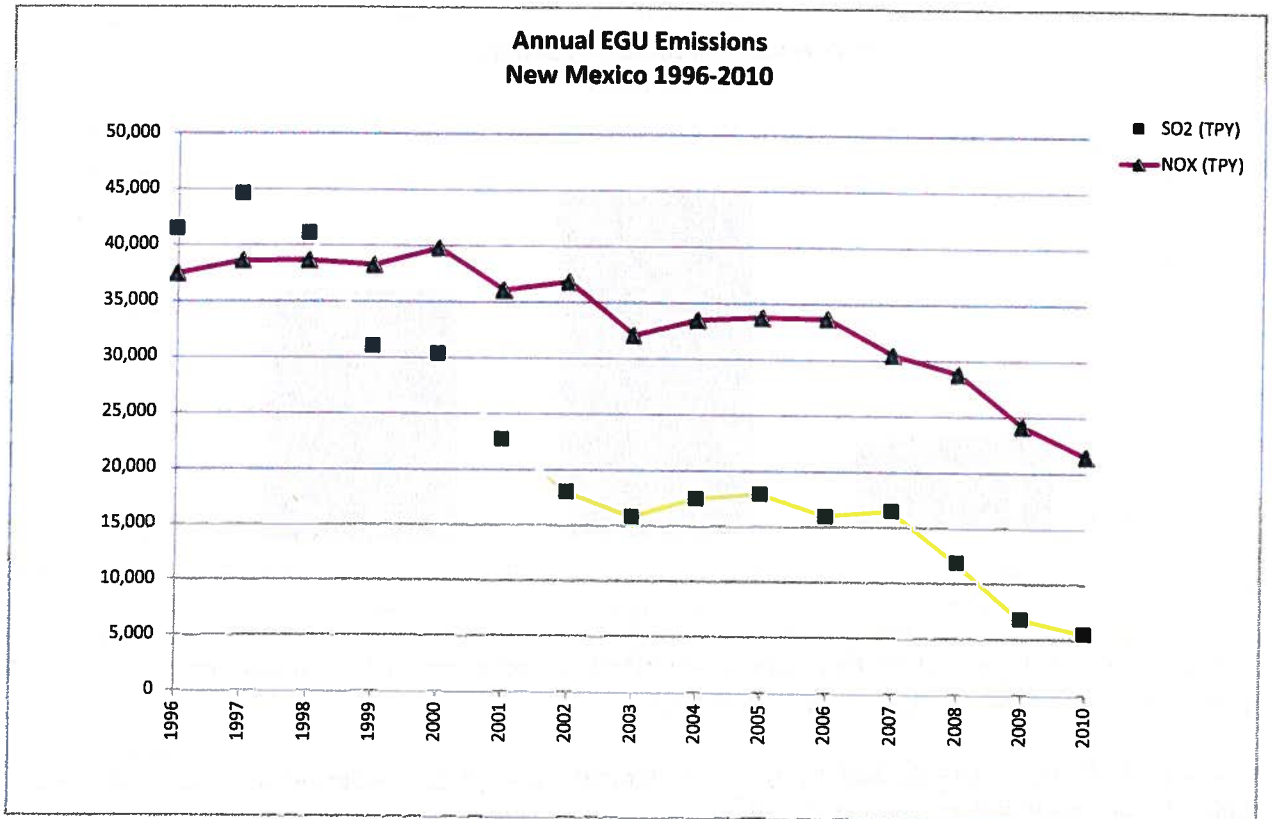

Figure 3.20. Sum of EGU Emissions of SO_2 and NO_X reported between 1996 and 2010 for New Mexico.

3.6 Changes to Anthropogenic Emissions: 40 CFR § 51.309(d)(10)(i)(E)

40 CFR § 51.309(d)(10)(i)(E) requires "*an assessment of any significant changes in anthropogenic emissions within or outside the State that have occurred over the past 5 years that have limited or impeded progress in reducing pollutant emissions and improving visibility.*"

Figure 3.21 displays the average light extinction for the 20% worst days over the 5-year period 2005 through 2009 for all Class I areas in New Mexico. This figure demonstrates that on the 20% worst days in the Class I areas in New Mexico, ammonium sulfate and particulate organic matter are the major concern for visibility impairment. Stationary point sources are the largest contributor of SO_2 emissions, accounting for 90% of the SO_2 emissions in New Mexico. Over 50% of the particulate organic matter emissions are from fire, including natural and anthropogenic. Appendix C includes monitoring data summaries over the 5-year 2006-2009 for the 20% worst and best days for each Class I area in New Mexico.

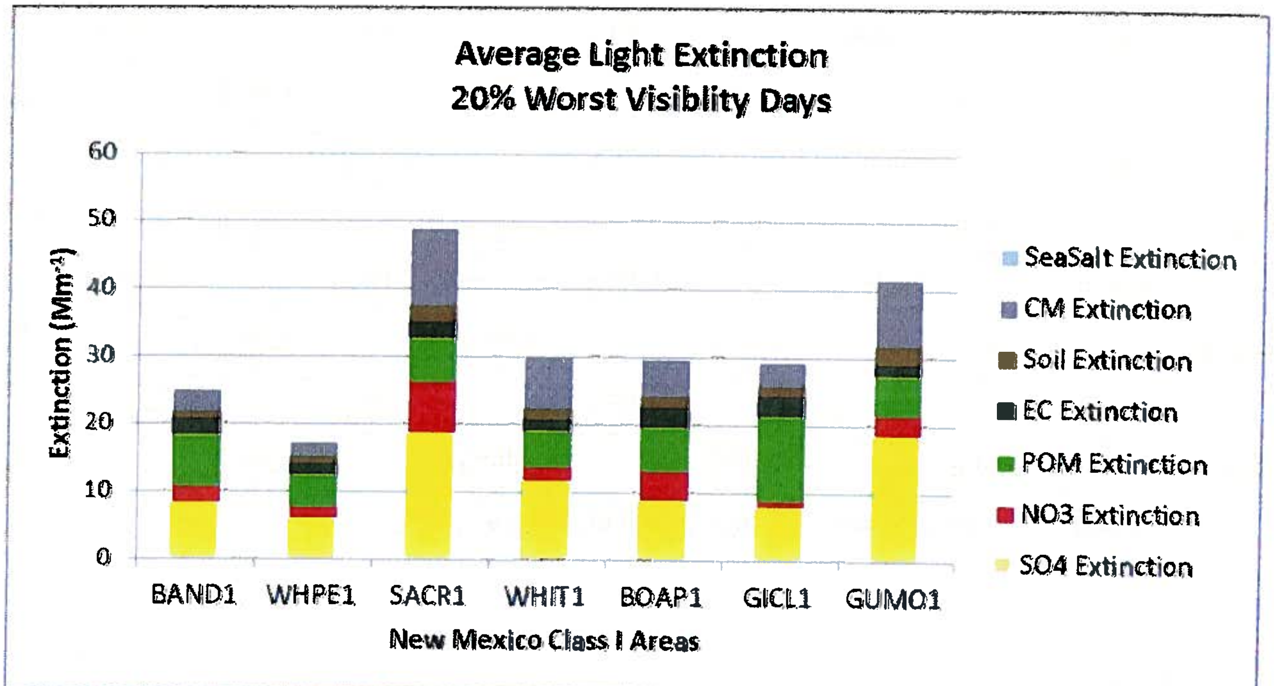

Figure 3.21. Average light extinction for the 20% worst days over the 5-year period 2005 through 2009 for all Class I areas in New Mexico.

Anthropogenic sources of SO_2 include coal-burning power plants and other industrial sources, such as smelters, industrial boilers, and oil refineries, and to a lesser extent, gasoline and diesel combustion. The primary sources of anthropogenic particulate organic matter in New Mexico include prescribed forest and agricultural burning, vehicle exhaust, vehicle refueling, solvent evaporation (e.g., paints), food cooking, and various commercial and industrial sources. Both of these pollutants are covered by existing RH long-term control strategies.

There does not appear to be any anthropogenic emissions within New Mexico that would have limited or impeded progress in reducing pollutant emissions or improving visibility.

3.7 Assessment of Current SIP Strategy: 40 CFR § 51.309(d)(10)(i)(F)

40 CFR § 51.309(d)(10)(i)(f) requires *"an assessment of whether the current implementation plan elements and strategies are sufficient to enable the State, or other States with mandatory Federal Class I areas affected by emissions from the State, to meet all established reasonable progress goals."*

Figure 3.22 displays the reconstructed extinction for the 20% worst days at the Gila Wilderness Area from 2000 through 2010. Similar results are seen at the other Class I areas in New Mexico (Appendix C). This figure demonstrates that on the 20% worst days, visibility continues to improve at New Mexico's Class I areas.

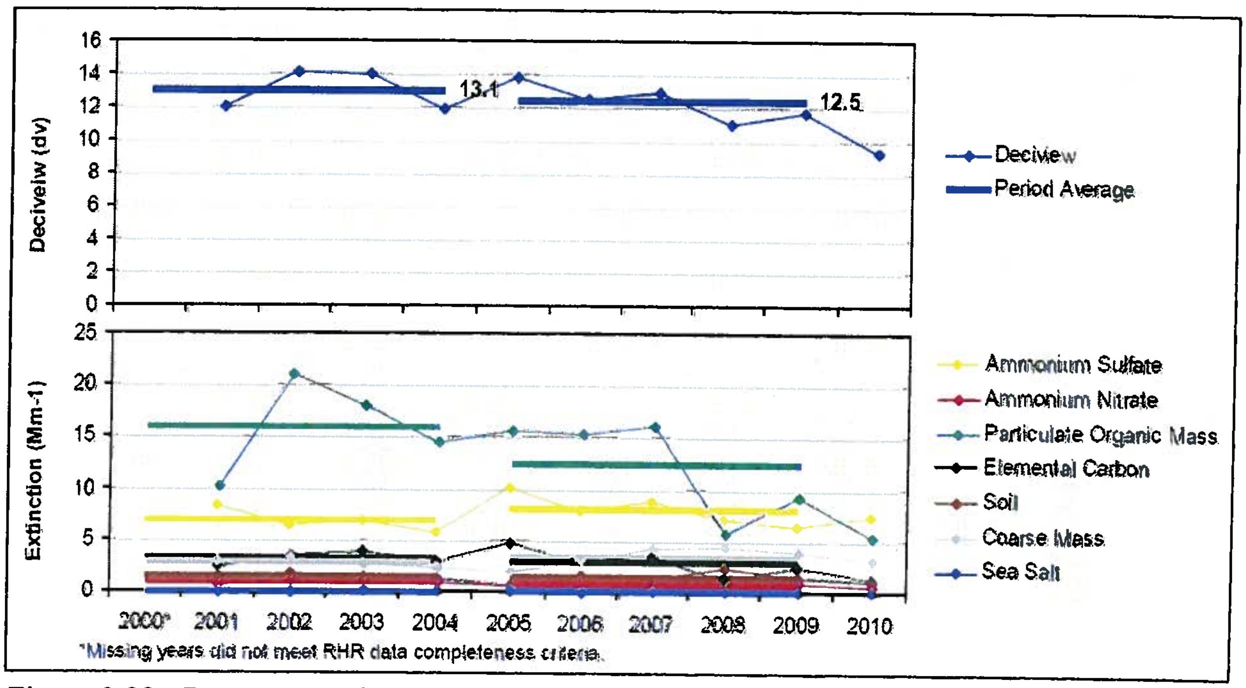

Figure 3.22. Reconstructed extinction for the 20% worst days at the Gila Wilderness Area from 2000 through 2010.

As Table 2.1 shows, the state is showing improving visibility at all New Mexico Class I areas, and is already exceeding the 2018 reasonable progress goals at all but two, BOAP1 and SACR1, of New Mexico's Class I areas. New Mexico believes that the current control strategies in the state's Section 309 and 309(g) SIP submittals are sufficient to meet all of the state's established 2018 reasonable progress goals and will not impede Class I areas outside of New Mexico from meeting their goals.

3.8 Assessment of Current Monitoring Strategy: 40 CFR § 51.309(d)(10)(i)(G)

40 CFR § 51.309(d)(10)(i)(G) requires *"a review of the State's visibility monitoring strategy and any modifications to the strategy as necessary."*

The primary monitoring network for regional haze, both nationwide and in New Mexico, is the IMPROVE monitoring network. Given that IMPROVE monitoring data from 2000-2004 serves as the baseline for the regional haze program, the future regional haze monitoring strategy must necessarily be based on, or directly comparable to the current IMPROVE network. The IMPROVE measurements provide the only long-term record available for tracking visibility improvement or degradation and therefore New Mexico intends to continue reliance on the IMPROVE network for complying with the RH monitoring requirement in the RH rule.

There are currently seven (7) IMPROVE sites in New Mexico and one (1) in Texas that is utilized for Carlsbad Caverns National Park (see Table 3.15 and Figure 3.23). No modifications to the existing visibility monitoring strategy are necessary at this time.

Table 3.15
New Mexico CIAs and Representative IMPROVE Monitors

Class I Area	Representative IMPROVE Site	Latitude	Longitude	Elevation (m)
Bandelier NM	BAND1	35.78	-106.27	1988
Bosque del Apache WA	BOAP1	33.87	-106.85	1389
Gila WA	GICL1	33.22	-108.24	1775
Guadalupe Mountains NP Carlsbad Caverns NP	GUMO1*	31.83	-104.81	1672
Salt Creek WA	SACR1	33.46	-104.40	1072
San Pedro Parks WA	SAPE1	36.01	-106.84	2935
White Mountain WA	WHIT1	33.47	-105.53	2063
Wheeler Peak WA Pecos WA	WHPE1	36.59	-105.45	3366

*IMPROVE Site is located in Texas.

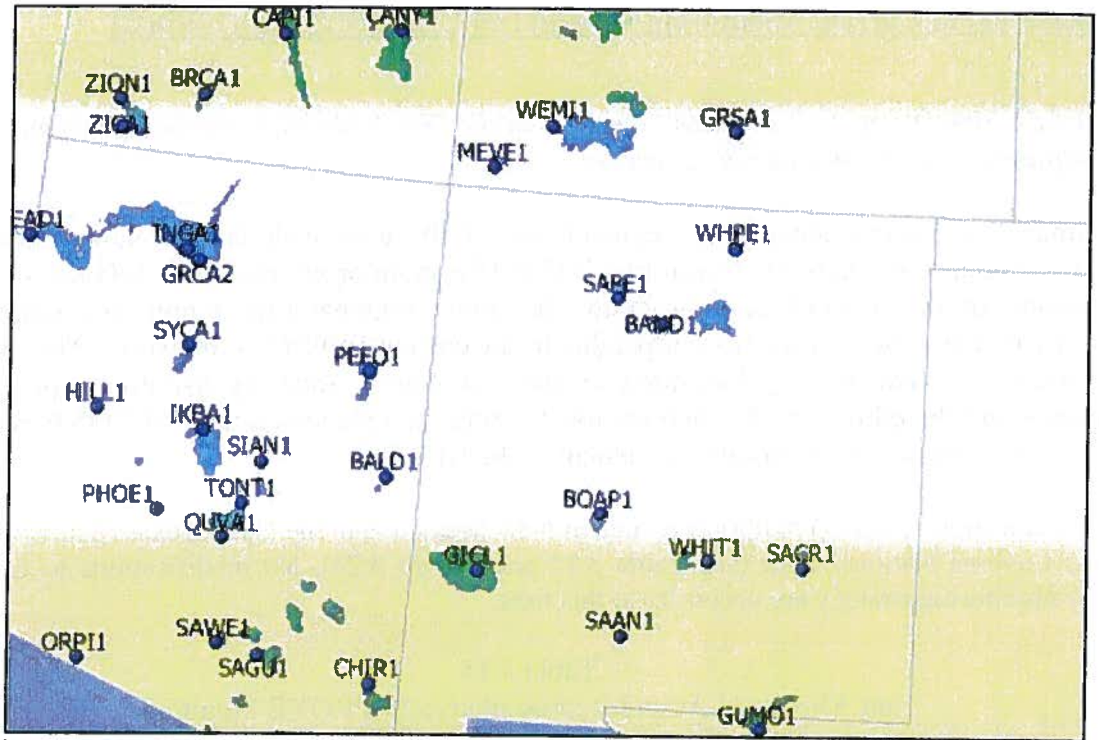

Figure 3.23. New Mexico's Federal Class I area IMPROVE monitoring sites

3.9 ASSESSMENT OF VISIBILITY CONDITIONS 40 CFR 51.309(d)(10)(ii)

40 CFR § 51.309(d)(10)(ii) requires "*Determination of the adequacy of existing implementation plan. At the same time the State is required to submit any 5-year progress report to EPA in accordance with paragraph (d)(10)(i) of this section, the State must also take one of the following actions based upon the information presented in the progress report:*

(1) If the State determines that the existing implementation plan requires no further substantive revision at this time in order to achieve established goals for visibility improvement and emissions reductions, the State must provide to the Administrator a negative declaration that further revision of the existing implementation plan is not needed at this time.

(2) If the State determines that the implementation plan is or may be inadequate to ensure reasonable progress due to emissions from sources in another State(s) which participated in a regional planning process, the State must provide notification to the Administrator and to the other State(s) which participated in the regional planning process with the States. The State must also collaborate with the other State(s) through the regional planning process for the purpose of developing additional strategies to address the plan's deficiencies.

(3) Where the State determines that the implementation plan is or may be inadequate to ensure reasonable progress due to emissions from sources in another country, the State shall provide notification, along with available information, to the Administrator.

(4) Where the State determines that the implementation plan is or may be inadequate to ensure reasonable progress due to emissions from sources within the State, the State shall revise its implementation plan to address the plan's deficiencies within one year"

The State of New Mexico has provided the information required under 40 CFR § 51.309(d)(10)(i) in this 5-year progress report. Based upon this information, New Mexico believes that the current Section 309 and 309(g) RH SIPs are adequate to meet the state's 2018 reasonable progress goals and require no further revision at this time.

4.0 REGIONAL SUMMARY FOR 309 GCVTC Class I Area Sites

Section 309 rules were based on recommendations from the Grand Canyon Visibility Transport Commission (GCVTC) Recommendations report,[5] specific to visibility impacts at the 16 Class I areas on the Colorado Plateau. Of the nine western states originally eligible for Section 309 RH rule implementation, only the states of New Mexico, Utah, and Wyoming and the city of Albuquerque/Bernalillo County currently exercise this option.

The 16 Class I areas on the Colorado Plateau are depicted in Figure 4.1 and listed in Table 4.1. Note that the ZION1 site, which originally represented Zion Canyon National Park, has since been replaced with the ZICA1 site. This section presents regional progress summaries specific to monitoring and emissions data at these Colorado Plateau sites.

Table 4.1
Colorado Plateau Class I Areas and Representative IMPROVE Monitors

Class I Area	Representative IMPROVE Site	Latitude	Longitude	Elevation (m)
Arizona				
Grand Canyon NP	GRCA2	35.97	-111.98	2267
Mount Baldy WA	BALD1	34.06	-109.44	2508
Petrified Forest NP	PEFO1	35.08	-109.77	1766
Sycamore Canyon WA	SYCA1	35.14	-111.97	2046
Colorado				
Black Canyon of the Gunnison NP Weminuche WA	WEMI1	37.66	-107.80	2750
Flat Tops WA Maroon Bells-Snowmass WA West Elk WA	WHRI1	39.15	-106.82	3413
Mesa Verde NP	MEVE1	37.20	-108.49	2172
New Mexico				
San Pedro Parks WA	SAPE1	36.01	-106.84	2935
Utah				
Bryce Canyon NP	BRCA1	37.62	-112.17	2481
Canyonlands NP Arches NP	CANY1	38.46	-109.82	1798
Capitol Reef NP	CAPI1	38.30	-111.29	1896
Zion NP	ZICA1*	37.20	-113.15	1215

*Replaced the ZION1 monitoring site in 2003.

[5] The Grand Canyon Visibility Transport Commission Recommendations for Improving Western Vistas Report is archived on the WRAP website at www.wrapair.org/WRAP/reports/GCVTCFinal.PDF.

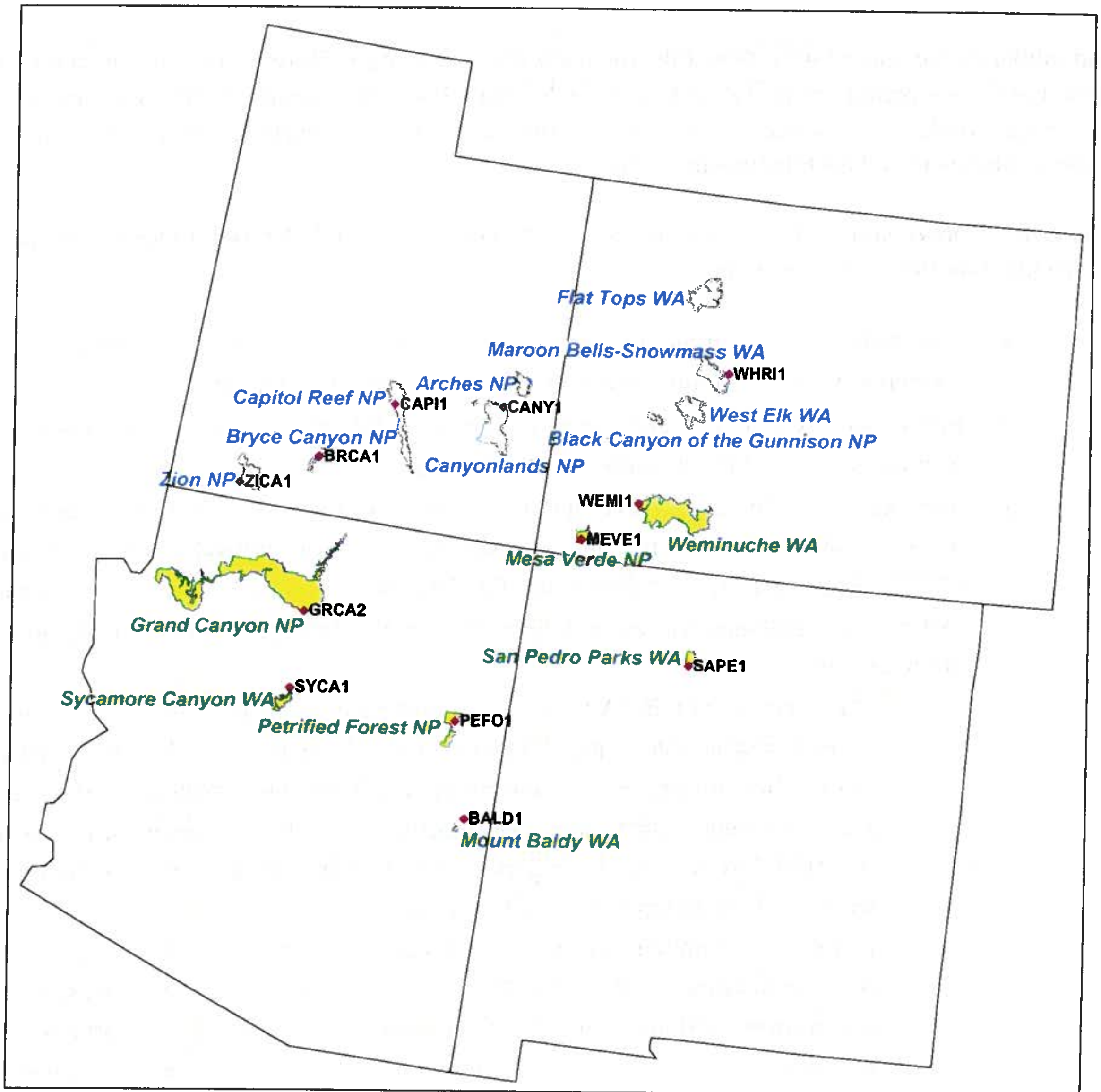

Figure 4.1. Map Depicting Colorado Plateau CIAs and Representative IMPROVE Monitors in Arizona, Colorado, New Mexico, and Utah.

Monitoring Data

Figures 4.2 and 4.3 present the 2005-2009 visibility averages for the 20% worst and best days for the IMPROVE sites representing Class I areas on the Colorado Plateau. The size of the pie chart is related to the magnitude of visibility impairment, and colors represent the relative contribution of the pollutants which are measured by the IMPROVE network. Tables 4.2 and 4.3 present the difference between the 2000-2004 baseline period average and the 2005-2009 first progress period average for the 20% worst and best days, respectively, for the Class I area sites in the Colorado Plateau region.

Table 4.4 presents the differences between the 2000-2004 baseline period average extinction and the 2005-2009 progress period average for each Class I area site in the Colorado Plateau region for the 20% most impaired days, and Table 4.5 presents similar data for the least impaired days. Averages that increased are depicted in red text and averages that decreased in blue.

Trend statistics for the years 2000-2009 for each species at each Class I area site in the Colorado Plateau region are presented in Table 4.6. As in Section 3.4.3, only trends for aerosol species trends with p-value statistics less than 0.15 (85% confidence level) are presented in the table here, with increasing slopes in red and decreasing slopes in blue.

Some general observations for the current visibility conditions, and the difference between current and baseline conditions are listed below:

- The largest contributors to aerosol extinction at the Colorado Plateau sites were particulate organic matter, ammonium sulfate, and coarse mass.
- For all sites, the 5-year average as measured in the deciview metric decreased for the best days between the baseline and first progress period.
- For most sites, the 5-year average as measured in the deciview metric decreased for the worst days between the baseline and first progress period. Exceptions included GRCA2 and BALD1 in Arizona and BRCA1 and CAPI1 in Utah. Some contributing factors for aerosol measurements that affected increased in 5-year average deciviews are listed below.
    - The increase at GRCA2 was due to increases in ammonium sulfate, elemental carbon, particulate organic matter and soil, partially offset by decreases in ammonium nitrate and coarse mass. The particulate organic carbon increase was associated with high measurements due to fire events in June and August of 2009. No statistically significant increasing annual trends were measured for any of the species at the GRCA2 site.
    - Extinction remained relatively unchanged in terms of deciviews for the worst days measured at the BALD1 site. Increases in coarse mass, soil, and ammonium sulfate were offset by decreases in particulate organic matter, elemental carbon, and ammonium nitrate. Trend statistics showed an increasing coarse mass trend at the BALD1 and PEFO1 sites in eastern Arizona.
    - At the BRCA1 and CAPI1 sites, the largest contributor to increases was particulate organic matter which, similar to GRCA2, was associated with large fires events in July and August, 2009. These increases were offset by decreases in ammonium nitrate and ammonium sulfate. An increasing soil trend was measured for the worst days at the CAPI1 site.
- Increases in 5-year average ammonium sulfate were measured at many regional sites, although most sites showed decreasing annual average ammonium sulfate trends. The 5-year average was influenced by relatively high regional measurements of ammonium sulfate in 2005. Figure 4.4 presents a plot of the annual averages for all Colorado Plateau sites, showing the high values measured in 2005, followed by generally decreasing trends.

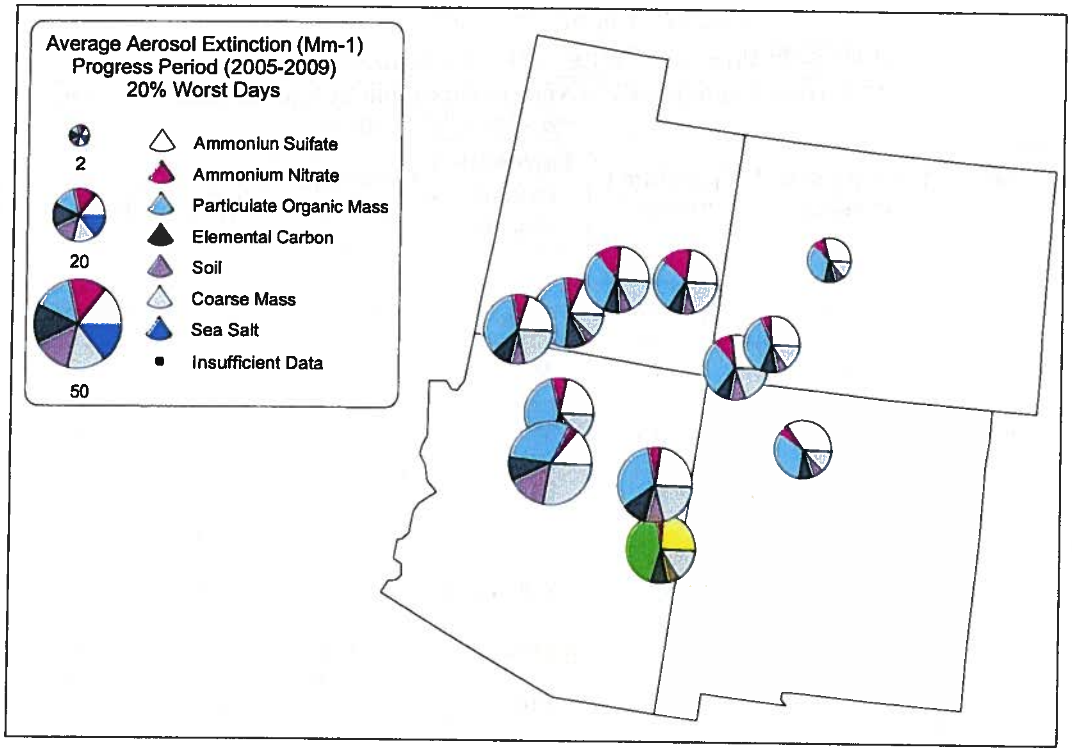

Figure 4.2. Regional Average of Aerosol Extinction by Pollutant for the First Progress Period Average (2005 – 2009) for 20% Worst Days.

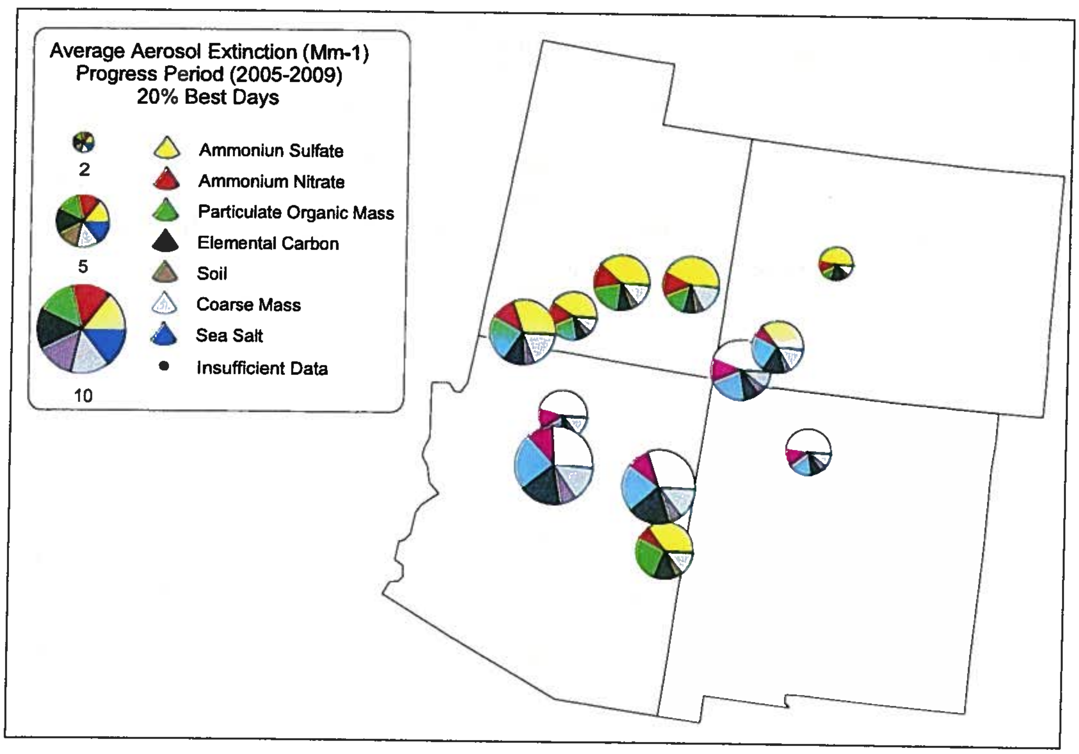

Figure 4.3.Regional Average of Aerosol Extinction by Pollutant for First Progress Period Average (2005 – 2009) for 20% Best Days

Table 4.2
Colorado Plateau Class I Area IMPROVE Sites

Current Visibility Conditions
2005-2009 Progress Period, 20% Most Impaired Days

Site	Deciviews (dv)	Percent Contribution to Aerosol Extinction by Species (Excludes Rayleigh) (% of Mm^{-1}) and Rank*						
		Ammonium Sulfate	Ammonium Nitrate	Particulate Organic Matter	Elemental Carbon	Soil	Coarse Mass	Sea Salt
Arizona								
GRCA2	12.0	22% (2)	7% (5)	**41% (1)**	11% (4)	6% (6)	12% (3)	0% (7)
BALD1	11.8	25% (2)	4% (6)	**42% (1)**	8% (4)	6% (5)	16% (3)	0% (7)
PEFO1	13.0	23% (2)	5% (6)	**31% (1)**	11% (4)	8% (5)	21% (3)	1% (7)
SYCA1	15.2	15% (4)	4% (6)	**29% (1)**	9% (5)	15% (3)	28% (2)	0% (7)
Colorado								
WEMI1	10.0	27% (2)	5% (6)	**36% (1)**	10% (4)	7% (5)	15% (3)	0% (7)
WHRI1	8.9	30% (2)	8% (5)	**33% (1)**	8% (4)	7% (6)	13% (3)	0% (7)
MEVE1	11.3	27% (2)	9% (4)	**28% (1)**	7% (6)	9% (5)	20% (3)	0% (7)
New Mexico								
SAPE1	9.9	**34% (1)**	6% (6)	32% (2)	8% (4)	7% (5)	13% (3)	0% (7)
Utah								
BRCA1	11.9	19% (2)	9% (5)	**45% (1)**	10% (4)	5% (6)	12% (3)	0% (7)
CANY1	11.0	23% (2)	14% (4)	**27% (1)**	7% (5)	7% (6)	20% (3)	0% (7)
CAPI1	11.3	24% (2)	12% (4)	**32% (1)**	8% (5)	7% (6)	17% (3)	0% (7)
ZICA1	12.3	21% (3)	7% (5)	**33% (1)**	9% (4)	7% (6)	22% (2)	0% (7)

*Highest aerosol species contribution per site is highlighted in bold.

Table 4.3
Colorado Plateau Class I Area IMPROVE Sites
Current Visibility Conditions
2005-2009 Progress Period, 20% Least Impaired Days

Site	Deciviews (dv)	Percent Contribution to Aerosol Extinction by Species (Excludes Rayleigh) (% of Mm^{-1}) and Rank*						
		Ammonium Sulfate	**Ammonium Nitrate**	**Particulate Organic Matter**	**Elemental Carbon**	**Soil**	**Coarse Mass**	**Sea Salt**
Arizona								
GRCA2	2.2	**45% (1)**	13% (4)	15% (2)	9% (5)	4% (6)	14% (3)	1% (7)
BALD1	2.9	**35% (1)**	7% (5)	26% (2)	13% (4)	5% (6)	13% (3)	1% (7)
PEFO1	4.6	**31% (1)**	9% (5)	21% (2)	19% (3)	6% (6)	14% (4)	0% (7)
SYCA1	5.1	**27% (1)**	10% (5)	23% (2)	17% (3)	7% (6)	15% (4)	1% (7)
Colorado								
WEMI1	2.4	**36% (1)**	6% (5)	23% (2)	15% (4)	4% (6)	15% (3)	1% (7)
WHRI1	0.2	**46% (1)**	10% (5)	14% (3)	15% (2)	5% (6)	11% (4)	0% (7)
MEVE1	3.1	**44% (1)**	12% (3)	21% (2)	9% (5)	5% (6)	9% (4)	0% (7)
New Mexico								
SAPE1	1.0	**47% (1)**	12% (3)	18% (2)	8% (5)	5% (6)	10% (4)	1% (7)
Utah								
BRCA1	11.9	19% (2)	9% (5)	**45% (1)**	10% (4)	5% (6)	12% (3)	0% (7)
CANY1	11.0	23% (2)	14% (4)	**27% (1)**	7% (5)	7% (6)	20% (3)	0% (7)
CAPI1	11.3	24% (2)	12% (4)	**32% (1)**	8% (5)	7% (6)	17% (3)	0% (7)
ZICA1	12.3	21% (3)	7% (5)	**33% (1)**	9% (4)	7% (6)	22% (2)	0% (7)

*Highest aerosol species contribution per site is highlighted in bold.

Table 4.4
Colorado Plateau Class I Area IMPROVE Sites
Difference in Aerosol Extinction by Species
2000-2004 Baseline Period to 2005-2009 Progress Period
20% Most Impaired Days

Site	Deciview (dv)			Change in Extinction by Species (Mm^{-1})*						
	2000-04 Baseline Period	2005-09 Progress Period	Change in dv*	Amm. Sulfate	Amm. Nitrate	POM	EC	Soil	CM	Sea Salt
Arizona										
GRCA2	11.7	12.0	+0.3	+0.5	-0.4	+0.1	+0.5	+0.1	-0.3	0.0
BALD1	11.8	11.8	0.0	+0.3	-0.1	-2.1	-0.7	+0.4	+1.3	+0.1
PEFO1	13.2	13.0	-0.2	+0.5	-0.3	-1.4	+0.5	+0.6	-1.0	+0.1
SYCA1	15.3	15.2	-0.1	+0.7	-0.7	-0.5	+0.4	-1.0	+1.4	0.0
Colorado										
WEMI1	10.3	10.0	-0.3	+0.1	-0.2	-1.4	-0.2	+0.1	0.0	-0.1
WHRI1	9.6	8.9	-0.7	+0.3	0.0	-2.3	-0.3	+0.1	-0.5	0.0
MEVE1	13.0	11.3	-1.7	-0.2	-0.3	-5.8	-0.7	-0.5	-2.0	0.0
New Mexico										
SAPE1	10.2	9.9	-0.3	+1.0	-0.4	-1.4	-0.1	-0.1	-0.2	0.0
Utah										
BRCA1	11.6	11.9	+0.3	-0.2	-0.3	+2.5	+0.2	+0.1	-0.9	0.0
CANY1	11.2	11.0	-0.2	-0.3	+0.3	-0.9	-0.1	+0.1	+0.8	0.0
CAPI1	10.9	11.3	+0.4	-0.2	-0.7	+1.8	+0.2	+0.3	+0.7	+0.1
ZICA1	12.5	12.3	-0.2	+0.2	-0.3	-0.8	-0.1	+0.1	0.0	+0.1

*Change is calculated as progress period average minus baseline period average. Values in red indicate increases in extinction and values in blue indicate decreases.

Table 4.5
Colorado Plateau Class I Area IMPROVE Sites
Difference in Aerosol Extinction by Species
2000-2004 Baseline Period to 2005-2009 Progress Period
20% Least Impaired Days

Site	Deciview (dv)			Change in Extinction by Species (Mm^{-1})*						
	2000-04 Baseline Period	2005-09 Progress Period	Change in dv*	Amm. Sulfate	Amm. Nitrate	POM	EC	Soil	CM	Sea Salt
Arizona										
GRCA2	2.2	2.2	0.0	+0.1	0.0	-0.1	0.0	0.0	0.0	0.0
BALD1	3.0	2.9	-0.1	-0.1	-0.1	-0.1	0.0	0.0	+0.1	0.0
PEFO1	5.0	4.6	-0.4	-0.1	-0.2	-0.4	0.0	+0.1	0.0	0.0
SYCA1	5.6	5.1	-0.5	+0.1	-0.1	-0.6	-0.2	-0.1	+0.1	0.0
Colorado										
WEMI1	3.1	2.4	-0.7	-0.1	-0.1	-0.4	-0.2	0.0	-0.1	0.0
WHRI1	0.7	0.2	-0.5	0.0	-0.1	-0.3	-0.1	0.0	0.0	0.0
MEVE1	4.3	3.1	-1.2	-0.3	-0.3	-0.5	-0.2	-0.2	-0.3	0.0
New Mexico										
SAPE1	1.5	1.0	-0.5	-0.1	-0.1	-0.2	-0.1	0.0	0.0	0.0
Utah										
BRCA1	2.8	2.1	-0.7	-0.1	-0.2	-0.3	-0.2	0.0	-0.1	0.0
CANY1	3.7	2.8	-0.9	-0.3	-0.1	-0.5	-0.1	-0.1	-0.2	0.0
CAPI1	4.1	2.7	-1.4	-0.3	-0.4	-0.5	-0.2	-0.1	-0.4	0.0
ZICA1	5.0	4.3	-0.7	-0.1	-0.2	-0.5	-0.2	0.0	-0.1	0.0

*Change is calculated as progress period average minus baseline period average. Values in red indicate increases in extinction and values in blue indicate decreases.

Table 4.6
Colorado Plateau Class I Area IMPROVE Sites
Change in Aerosol Extinction by Species
2000-2009 Annual Average Trends

Site	Group	Annual Trend* (Mm^{-1}/year)						
		Amm. Sulfate	**Amm. Nitrate**	**POM**	**EC**	**Soil**	**CM**	**Sea Salt**
Arizona								
GRCA2	20% Best	--	--	--	0.0	--	--	0.0
	20% Worst	--	-0.1	--	--	--	--	--
	All Days	--	0.0	--	--	--	--	--
BALD1	20% Best	--	0.0	--	0.0	--	0.0	0.0
	20% Worst	-0.2	--	--	--	0.1	0.3	0.0
	All Days	-0.1	0.0	--	--	--	0.1	0.0
PEFO1	20% Best	--	0.0	-0.1	--	--	--	0.0
	20% Worst	--	--	--	--	0.1	--	0.0
	All Days	--	0.0	--	--	0.0	0.1	0.0
SYCA1	20% Best	--	--	-0.1	--	--	--	0.0
	20% Worst	--	--	--	0.1	-0.3	--	--
	All Days	--	0.0	--	--	-0.1	--	--
Colorado								
WEMI1	20% Best	-0.1	0.0	-0.1	-0.1	--	--	--
	20% Worst	--	--	--	0.0	--	--	--
	All Days	--	0.0	--	-0.1	--	--	--
WHRI1	20% Best	--	0.0	-0.1	0.0	--	--	--
	20% Worst	--	--	--	-0.1	--	--	0.0
	All Days	--	--	-0.1	0.0	--	--	0.0
MEVE1	20% Best	-0.1	0.0	-0.1	0.0	0.0	0.0	--
	20% Worst	--	--	--	-0.2	--	--	0.0
	All Days	-0.1	--	-0.3	-0.1	--	--	0.0
New Mexico								
SAPE1	20% Best	--	0.0	0.0	0.0	--	--	--
	20% Worst	--	-0.1	--	--	--	--	--
	All Days	--	0.0	-0.1	0.0	--	0.0	0.0
Utah								
BRCA1	20% Best	--	0.0	-0.1	0.0	--	0.0	0.0
	20% Worst	-0.2	--	0.5	0.1	--	--	0.0
	All Days	-0.1	0.0	--	--	--	--	--
CANY1	20% Best	-0.1	--	-0.1	0.0	--	-0.1	0.0
	20% Worst	-0.1	--	--	--	--	--	0.0
	All Days	-0.1	0.0	--	0.0	0.0	--	0.0
CAPI1	20% Best	-0.1	-0.1	-0.1	0.0	--	-0.1	--
	20% Worst	--	-0.2	--	--	0.1	--	0.0
	All Days	-0.1	-0.1	--	0.0	--	--	0.0
ZICA1	20% Best	0.0	--	--	0.0	0.0	--	0.0
	20% Worst	-0.5	--	--	--	--	--	--
	All Days	-0.2	--	--	-0.1	0.1	--	--

*(--) Indicates statistically insignificant trend (<85% confidence level). Annual averages and complete trend statistics for all significance levels are included for each site in state specific appendices.

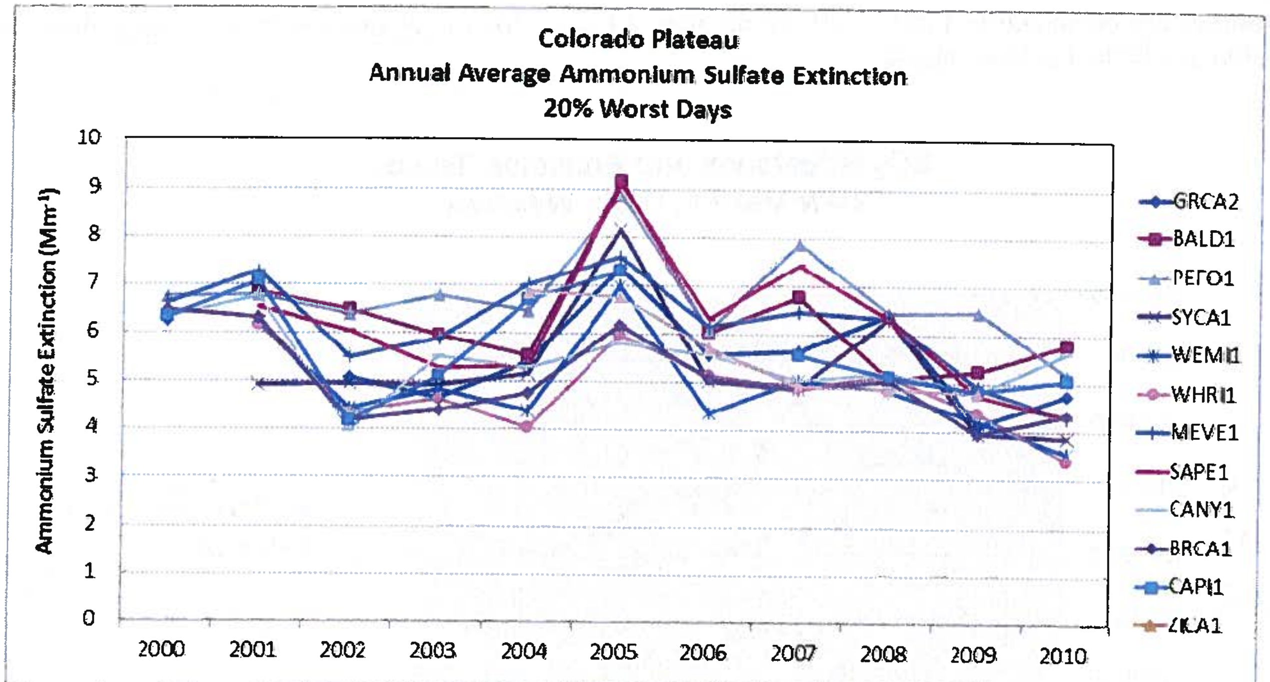

Figure 4.4. Chart Depicting Annual Average Ammonium Sulfate Concentrations for the 20% Worst Days as Measured at the Colorado Plateau CIA IMPROVE Sites.

Similar to 308 requirements, Section 309 states are required to address how total state emissions have changed over the past 5 years (51.309(d)(10)(i)(D)). Emission inventory summaries using 2002 and 2008 inventories to represent changes between the baseline and progress periods are described in detail for the entire state in Section 3.5.

In addition to tracking these differences in inventories, for the initial SIPs, Section 309 states were required to identify "clean air corridors" and track emissions inside and outside of these corridors that may affect impairment on the cleanest days.[6] In these initial Section 309 SIPs, an area covering major portions of Nevada, southern Utah, eastern Oregon and southwestern Idaho was defined as a "clean air corridor," which was intended to represent a region from which clean air transport influences many of the clean air days at Grand Canyon National Park. Visibility has improved for the best days at all of the Class I area sites on the Colorado Plateau, so emissions specific to the "clean air corridor" counties are not presented separately here.

As part of the Western Backstop Sulfur Dioxide Trading Program, the participating states (and county) identified SO_2 emissions milestones, where a milestone is a maximum level of annual emissions for a given year. WRAP supports the Section 309 states with the submittal of annual regional SO_2 and emission milestone reports (Appendix B) which compare actual emissions estimates to the pre-defined milestones.[7] Figure 4.5 presents a plot from the most recent SO_2 milestone report, showing the 3-year average of current emissions through 2010, which indicated that actual emissions were below the SO_2 milestone. Additionally, SO_2 emissions specific to EGU

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[6] Section 51.309(d)(3) states, for treatment of clean-air corridors, "the plan must describe and provide for implementation of comprehensive emission tracking strategies for clean-air corridors to ensure that the visibility does not degrade on the least-impaired days at any of the 16 Class I areas."
[7] Annual regional SO_2 emissions and milestone reports are located on the WRAP website at http://www.wrapair2.org/reghaze.aspx.

sources are presented in Figure 3.19 on an annual basis showing changes in these sources between 1996 and 2010 for New Mexico.

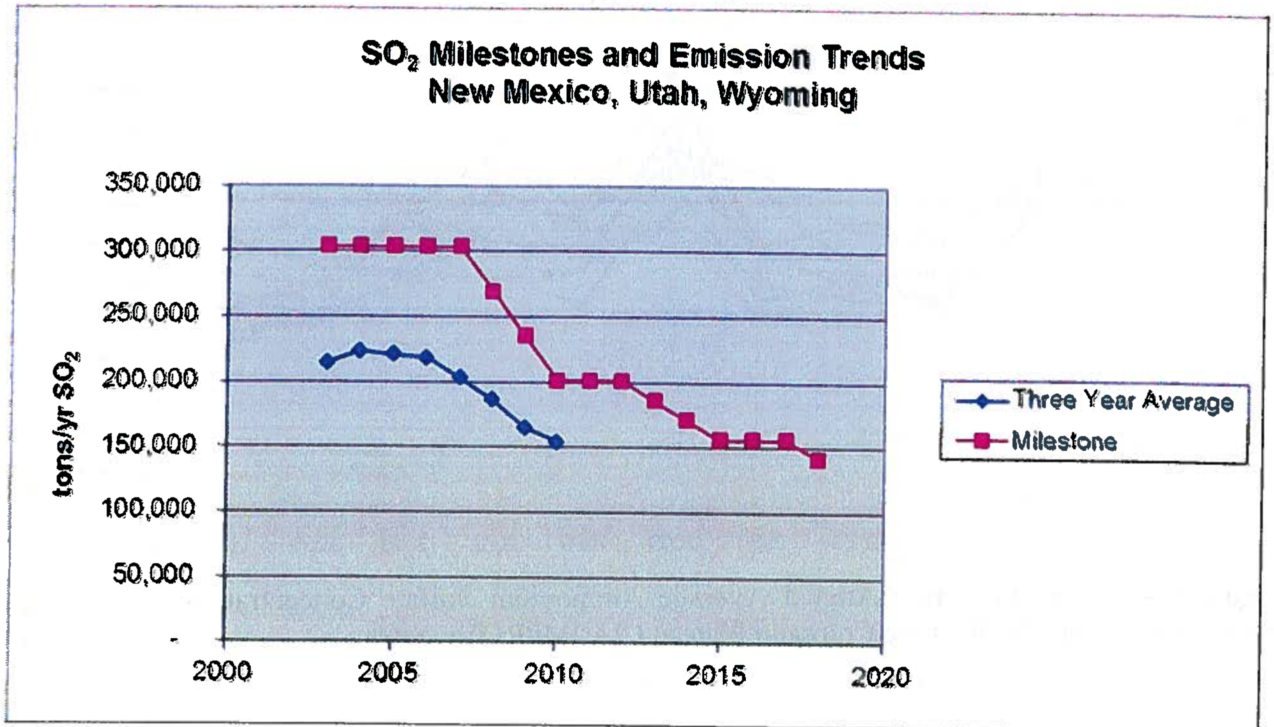

Figure 4.5. Chart Depicting 3-Year Average Sum of SO_2 emissions for New Mexico, Utah and Wyoming and the city of Albuquerque/Bernalillo County as compared to the Section 309 SIP SO_2 Milestones.