REVISIONS TO THE STATE OF NEW MEXICO IMPLEMENTATION PLAN FOR THE CONTROL OF REGIONAL HAZE, ALBUQUERQUE-BERNALILLO COUNTY ELEMENT

2024 REGIONAL HAZE STATE IMPLEMENTATION PLAN REVISION FOR THE SECOND PLANNING PERIOD

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Abbreviations and Acronyms

µg- Micrograms
µg/m^3- Micrograms per Cubic Meter
40 CFR §51.308- Title 40 of the Code of Federal Regulations, Part 51, Subpart P, Section 308
40 CFR §51.309- Title 40 of the Code of Federal Regulations, Part 51, Subpart P, Section 309
A-BC- Albuquerque - Bernalillo County
A-BC AQCB or Board- Albuquerque - Bernalillo County Air Quality Control Board
A-BC Section 309 SIP- Albuquerque - Bernalillo County Section 309 Regional Haze State Implementation Plan
ABS- Ammonium Bisulfate Salt
ACI- Air Curtain Incinerator
ACT- Alternative Control Techniques
AEG- Annual Emissions Goal
NH_3- Ammonia
APC- Air Pollution Control
AQB- Air Quality Bureau, New Mexico Environment Department
AQP- Air Quality Program, Environmental Health Department, City of Albuquerque
ATS- Allowance Tracking System
BACT- Best Available Control Technology
BAND1- Bandelier Wilderness IMPROVE Monitor
BART- Best Available Retrofit Technology
B_{ext}- Extinction coefficient or Light extinction coefficient
BOAP1- Bosque del Apache Wilderness IMPROVE Monitor
CAA or Act- Clean Air Act
CAVE1- Carlsbad Caverns IMPROVE Monitor
CCF- Ceramic Catalytic Filters
CFR- Code of Federal Regulations
CIA- Class I Area
CM- Coarse Mass
CO- Carbon Monoxide
CY- Calendar Year
d- Distance to the Nearest Class I Area
DSI- Dry Sorbent Injection
dv, DV- Deciview(s)
EATS- Emission Allowance Tracking System
EC- Elemental Carbon
EDMS- Emissions Data Reporting, Management and Tracking System
EGU- Electrical Generating Unit
EHD- Environmental Health Department, City of Albuquerque
EIA- Energy Information Agency
EIB- State of New Mexico Environmental Improvement Board
EPA- U.S. Environmental Protection Agency
ERG- Eastern Research Group, Inc.
ERT- Emission Reduction Technique
ESP- Electrostatic Precipitator

Fed. Reg.- Federal Register
FEJF- Fire Emissions Joint Forum
FEP- Fire Emissions Project
FIP- Federal Implementation Plan
FLM(s)- Federal Land Manager(s)
GA- Georgia
GCC or GCC Tijeras GCC Rio Grande, Inc.- Portland Cement Manufacturing Plant in Tijeras, New Mexico
GCP- Good Combustion Practices
GCVTC- Grand Canyon Visibility Transport Commission
GICL1- Gila Wilderness IMPROVE Monitor
GUMO1- Guadalupe Mountains National Park/Carlsbad Caverns National Park IMPROVE Monitor
HCL- Hydrochloric Acid
HHV- Higher Heating Value
I&M- Inspection and Maintenance Program
IMPROVE- Interagency Monitoring of Protected Visual Environments
IN- Indiana
IL- Illinois
IPRA- Inspection of Public Records Act
Km- Kilometers
LAER- Lowest Achievable Emission Rate
Ln- Natural Logarithm
LNB- Low NOx Burner
LTS- Long-Term Strategy
MID- Most Impaired Days
Mm^{-1}-Inverse Megameters
MMBtu- Million British Thermal Units
MOU- Memorandum of Understanding
MSL- Mean Sea Level
MW- Megawatts
N_2- Nitrogen
NAAQS- National Ambient Air Quality Standards
NEI- National Emissions Inventory
NH_3- Ammonia
NM- New Mexico
NMAC- New Mexico Administrative Code
NMED- New Mexico Environment Department
NMSA- New Mexico Statutes Annotated
NO- Nitric Oxide
NO_x- Nitrogen Oxides
NO_2- Nitrogen Dioxide
NSCR- Non-Selective Catalytic Reduction
NSPS- New Source Performance Standards
NSR- New Source Review
NVC- Natural Visibility Conditions
NWR or Refuge- National Wildlife Refuge
O_3- Ozone
OC or OMC or POM- Organic Carbon or Organic Mass from Carbon or Particulate Organic Matter
PBII- Prescribed Burn II

PM- Particulate Matter
$PM_{2.5}$- Particulate Matter 2.5 Microns or Smaller in Diameter
PM_{10}- Particulate Matter 10 Microns or Smaller in Diameter
Ppb- Parts per Billion
PRC- State of New Mexico Public Regulation Commission
PSD- Prevention of Significant Deterioration
PTE- Potential to Emit
Q- Quantity of Emissions
Q/d Analysis- Quantity of Emissions Divided by Distance to the Nearest Class I Area
RACT- Reasonably Available Control Technology
RATA- Relative Accuracy Test Audit
RAVI- Reasonably Attributable Visibility Impairment
RBLC- EPA RACT/BACT/LAER Clearinghouse
RH- Regional Haze
RHR or Rule- Regional Haze Rule
ROA- Revised Ordinances of the City of Albuquerque
RPG(s)- Reasonable Progress Goal(s)
RPO(s)- Regional Planning Organization(s)
RPS- Renewable Portfolio Standard
SAAN1- San Andres IMPROVE Monitor
SACR1- Salt Creek Wilderness IMPROVE Monitor
SAPE1- San Pedro Parks Wilderness IMPROVE Monitor
SCR- Selective Catalytic Reduction
SEP- Supplemental Environmental Project
SIP(s)- State Implementation Plan(s)
SIPr- State Implementation Plan Revision
SJGS- San Juan Generating Station
SLEIS- State and Local Emissions Inventory System
SMP- Smoke Management Plan or Smoke Management Program
SNCR- Selective Non-Catalytic Reduction
SO_2- Sulfur Dioxide
SO_4- Sulfate
Soil- Fine Soil
SOP(s)- Standard Operating Procedure(s)
SWB- Solid Waste Bureau, New Mexico Environment Department
TDF- Tire Derived Fuel
TIP- Tribal Implementation Plan
TOR- Thermal-Optical-Reflectance
TPY- Tons per Year
TSA- Tracking System Administrator
TSD- Technical Support Document
TX- Texas
URP- Uniform Rate of Progress
USFS- U.S. Forest Service
USFWS- U.S. Fish and Wildlife Service
USNPS- U.S. National Park Service
VMT- Vehicle Miles Traveled
VOCs- Volatile Organic Compounds

VR- Visual Range
WB- Wind-blown
WEB- Western Emissions Budget
WEB EATS- Western Emissions Budget Emission Allowance Tracking System
WEP- Weighted Emissions Potential
WESTAR- Western States Air Resources Council
WFU- Wildland Fire Managed for Resource Benefit
WGA- Western Governors' Association
WHIT1- White Mountain Wilderness IMPROVE Monitor
WHPE1- Wheeler Peak Wilderness/Pecos Wilderness IMPROVE Monitor
WRAP- Western Regional Air Partnership
WRAP TSS(v2)- Western Regional Air Partnership Technical Support System Website (Version 2)
XRF- X-Ray Fluorescence

Chapter 1: Introduction

1.1 Overview

The City of Albuquerque Environmental Health Department (EHD) prepared this Regional Haze State Implementation Plan Revision (SIPr) element in accordance with U.S. Environmental Protection Agency (EPA) regulations for consideration by the Albuquerque-Bernalillo County Air Quality Control Board. The plan element describes how Albuquerque-Bernalillo County meets requirements of the federal regulation known as the Regional Haze Rule, which appears in Title 40 of the Code of Federal Regulations, Part 51, Subpart P, Sections 308 and 309 (40 CFR §§ 51.308 and 309). The purpose of the Regional Haze Rule is to improve visibility impairment at certain designated federal areas caused by emissions of anthropogenic air pollutants known to result in such impairment.

We refer to this document as a plan "element" for the state because it functions in tandem with a similar plan element, to be proposed separately by the State of New Mexico Environment Department (NMED) for consideration by the Environment Improvement Board (EIB) for application to the rest of the state, which is a separate air quality jurisdiction from Albuquerque-Bernalillo County. The two plan elements together will function as a single plan for the entire state of New Mexico, excluding tribal lands. The EPA has requested this cooperative approach because the Regional Haze Rule applies to entire states.

Therefore, the Albuquerque-Bernalillo County Regional Haze State Implementation Plan Revision element for this second planning period (2019-2028) will be referred to as the "Regional Haze SIPr Round 2 (2019-2028)" for Bernalillo County excluding the rest of New Mexico and tribal lands.

This introductory chapter provides an overview of the Regional Haze Rule and its requirements, how this SIPr document satisfies those requirements, and the organizations involved in preparing and approving the SIPr at the local, state, regional, and federal levels.

1.2 Definitions of Visibility-Related Concepts

Implementation of the Regional Haze Rule depends on sound technical methods to characterize visibility at Class I Areas. A list of selected definitions from 40 CFR § 51.301[1],which apply to 40 CFR § 51.308 that covers EPA's Regional Haze Rule requirements, is provided in 1.1.1: 40 CRF § 51.301 Definitions. These definitions will help to serve as a reference for some of the technical terms that will be used throughout this SIPr. Other relevant definitions and explanations of visibility-related terms are provided in 1.1.2: Other definitions.

40 CFR § 51.301 definitions

- **Baseline visibility condition** means the average of the five annual averages of the individual values of daily visibility for the period 2000–2004 unique to each Class I Area for either the most impaired days or the clearest days.

[1] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-51/subpart-P/section-51.301

- **Best Available Retrofit Technology (BART)** means an emission limitation based on the degree of reduction achievable through the application of the best system of continuous emission reduction for each pollutant which is emitted by an existing stationary facility. The emission limitation must be established, on a case-by-case basis, taking into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts of compliance, any pollution control equipment in use or in existence at the source, the remaining useful life of the source, and the degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology.

- **Clearest days** means the twenty percent of monitored days in a calendar year with the lowest values of the deciview index.

- **Current visibility condition** means the average of the five annual averages of individual values of daily visibility for the most recent period for which data are available unique to each Class I Area for either the most impaired days or the clearest days.

- **Deciview (DV)** is the unit of measurement on the deciview index scale for quantifying, in a standard manner, human perceptions of visibility.

- **Deciview index** means a value for a day that is derived from calculated or measured light extinction, such that uniform increments of the index correspond to uniform incremental changes in perception across the entire range of conditions, from pristine to very obscured. The deciview index is calculated based on the following equation (for the purposes of calculating deciview using IMPROVE data, the atmospheric light extinction coefficient must be calculated from aerosol measurements and an estimate of Rayleigh scattering):

$$10 \ln (b_{ext}/10\ Mm{-}1)$$

  where, b_{ext} = atmospheric light extinction coefficient, expressed in inverse megameters (Mm−1).

- **Federal Land Manager (FLM)** means the Secretary of the department with authority over the Federal Class I Area (or the Secretary's designee) or, with respect to Roosevelt-Campobello International Park, the Chairman of the Roosevelt-Campobello International Park Commission.

- **Federally enforceable** means all limitations and conditions which are enforceable by the Administrator under the Clean Air Act including those requirements developed pursuant to parts 60 and 61 of Title 40, requirements within any applicable State Implementation Plan, and any permit requirements established pursuant to § 52.21 of Chapter I or under regulations approved pursuant to part 51, 52, or 60 of Title 40.

- **Fixed capital cost** means the capital needed to provide all of the depreciable components.

- **Fugitive emissions** means those emissions which could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening.

- **Implementation plan** means, for the purposes of Part 51, any State Implementation Plan, Federal Implementation Plan, or Tribal Implementation Plan.

- **Native American tribe or tribe** means any Native American tribe, band, nation, or other organized group or community, including any Alaska Native village, which is federally recognized as eligible for the special programs and services provided by the United States to Native Americans because of their status as Native Americans.

- **In existence** means that the owner or operator has obtained all necessary preconstruction approvals or permits required by Federal, State, or local air pollution emissions and air quality laws or regulations and either has (1) begun, or caused to begin, a continuous program of physical on-site construction of the facility or (2) entered into binding agreements or contractual obligations, which cannot be cancelled or modified without substantial loss to the owner or operator, to undertake a program of construction of the facility to be completed in a reasonable time.

- **Installation** means an identifiable piece of process equipment.

- **Integral vista** means a view perceived from within the mandatory Class I Federal area of a specific landmark or panorama located outside the boundary of the mandatory Class I Federal area.

- **Least impaired days** means the twenty percent of monitored days in a calendar year with the lowest amounts of visibility impairment.

- **Major stationary source** and major modification mean major stationary source and major modification, respectively, as defined in 40 CFR § 51.166.

- **Mandatory Class I Federal Area or Mandatory Federal Class I Area** means any area identified in part 81, subpart D of Title 40.

- **Most impaired days** means the twenty percent of monitored days in a calendar year with the highest amounts of anthropogenic visibility impairment.

- **Natural conditions** reflect naturally occurring phenomena that reduce visibility as measured in terms of light extinction, visual range, contrast, or coloration, and may refer to the conditions on a single day or a set of days. These phenomena include, but are not limited to, humidity, fire events, dust storms, volcanic activity, and biogenic emissions from soils and trees. These phenomena may be near or far from a Class I Area and may be outside the United States.

- **Natural visibility** means visibility (contrast, coloration, and texture) on a day or days that would have existed under natural conditions. Natural visibility varies with time and location, is estimated or inferred rather than directly measured, and may have long-term trends due to long-term trends in natural conditions.

- **Natural visibility condition** means the average of individual values of daily natural visibility unique to each Class I Area for either the most impaired days or the clearest days.

- **Potential to emit** means the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant including air pollution control equipment and restrictions on hours of operation

or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is federally enforceable. Secondary emissions do not count in determining the potential to emit of a stationary source.

- **Prescribed fire** means any fire intentionally ignited by management actions in accordance with applicable laws, policies, and regulations to meet specific land or resource management objectives.

- **Regional haze** means visibility impairment that is caused by the emission of air pollutants from numerous anthropogenic sources located over a wide geographic area. Such sources include, but are not limited to, major and minor stationary sources, mobile sources, and area sources.

- **Secondary emissions** are emissions which occur as a result of the construction or operation of an existing stationary facility but do not come from the existing stationary facility. Secondary emissions may include, but are not limited to, emissions from ships or trains coming to or from the existing stationary facility.

- **Stationary Source** means any building, structure, facility, or installation which emits or may emit any air pollutant.

- **Visibility** means the degree of perceived clarity when viewing objects at a distance. Visibility includes perceived changes in contrast, coloration, and texture elements in a scene.

- **Visibility impairment or anthropogenic visibility impairment** means any humanly perceptible difference due to air pollution from anthropogenic sources between actual visibility and natural visibility on one or more days. Because natural visibility can only be estimated or inferred, visibility impairment also is estimated or inferred rather than directly measured.

- **Visibility in any mandatory Class I Federal area** includes any integral vista associated with that area.

Other definitions

These additional definitions are from the Western Regional Air Partnership Technical Support System glossary[2], unless otherwise noted.

- **Aerosol** means suspensions of tiny liquid and/or solid particles in the air. [3]

- **Aerosol, primary** means aerosol particles directly emitted from a source.[4]

- **Aerosol, secondary** means aerosols formed by the interaction of two or more gas molecules and/or primary aerosols.[4]

- **Anthropogenic** means produced by human activities.

[2] https://views.cira.colostate.edu/tssv2/
[3] http://vista.cira.colostate.edu/Improve/glossary/
[4] https://www.nps.gov/subjects/air/glossary.htm

- **Class I Areas** as defined by the Clean Air Act, includes national parks greater than 6,000 acres, wilderness areas and national memorial parks greater than 5,000 acres, and international parks that existed as of August 1977.[5]

- **Extinction Budget** means apportioning the extinction coefficient to atmospheric constituents to analysis estimate the change in visibility caused by a change in constituent concentrations.

- **Extinction coefficient** means a measure of the ability of particles or gases to absorb and scatter photons from a beam of light; a number that is proportional to the number of photons removed from the sight path per unit length.

- **Haze** means an atmospheric aerosol of sufficient concentration to be visible. The particles are so small that they cannot be seen individually, but are still effective in scene distortion and visual range restriction.

- **Light Extinction** means the attenuation of light due to scattering and absorption as it passes through a medium.

- **Particulate Matter** means particles found in the air, including dust, soot, smoke, and liquid droplets. Some particles are large or dark enough to be seen as soot or smoke. Others are so small that individually they can only be detected with an electron microscope.[6]

- **$PM_{2.5}$** means Measure of particulate matter (pollutants from combustion and natural sources); denotes particles smaller than 2.5 micrometers in diameter.[3]

- **PM_{10}** means Measure of particulate matter (pollutants from combustion and natural sources); denotes particles with a nominal size less than 10 micrometers in diameter**.**[3]

- **Rayleigh Scattering** means the scattering of light by particles much smaller than the wavelength of the light, e.g., molecular scattering in the natural atmosphere.[7]

- **URP framework** means the interrelated Regional Haze Rule requirements regarding the quantification of historical and projected visibility conditions using specific metrics, the quantification of natural conditions, the quantification of the uniform rate of progress that would achieve natural visibility conditions for the 20 percent most anthropogenically impaired days in 2064, the URP glidepath, the setting of RPGs for the end of the implementation period, and the comparison of the RPG for the 20 percent most anthropogenically impaired days to the URP glidepath.[8]

- **URP glidepath** means the hypothetical straight-line path on the deciview scale between the baseline period visibility condition in 2000-2004 (associated with December 31, 2004) and the sum of the natural visibility condition and optional adjustments for international anthropogenic impacts and

[5] Equivalent to Section 1.1.1 - Mandatory Class I Federal Area or Mandatory Federal Class I Area
[6] https://www.nps.gov/subjects/air/glossary.htm.
[7] https://vista.cira.colostate.edu/Improve/glossary/
[8] https://www.epa.gov/sites/default/files/2019-08/documents/8-20-2019_-_regional_haze_guidance_final_guidance.pdf

impacts from certain wildland prescribed fires (associated with December 31, 2064), for the 20 percent most anthropogenically impaired days for a particular Class I Area.[8]

- **Visual Range** means the distance at which a large black object just disappears from view.

- **Western Regional Air Partnership ("WRAP")** is one of five Regional Planning Organizations. It includes the states and tribal areas encompassed by Arizona, California, Colorado, Idaho, Montana, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming and is affiliated with the Western States Air Resources Council.

1.3 A Brief History of the Regional Haze Rule

In 1977, Congress adopted amendments to the federal Clean Air Act (CAA or Act) to protect visibility in certain designated federal areas, known as mandatory Federal Class I Areas (Class I Area or CIA).[9] This early provision of the CAA focused on emissions from major sources of human-caused, i.e. anthropogenic, air pollutants that "may reasonably be anticipated to cause or contribute" to visibility impairment at Class I Areas located close to the contributing major sources. Over time, the EPA and other stakeholders realized that further action was necessary to address more numerous, widely scattered sources that may not be located close to a Class I Area. In light of this need, Congress amended the visibility protection provisions of the CAA in 1990.[10] In accordance with these CAA provisions, as amended, the EPA adopted the Regional Haze Rule in 1999.[11]

The rule addressed the more numerous, widely scattered sources responsible for Class I Area visibility issues. It required states to take gradual steps over time to improve visibility at Class I Areas, returning visibility to "natural conditions," free of anthropogenic interference, by the year 2064. To that end, the Rule required states to submit Regional Haze State Implementation Plans (SIPs) beginning in 2003 and at ten-year intervals thereafter, corresponding with ten-year planning periods. However, litigation substantially delayed the SIP submittal process and required EPA to amend the Regional Haze Rule.[12] The initial Regional Haze SIPs were ultimately due to EPA by December 17, 2007.[13]

Albuquerque - Bernalillo County and the State of New Mexico submitted their initial Regional Haze SIPs in 2008. EPA subsequently required certain amendments to these SIPs, which the two jurisdictions revised in later submittals. Albuquerque - Bernalillo County submitted its revised Regional Haze SIP in 2011.[14]

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[9] 42 U.S.C. § 7491.
[10] 42 U.S.C. § 7492.
[11] 64 Fed. Reg. 35714 (July 1, 1999) (Regional Haze Regulations).
[12] 71 Fed. Reg. 60612 (October 13, 2006) (Regional Haze Regulations; Revisions to Provisions Governing Alternative to Source-Specific Best Available Retrofit Technology (BART) Determinations).
[13] 40 CFR § 51.308(b).
[14] This procedural history is addressed in EPA's proposed and final approval of the revised Regional Haze SIP for Albuquerque - Bernalillo County. 77 Fed. Reg. 24,768 (Apr. 25, 2012) (EPA proposed rule approving Regional Haze SIP for Albuquerque Bernalillo County); 77 Fed. Reg. 71,119 (Nov. 29, 2012) (EPA final rule approving Regional Haze SIP). The Albuquerque - Bernalillo County Regional Haze SIP, and related documentation, is available in EPA's docket for review of the revised city/county SIP, at https://www.regulations.gov/docket?D=EPA-R06-OAR-2008-0702 (last accessed June 4, 2024).

The Section 309 SIP addressed the first phase of Regional Haze Rule requirements, with an emphasis on stationary source SO_2 emission reductions and a focus on improving visibility in the 16 Class I Areas on the Colorado Plateau (including San Pedro Parks Wilderness in New Mexico). Under 40 CFR § 51.309(g)(2)(i), States that prepare Section 309 SIPs can take credit for improved visibility in the Class I Areas *not* on the Colorado Plateau. The Section 309(g) SIP extended the scope of the Regional Haze SIP to all Class I Areas within the state, addressing the visibility requirements and improvements in New Mexico's remaining eight Class I Areas, including Bandelier Wilderness Area, Bosque del Apache Wilderness Area, Carlsbad Caverns National Park, Gila Wilderness Area, Pecos Wilderness Area, Salt Creek Wilderness Area, Wheeler Peak Wilderness Area, and White Mountain Wilderness Area.

Originally, Regional Haze SIPs for the second planning period, 2019 to 2028, were to be submitted to EPA in 2018. However, on January 10, 2017, EPA revised the Regional Haze Rule so that the SIPs for the second implementation period would instead be due July 31, 2021. [15] However, the years for the second planning period remain 2019 to 2028 despite the revised SIP submittal deadline.

Future Regional Haze SIP submittals are expected to be due by July 31, 2028 and at ten-year intervals thereafter, unless EPA revises the Regional Haze Rule again.[16]

1.4 Overview of Regulatory Provisions in the Regional Haze Rule

This Section summarizes the major requirements of the Regional Haze Rule.[17] More detailed discussion of specific requirements will be presented in individual chapters of this Regional Haze SIPr Round 2 (2019-2028), as warranted. The following discussion refers to regional haze requirements for a state. As a practical matter, Albuquerque-Bernalillo County, a separate air quality jurisdiction within a state, must work with state agencies to achieve a Regional Haze planning approach that works in an integrated fashion for the entire state.

Clean Air Act distinction between protection of visibility versus protection of health

The Regional Haze Rule, and the Clean Air Act visibility protection provisions upon which it is based, are not health-based air quality standards. They protect visibility in Class I Areas by gradually reducing visibility-impairing anthropogenic air pollutants over time.[18] Such pollutants are also known to have effects on human health, but the federal regulatory scheme addresses health effects by a different mechanism: the National Ambient Air Quality Standards (NAAQS).[19] The NAAQS define the maximum amount of six common air pollutants that can be present in outdoor air without harming public health.[20]

[15] 82 Fed. Reg. 3078 (January 10, 2017) (Protection of Visibility: Amendments to Requirements for State Plans).
[16] 40 CFR § 51.308(f).
[17] This subsection is substantially based on an overview of the Regional Haze Rule prepared by the Western Regional Air Partnership ("WRAP"): see WRAP, Overview of Regional Haze Planning, Regional Haze Planning Work Group Consensus, May 7, 2019, available at https://www.westar.org/wp-content/uploads/2022/09/Overview-of-RH-Planning-RHPWG-consensus-May7_2019.pdf, last accessed September 5, 2023.
[18] 42 U.S.C. §§ 7491 and 7492; 40 CFR §§ 51.300 to 51.309.
[19] 42 U.S.C. §§ 7408 and 7409; 40 CFR §§ 50.1 to 50.19.
[20] The six pollutants for which EPA must set National Ambient Air Quality Standards are carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide.

Specific regulatory provisions

The Regional Haze Rule establishes a multi-step process to improve visibility at Class I Areas. The Regional Haze Rule divides the process into ten-year planning periods. During each period, states undertake a series of steps to achieve gradual improvement in visibility, which must be documented in a Regional Haze SIP revision. The current planning period covers the years from 2019 to 2028. However, Regional Haze SIP revisions for this period were not due until July 31, 2021. EPA designed the Regional Haze Rule to achieve the Clean Air Act goal for visibility to be restored to natural conditions for each Class I Area.

The Regional Haze Rule requires a Regional Haze SIP revision that estimates emissions from natural sources (such as sea salt, dust, and wildfire smoke), emissions from anthropogenic sources, and amounts of pollution which are beyond the control of states (such as international emissions and some transportation-related emissions).

Before submitting the SIP revision for a ten-year planning period, every state must complete a series of steps, described below. Further details about each step will appear throughout this Regional Haze SIPr Round 2 (2019-2028).

1) States review the data from the Interagency Monitoring of Protected Visual Environments (IMPROVE) monitoring network,[21] which measures the visibility-impairing pollutant concentrations at Class I Areas throughout the U.S.
2) States calculate the amount of air pollutants known to contribute to poor visibility that is emitted within their boundaries from a variety of different sources.
3) States analyze this data on visibility and pollutants to identify pollution sources likely contributing to visibility problems at particular areas, both inside their own borders and in other states.
4) Each state identifies “reasonable” pollution control methods that will reduce emissions from human-caused sources and thus improve visibility at Class I Areas.
5) Technical experts at Regional Planning Organizations (RPOs), which assist states in preparing Regional Haze SIPs, use computer modeling or other technical approaches to understand how pollution control measures at particular anthropogenic pollutant sources can reasonably be expected to improve visibility at each Class I Area over a ten-year Regional Haze planning period.
6) Throughout Regional Haze SIP development, states consult informally with the Federal Land Managers (FLMs) of the Class I Areas within their jurisdiction to communicate the intended benefits of proposed regulatory actions, and then ask the FLMs for a formal review of the plan before a formal public hearing on the plan is held. The Regional Haze Rule requires states to consult with other states that have emissions reasonably anticipated to contribute to visibility impairment in the same Class I Area or areas. EPA and RPOs also encourage states to consult informally with tribes, local authorities, and any stakeholder that may desire to comment on a state's proposed approach to protecting visibility at Class I Areas.
7) EPA encourages states to consult with their respective EPA regional offices throughout the SIP planning process. This may help identify and resolve potential technical, policy, and legal issues

[21] http://vista.cira.colostate.edu/Improve.

before plan finalization and adoption by the state. This also improves the likelihood that the State will submit an approvable SIP revision. EPA recommends submission of a draft plan for review and feedback in advance of formal plan submission to EPA.

8) After public review, states hold public hearings of their air quality boards or commissions to adopt plans to implement the identified pollution control methods, make them legally binding, and thus strive to achieve visibility improvement at each Class I Area over the course of the planning period.

9) A Regional Haze SIP revision must include a progress report on past visibility trends and the implementation status of previously adopted pollution control measures to improve Class I Area visibility.

A Regional Haze SIP revision does not go into effect until EPA completes its review and approves the SIP following the state adoption process.

1.5 Overview of how this SIPr Document is Organized

This Regional Haze SIPr Round 2 (2019-2028) for Albuquerque-Bernalillo County is organized into twelve chapters. Each chapter presents information on a specific aspect of Regional Haze planning. Considered as a whole, the twelve chapters collectively meet Regional Haze Rule requirements for the State. Requirements for the rest of New Mexico will be addressed in a separate Regional Haze SIPr element, prepared by NMED and proposed to the EIB.

The twelve chapters of this SIP for Albuquerque-Bernalillo County cover the following topics:

- Chapter 1. Introductory material presenting an overview of the Regional Haze planning process.
- Chapter 2. An overview of the nine Class I Areas located in New Mexico, as well as the IMPROVE monitors providing data about the visibility conditions at these areas and visibility-impairing pollutants present at each area.
- Chapter 3. Detailed IMPROVE monitor data for each New Mexico Class I Area, monitoring trends analyses, and tracking visibility progress.
- Chapter 4. Data analyzing whether emissions of visibility-impairing pollutants from within the State of New Mexico may cause or contribute to visibility impairment at Class I Areas in other states outside New Mexico.[22]
- Chapter 5. Progress report on implementation of the State of New Mexico Regional Haze SIP for the second half of the first Regional Haze planning period (i.e., 2014 – 2018).
- Chapter 6. Description of the process by which NMED cooperated with City of Albuquerque EHD on a common, statewide screening process to select facilities throughout New Mexico that are major sources of visibility-impairing pollutants, with a potential impact on Class I Area visibility, that would be subject to an analysis identifying potential new pollutant control measures at each facility. This process identified 24 sources total, including one source in Albuquerque – Bernalillo County.

[22] Potential contributions to visibility impairment at New Mexico Class I Areas due to emissions from other states will be assessed in the Regional Haze SIP prepared by the NMED and considered by the EIB.

- Chapter 7. A description of the technical analysis of potential new pollutant control measures for the one screened facility in Albuquerque – Bernalillo County.
- Chapter 8. A description of the Long-Term Strategy (LTS) for control of visibility-impairing pollutants in Albuquerque-Bernalillo County during the second Regional Haze planning period, 2019 to 2028. In the Regional Haze Rule, a LTS is a set of legally enforceable control measures upon which an air quality jurisdiction (typically a state) will rely to improve visibility at Class I Areas within its borders and in other states during a Regional Haze planning period.
- Chapter 9. A description of 2028 visibility goals, which the Regional Haze Rule calls Reasonable Progress Goals (RPGs), for the nine Class I Areas in New Mexico and the relation of those goals to the LTS.
- Chapter 10. Uniform rate of progress glidepath checks for the Most Impaired and Clearest Days, and additional information needed for a robust demonstration for areas that are not be on the glidepath to natural visibility conditions by 2064.
- Chapter 11. A description of how EHD conducted outreach to stakeholders in partnership with NMED during preparation of their proposed Regional Haze SIPr elements. This chapter also details how EHD met Regional Haze Rule requirements for consultation with FLMs who supervise the Class I Areas in New Mexico.
- Chapter 12. A final chapter addressing certain other aspects of the Regional Haze Rule, including provisions for future monitoring of visibility-impairing pollutants and future progress reports on implementation of this Regional Haze SIPr Round 2 (2019 – 2028).

1.6 Technical Assistance from the Western Regional Air Partnership

The Western Regional Air Partnership (WRAP) is a voluntary partnership of government agencies from 15 western states involved in air quality regulation and planning.[23] WRAP members include state and local air quality regulatory agencies, Indian tribes, EPA, and the federal land management agencies, which are the National Park Service, U.S. Forest Service, U.S. Fish and Wildlife Service, and the Bureau of Land Management.[24] As an RPO, WRAP pools and compiles the efforts of its member agencies to provide the technical assistance necessary for them to pursue air quality regulatory initiatives, including those related to Regional Haze.

WRAP Role in SIP Preparation

For the current Regional Haze planning period, WRAP has provided substantial resources for use by state, local, and tribal air quality agencies in preparing Regional Haze SIPs. These resources include quantitative data in the form of air quality monitoring results, emissions inventory estimates, and computer modeling outputs. They also include two types of written documentation: 1) technical support documents describing how the quantitative data was assembled; and 2) written guidance on approaches states may wish to take (but are not required to take) in researching and writing their Regional Haze SIPs.

[23] WRAP membership is open to agencies located in the geographical area encompassed by the States of Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming.
[24] The full list of WRAP member agencies is available at https://www.westar.org/wrap-council-members/.

WRAP is not a regulatory body but it does play an important role in the Regional Haze regulatory process. It has no legal authority to make decisions for its members. Rather, it provides technical resources and advice to those members, based on consensus decisions among them. States may then use the resulting technical resources based on their best judgment about their own circumstances and the applicable regulatory requirements. In meeting those requirements, the Regional Haze Rule allows states to rely on the technical data and advice of WRAP and other RPOs in deciding on control measures for a Regional Haze SIP.[25] This is the key role played by WRAP. It provides data and advice that the individual air agency members would otherwise lack the staff and resources to provide for themselves.

WRAP Technical Support System

For the second Regional Haze planning period, WRAP prepared an online resource and data portal called the Technical Support System (TSS).[26] The TSS provides data that state, local, and tribal air agencies may use in preparing their Regional Haze SIPs. The TSS includes air monitor data, emissions inventory data, and modeling data. Explanations and documentation of the data and the methods by which it was obtained are provided on the TSS[27] and on the WRAP website.[28]

The TSS hosts the visibility monitoring, emissions, and air quality modeling analyses that support the 15 western states in developing Regional Haze SIPs. The Emissions Methods, Results, and References document and the Modeling Methods, Results, and References document describe the WRAP emissions and modeling analyses and illustrates how the TSS products can be applied and interpreted to support the 2028 visibility progress demonstrations for western U.S. Class I Areas. These reports are included as Appendices A and B to this Regional Haze SIPr Round 2 (2019 – 2028).

This draft SIP relies on much of the technical work included in the WRAP TSS for visibility projections, glidepath checks, weighted emission potential analysis, and emissions data in the embedded progress report.

1.7 Supplementary Data from non-WRAP Sources

This Regional Haze SIPr Round 2 (2019-2028) relies on data from sources other than the WRAP. These will be noted in specific chapters/appendices, as appropriate.

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[25] 40 CFR § 51.308(f)(2)(iii). WRAP is one of five U.S. regional planning organizations that assist states in preparing Regional Haze SIPs. See https://www.epa.gov/visibility/visibility-regional-planning-organizations (last accessed September 28, 2020).

[26] The TSS is available online at https://views.cira.colostate.edu/tssv2/default.aspx (last accessed September 6, 2023). The TSS for the current planning period is the second version of the TSS. The first version, used during the first planning period, is archived at http://vista.cira.colostate.edu/tss/.

[27] The TSS web site provides a tab labeled "help," which leads the user to technical documentation for the data provided on the TSS. See the TSS web site at https://views.cira.colostate.edu/tssv2/default.aspx.

[28] The WRAP Regional Haze Planning Work Group web page provides thorough documentation of the process by which WRAP collated and generated data for air quality monitoring, emissions, and modeling. See the links and documents available at https://www.westar.org/regional-haze-planning-work-group/. Important technical documentation of WRAP Regional Haze planning also appears on the organization's Regional Tech Operations Work Group web page, available at https://www.westar.org/regional-tech-operations-work-group/.

1.8 Joint Regional Haze Planning by EHD and NMED

Because of the scope and design of the Regional Haze Rule, EHD prepared this Regional Haze SIPr Round 2 (2019-2028) in close cooperation with NMED. Under state and local law, EHD prepares SIPs applicable to the City of Albuquerque and Bernalillo County for consideration by the Albuquerque - Bernalillo County AQCB.[29] Separately, NMED prepares SIPs for the rest of the state and proposes these plans for consideration by the EIB.[30]

Subsequent chapters of this SIPr element will describe in detail the statewide Regional Haze analytical framework. This SIPr element should be read in conjunction with the SIPr element prepared by NMED for the rest of the state.

1.9 Role of EHD

State law requires EHD to develop SIPs and SIP revisions for consideration by the AQCB and the U.S. EPA.[31] In accordance with that requirement, EHD staff developed and wrote this Regional Haze SIPr Round 2 (2019-2028) in close cooperation with NMED. If the AQCB adopts this Regional Haze SIPr Round 2 (2019-2028), the Board will authorize EHD to submit it to the EPA in accordance with EPA regulations.

This Regional Haze SIPr Round 2 (2019-2028), developed and proposed by EHD, describes how Albuquerque-Bernalillo County will meet federal regulatory requirements in the Regional Haze Rule at 40 CFR §§ 51.308 and 51.309. This SIPr is not in itself an enforceable regulation, but it is legally mandatory for the state to submit the SIPr to EPA in order to meet the federal regulatory requirements.

1.10 Role of the Albuquerque-Bernalillo County Air Quality Control Board

The New Mexico Air Quality Control Act requires the AQCB to promulgate air quality regulations[32] and adopt a plan for the "regulation, control, prevention, or abatement of air pollution . . . ."[33] The Board may also adopt regulations "to protect visibility in mandatory Class I Areas . . . ."[34] These regulatory provisions provide authority for the Board to consider the Regional Haze SIPr Round 2 (2019 – 2028), including any new or amended legally enforceable regulations necessary to implement the SIP, in order to meet federal Regional Haze Rule requirements.

In considering a proposed SIP or SIPr and any accompanying proposed regulations, the AQCB must "give weight it deems appropriate to all facts and circumstances," including facts and circumstances specified in the state Air Quality Control Act, related to the following:[35]

[29] NMSA 1978 §§ 74-2-5 and 74-2-5.1; ROA 1994 §§ 9-5-4 and 9-5-1-5; Bernalillo County Code §§ 30-33 and 30-34.
[30] NMSA 1978 §§ 74-2-5 and 74-2-5.1.
[31] NMSA 1978 § 74-2-5. The language in this section requires EHD to develop an air quality "plan" but, in practice, EHD develops many different plans that collectively satisfy the requirement of the federal Clean Air Act for a single SIP. *See* 42 U.S.C. § 7410.
[32] NMSA 1978 § 74-2-5(B)(1).
[33] NMSA 1978 § 74-2-5(B)(2).
[34] NMSA 1978 § 74-2-5(D)(1).
[35] NMSA 1978 § 74-2-5(F).

1) "character and degree of injury to or interference with . . . visibility;"
2) "social and economic value of the sources and subjects of air contaminants;" and
3) "technical practicability and economic reasonableness" of emission reduction measures, with consideration of previous experience and available methods.

Under state and local law, any emission control requirement, such as those contained in this Regional Haze SIPr Round 2 (2019 – 2028), may be adopted by the AQCB only after a duly noticed public hearing.[36] Any permit modification that takes place to make regional haze requirements legally enforceable will go through a separate permit modification process, but are mentioned in this SIP. The SIP for this planning period contemplates a modification to GCC's construction permit to enforce the reasonable progress decisions, rather than a new rule.

1.11 Role of the U.S. EPA

This Regional Haze SIPr Round 2 (2019-2028) is subject to several federal regulatory requirements implemented and enforced by the U.S. EPA.

1) The Regional Haze Rule requires submittal of this SIPr to EPA,[37] with content in the SIPr that addresses specific requirements.[38]
2) The public rulemaking hearing held by the AQCB to consider this SIPr must be held only after reasonable notice provided at least 30 days prior to the date of the hearing.[39]
3) EHD must submit this SIPr to EPA with appropriate documentation, including documentation of the public hearing in accordance with federal, state, and local law.[40]

After a state submits a SIP to EPA, EPA has six months to certify that a state has made a complete submittal.[41]

Failure to submit an approvable Regional Haze SIPr Round 2 (2019-2028) to EPA may result in federal action. If a state fails to submit a SIP, EPA has until six months after the deadline for submittal to make a finding of failure to submit.[42] EPA must, within two years of such a finding, issue a Federal Implementation Plan (FIP) that accomplishes the purposes for which the SIP should have been submitted.[43] In the case of the Regional Haze Rule, EPA may issue a FIP that unilaterally imposes Regional Haze control measures on facilities in Albuquerque-Bernalillo County in order to protect visibility at Class I Areas.

1.12 Conclusion

[36] NMSA 1978 § 74-2-6(B) and (C).
[37] 40 CFR § 51.308(f).
[38] 40 CFR §§ 51.308(f)(1) to (f)(6), 51.308(g), and 51.309.
[39] 40 CFR § 51.102(d).
[40] 40 CFR § 51.103 and 40 CFR Part 51, Appendix V.
[41] 42 U.S.C. § 7410(k)(1)(B).
[42] 42 U.S.C. § 7410(k)(1)(B).
[43] 42 U.S.C. § 7410(c)(1).

This Regional Haze SIPr Rd 2 (2019-2028) developed by EHD is designed to provide the additional controls needed to ensure that visibility improves in Class I Areas. The plan was developed in consultation with Federal Land Managers and other interested parties. This Regional Haze SIPr Round 2 (2019-2028) will be submitted to EPA in accordance with the federal, state, and local procedural requirements discussed in this chapter.

Chapter 2: New Mexico Class I Areas and IMPROVE Monitor Sites

This chapter provides an overview of New Mexico's nine Class I Areas and the eight Interagency Monitoring of Protected Visual Environments ("IMPROVE") network monitor sites providing data for those areas. A brief description of the IMPROVE network prefaces the overview. Even though Albuquerque-Bernalillo County is a separate jurisdiction, with no Class 1 Areas within its boundaries, the information in this chapter is presented for contextual purposes because the County is part of the State of New Mexico. Chapter 3 presents a detailed technical description of how the IMPROVE network provides monitor data used to assess visibility conditions.

2.1 IMPROVE Monitoring Network

The IMPROVE program is a cooperative measurement effort governed by a steering committee from federal, regional, and state organizations. The program was established in 1985 to aid the creation of Federal and State Implementation Plans for the protection of visibility in mandatory Class I Areas, as stipulated in the 1977 amendments to the CAA and expanded upon in the 1990 amendments. As required by the Act, the U.S. EPA promulgated regulations designating 156 national parks and wilderness areas as Class I Areas. The IMPROVE monitoring network began operating in 1988 with 20 monitor sites in Class I Areas and has subsequently grown to 110 monitor sites sponsored by the Federal Land Managers (FLMs) plus an additional 48 "protocol sites" sponsored by state, regional, tribal, and national organizations that provide expanded spatial coverage for the network.[44]

The IMPROVE monitoring network consists of individual monitor sites across the United States containing aerosol speciation samplers, which measure the types, i.e., "species," and amounts of visibility-impairing pollutants present in the air in or around Class I Areas. A small number of IMPROVE monitor sites, in addition to measuring the type and amount of pollutants, also perform direct optical measurements of visibility impairment.

The regulatory objectives[45] of the IMPROVE monitoring network are:

- to establish current visibility and aerosol conditions in Class I Areas;
- to identify chemical species responsible for existing man-made visibility impairment, thereby allowing inference of emission sources for those species;
- to document long-term trends for assessing progress towards the Clean Air Act's national visibility goal, which is returning Class I Areas to natural visibility conditions; and,
- beginning with the EPA's enactment of the Regional Haze Rule in 1999, to provide regional haze monitoring representing all visibility-protected Class I Areas, using specific metrics and approaches defined in the Rule.

It is important to note that not every Class I Area has its own monitor. Sometimes, practicality requires that a single monitor provide representative data for more than one Class I Area. This chapter will provide examples of such monitor siting for Class I Areas in New Mexico.

[44] https://vista.cira.colostate.edu/Improve/improve-program/
[45] Id.

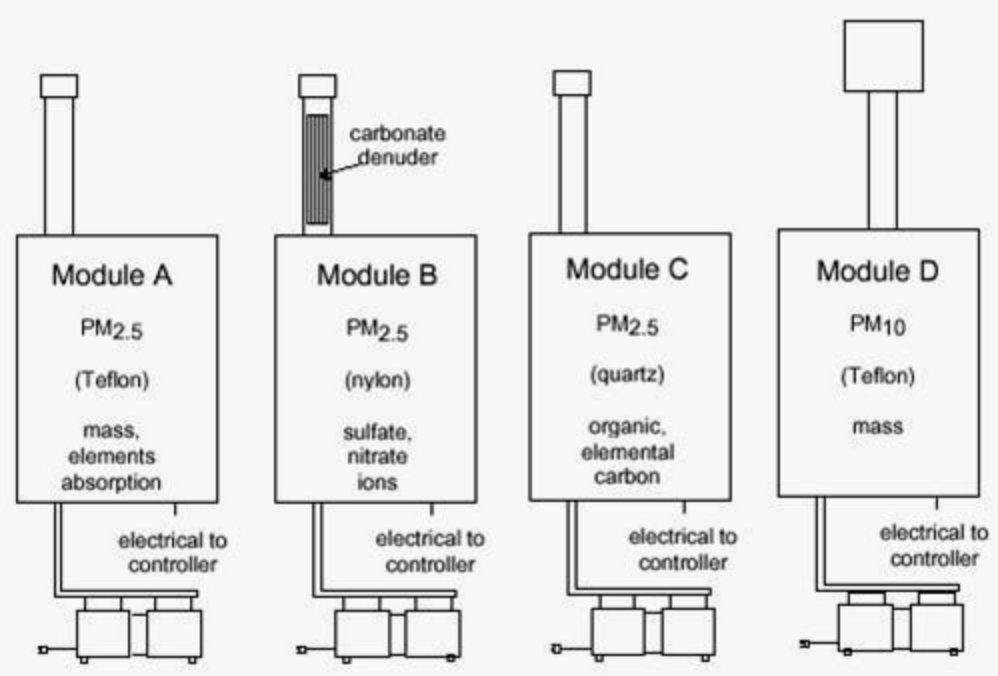
In addition to the above regulatory functions, the IMPROVE program has also been a key participant in visibility-related research, including the advancement of monitoring instrumentation, analysis techniques, visibility modeling, policy formulation, and source attribution field studies.

Figure 2-1 below shows a typical IMPROVE monitor site, in this case located at Bosque del Apache Wilderness Area, which is one of the nine Class I Areas in New Mexico. Like the other IMPROVE monitor sites, the one at Bosque del Apache contains four separate modules used for sampling the particulate species responsible for visibility impairment, as diagrammed in Figure 2-2 below. Each module consists of a size-cut filter cassette with appropriate filter material for species of interest, flow control, and a sample pump. IMPROVE samplers collect 24-hour samples, every three days. The collected filter samples are subsequently analyzed at the UC-Davis Crocker Nuclear Laboratory and other analytical laboratories for the indicated particulate species.

Figure 2-1: IMPROVE Monitor Site at Bosque del Apache Wilderness Area.

Photo credit: Kip Carrico

Figure 2-2: Four Aerosol Modules used for Regional Haze Monitoring at IMPROVE Monitor Sites.



For purposes of this Regional Haze SIPr Round 2 (2019 – 2028), the primary point to note is that IMPROVE monitor sites provide technically reliable information about visibility conditions and causes of visibility interference for each Class I Area, by methods that meet all applicable federal regulatory requirements. Chapter 3 of this SIPr provides additional technical details on how the IMPROVE network carries out this function.

2.2 New Mexico Class I Areas and IMPROVE Monitor Sites

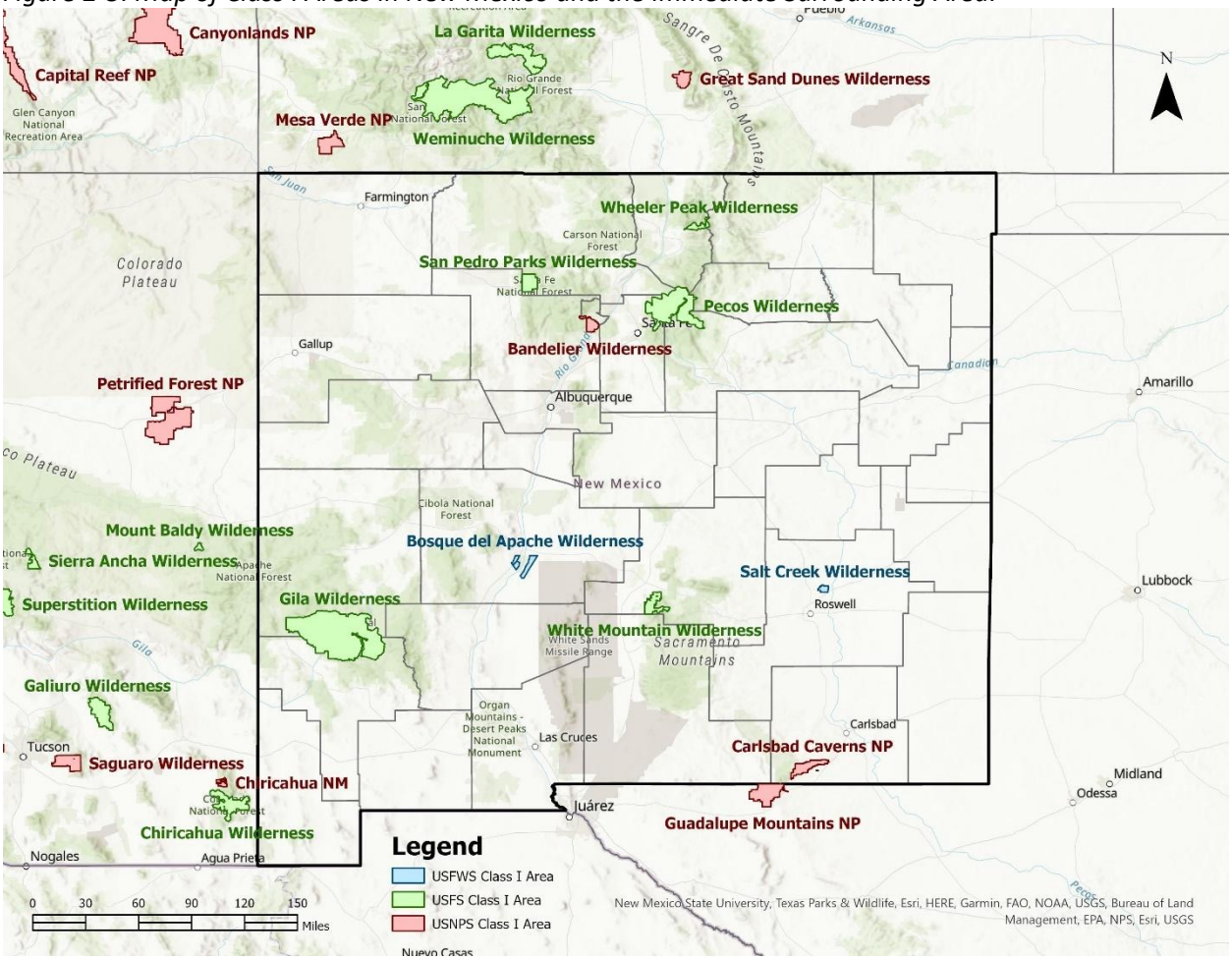
Table 2-1 lists the eight IMPROVE monitor sites that collect regional haze monitoring data for New Mexico's nine Class I Areas. The IMPROVE monitor for the Wheeler Peak Wilderness Area is also used to represent visibility conditions at the nearby Pecos Wilderness Area. The IMPROVE monitor for Carlsbad Caverns is located in Texas at Guadalupe Mountains National Park. Figure 2-3 shows the locations of the Class I Areas in New Mexico and the immediate surrounding areas. Each individual Class I Area in New Mexico is discussed further below.

Table 2-1: IMPROVE Monitoring Network and Associated Class I Areas in New Mexico.

Site Name	Site Code and GPS Coordinates	Location (County)	Class I Area	Agency	Elevation (feet AMSL)	Start Date
Bandelier	BAND1 35.7797° N 106.2664° W	Los Alamos	Bandelier Wilderness Area	U.S. National Park Service (USNPS)	6,523	March 1988
Bosque del Apache	BOAP1 33.8695° N 106.852° W	Socorro	Bosque del Apache	U.S. Fish and Wildlife Service (USFWS)	4,560	April 2000

			Wilderness Area			
Gila	GICL1 33.2204° N 108.2351° W	Catron	Gila Wilderness Area	U.S. Forest Service (USFS)	5,825	April 1994
Guadalupe Mountains (TX)	GUMO1 31.833° N 104.8094° W	Culberson (TX)	Carlsbad Caverns National Park	USNPS	5,486	March 1988
Salt Creek Wilderness	SACR1 33.4598° N 104.4042° W	Chaves	Salt Creek Wilderness Area	USFWS	3,518	April 2000
San Pedro Parks	SAPE1 36.0139° N 106.8447° W	Rio Arriba	San Pedro Parks Wilderness Area	USFS	9,629	August 2000
Wheeler Peak	WHPE1 36.5854° N 105.452° W	Taos	Wheeler Peak Wilderness Area, Pecos Wilderness Area	USFS	11,043	August 2000
White Mountain	WHIT1 33.4687° N 105.5349° W	Lincoln	White Mountain Wilderness Area	USFS	6,770	January 2002

Figure 2-3: Map of Class I Areas in New Mexico and the Immediate Surrounding Area.



The earliest New Mexico IMPROVE monitor sites, Bandelier and Guadalupe Mountains, have been active since the start of the IMPROVE program in 1988. Several New Mexico monitor sites became operational after January 1, 2000, all, however, are considered by EPA to have complete data records as discussed in Chapter 3. The data from these sites provides a comprehensive record of visibility conditions in the Class I Areas of New Mexico.

Bandelier Wilderness Area

The Bandelier Wilderness Area encompasses approximately 90 percent of Bandelier National Monument, which sits at the southern end of the Pajarito Plateau. The plateau was formed by two eruptions 1.6 and 1.4 million years ago. Elevations at Bandelier range from 5,340 feet at the Rio Grande River to the south to 10,199 feet at the summit of Cerro Grande to the north, which is almost a mile of elevation change in just under 12 miles. This large elevation gradient creates a unique diversity of habitats specific to northern New Mexico. The diversity of habitats and quick access to water supported a relatively large population of ancestral Pueblo peoples. Currently, piñon-juniper woodlands dominate in the southern parts of the monument, transitioning through ponderosa pine savannahs and forests, finally reaching mixed conifer forests at the highest elevations. Scattered throughout the monument are desert grasslands, montane meadows, and riparian areas in the canyon bottoms, providing home to

a wide variety of wildlife. The backcountry trails at Bandelier climb in and out of deep canyons and cross large flat mesas, showcasing the entire spectrum of volcanic geology.

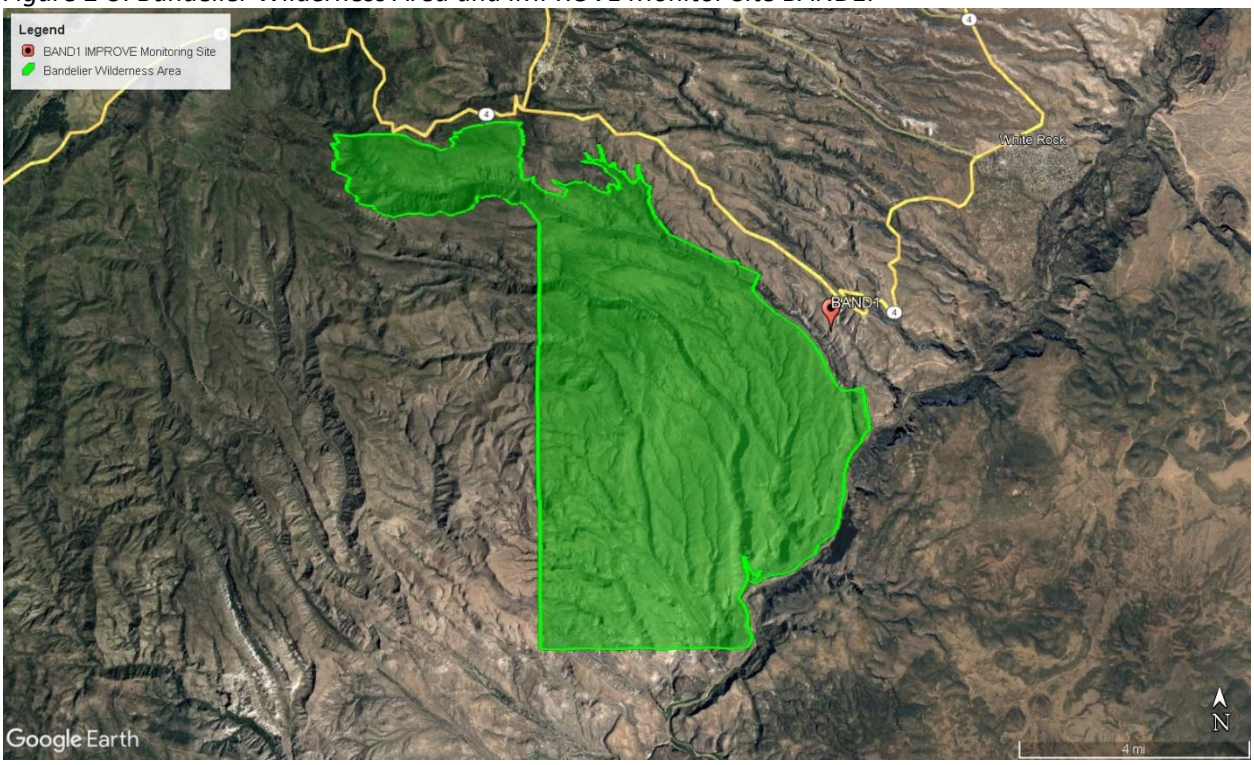
Additional information about the area around Bandelier is available from the National Park Service at https://www.nps.gov/band/index.htm.

The IMPROVE monitor site for the Bandelier Wilderness Area is BAND1, located near a fire tower on a ridge crest just outside of the eastern Wilderness boundary at an elevation of 6,523 feet. The BAND1 IMPROVE monitor site is in an exposed location at an elevation near the middle of the range of Wilderness elevations and about 1,000 feet above the Rio Grande River at the bottom of the canyon. The highest Bandelier Wilderness Area elevations are typically about 1,000 feet above the monitor site. As a result, BAND1 is considered representative of visibility conditions within Bandelier Wilderness Area.

Figure 2-4: Bandelier Wilderness Area within Sandoval, Los Alamos, and Santa Fe Counties, NM.

Photo credit: Kip Carrico.

Figure 2-5: Bandelier Wilderness Area and IMPROVE Monitor Site BAND1.



Bosque del Apache Wilderness Area

The Bosque del Apache Wilderness Area consists of three separate units within the larger Bosque del Apache National Wildlife Refuge (NWR), which is located along the Rio Grande River south of Socorro, New Mexico. The Refuge is located at the northern edge of the Chihuahuan Desert and straddles the river. The heart of the Refuge is about 12,900 acres of moist bottomlands – 3,800 acres are active floodplain and 9,100 acres are areas where water is diverted to create extensive wetlands, farmlands, and riparian forests. The rest of Bosque del Apache NWR is made up of arid foothills and mesas, which rise to the Chupadera Mountains to the west and the San Pascual Mountains to the east. Most of these desert lands are preserved as wilderness areas.

Managed by the U.S. Fish and Wildlife Service, Bosque del Apache NWR is an important link in the more than 500 federal wildlife refuges in North America. The goal of refuge management is to provide habitat and protection for migratory birds and endangered species and provide the public with a high-quality wildlife and educational experience.

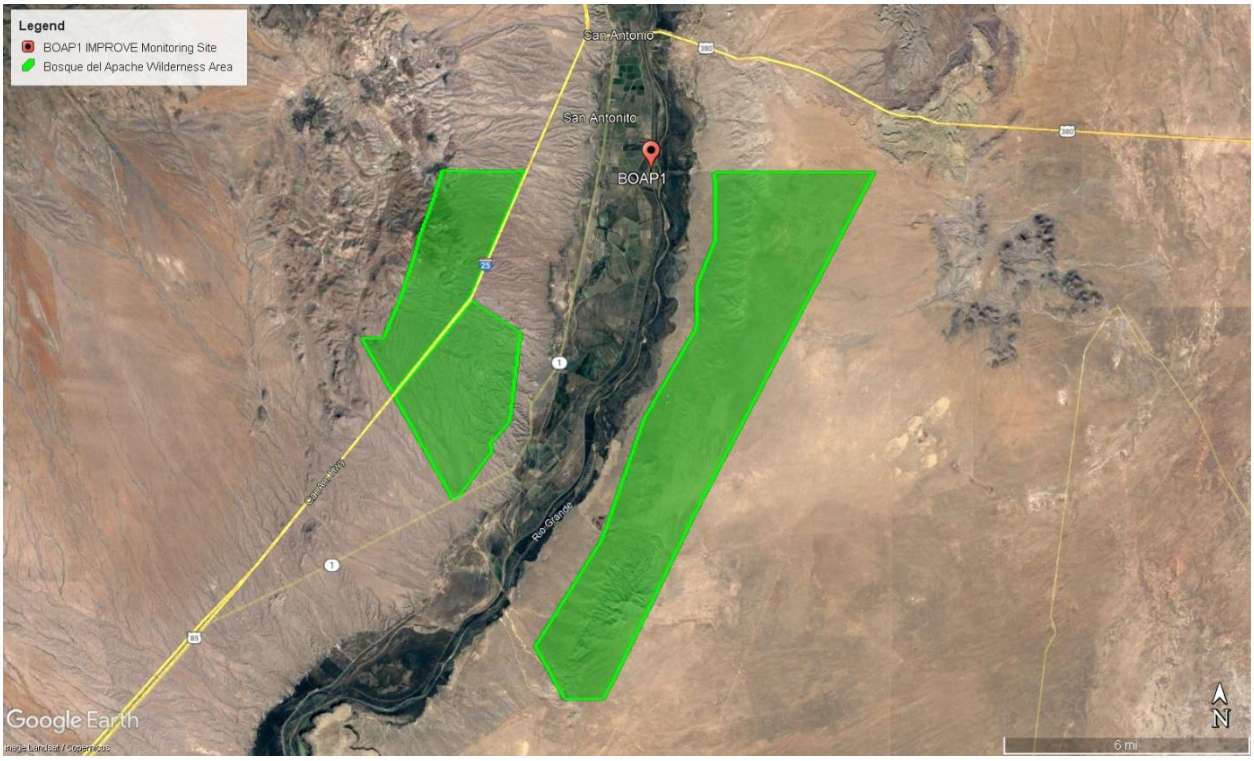
More information about the area around Bosque del Apache is available from the U.S. Fish and Wildlife Service at https://www.fws.gov/refuge/bosque_del_apache/.

Figure 2-6: Bosque del Apache Wilderness Area in Socorro County, NM.

Photo credit: Kip Carrico

The IMPROVE monitor site for Bosque del Apache Wilderness Area is BOAP1, located at the northern boundary near the Rio Grande River at an elevation of 4,560 feet. Given the narrow range of elevations at Bosque del Apache, BOAP1 should be very representative of visibility conditions there.

Figure 2-7: Bosque del Apache Wilderness Area and IMPROVE Monitor Site BOAP1.



Carlsbad Caverns National Park

Carlsbad Caverns National Park is located in the Guadalupe Mountains, a mountain range that runs from west Texas into southeastern New Mexico. The most famous of all the geologic features in the park are the more than 110 limestone caves, the most well-known of which is Carlsbad Caverns. Carlsbad Caverns receives more than 300,000 visitors each year and offers a rare glimpse of the underground worlds preserved under the desert above.

Elevations within the park rise from 3,595 feet in the lowlands to 6,520 feet atop the escarpment. Though there are scattered woodlands in the higher elevations, the park is primarily a variety of grassland and desert shrub land habitats. The park supports a diverse ecosystem, including habitat for many plants and animals that are at the geographic limits of their ranges. For example, the ponderosa pine reaches its extreme eastern limit here and several species of reptiles are at the edges of their distributions.

Figure 2-8: Carlsbad Caverns National Park Located in Eddy County, NM.

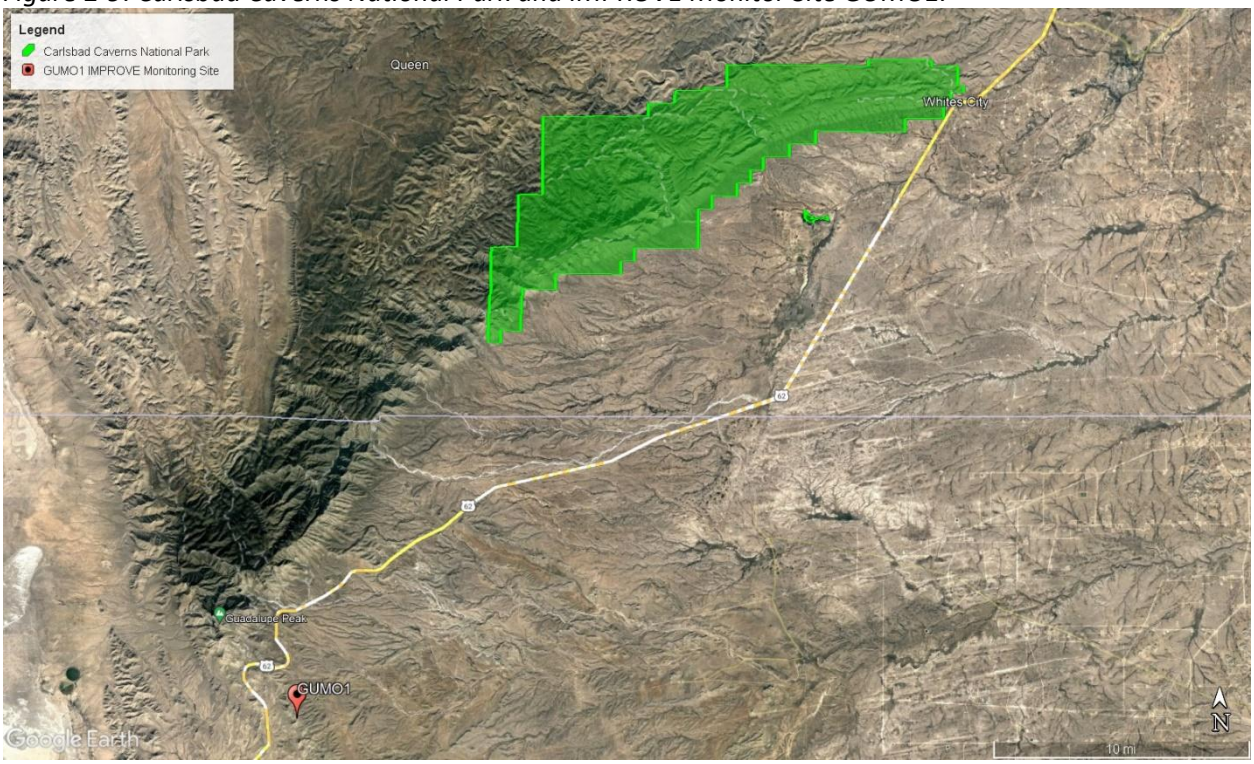
Photo credit: National Park Service (unidentified photographer, https://www.nps.gov/im/chdn/cave.htm).

Further information about the area around Carlsbad Caverns is available from the National Park Service at https://www.nps.gov/cave/index.htm.

The IMPROVE monitor site for Carlsbad Caverns National Park is GUMO1 (Guadalupe Mountains), located about 15 miles southwest in mountainous terrain near the crest of the Delaware Mountain Range at an elevation of 5,486 feet. It has good exposure to regional-scale winds and may be influenced by wind-blown dust from the salt flats in western Texas, as well as from the Mexican dry/barren region to the southwest. The ground cover near the monitor site is desert vegetation (shrub land and grassland, etc.) As a result, GUMO1 is considered representative of visibility conditions within Carlsbad Caverns National Park, especially at higher elevations.

A more recent IMPROVE monitor site (CAVE1) is located at the park but data for the new site began only in 2017 and thus is not considered for purposes of this SIPr.

Figure 2-9: Carlsbad Caverns National Park and IMPROVE Monitor Site GUMO1.



Gila Wilderness Area

The Gila Wilderness Area in southwestern New Mexico incorporates varied terrain. The northeastern and far eastern sections of the wilderness consist of high mesas and rolling hills, ranging in elevation from approximately 5,000 to 8,000 feet and cut by the deep canyons of the Gila River. The vegetation consists primarily of mixed junipers and piñon pines, grasses and, at the higher elevations and on northern slopes, ponderosa pines. Vast stands of ponderosas cover the central part of the Gila.
The river canyons offer spectacular cliffs, with mixed hardwoods and ponderosa pine growing along the riparian bottoms. The far western and southwestern sections of the Gila Wilderness consist of high mountains, with the highest elevation reaching 10,895 feet in the Mogollon Range. Steep side canyons are common, and vegetation includes Douglas fir, ponderosa pine, aspen, and a variety of ferns. The area includes the drainage basins of both Mogollon Creek and Turkey Creek.

Further information about the area around Gila Wilderness is available from the US Forest Service at https://www.fs.usda.gov/gila/.

Figure 2-10: Gila Wilderness Area in Grant and Catron Counties, NM.

Photo credit: View of the Gila Wilderness and Gila River drainage from the GICL1 site. Photo by Elizabeth Sorells.

The IMPROVE site for the Gila Wilderness Area is GICL1, located on a bank overlooking the Gila River in the east-central part of the Wilderness at an elevation of 5,825 feet. As a result of its location near the center of the Wilderness, GICL1 is considered representative of visibility conditions within the area.

Figure 2-11: Gila Wilderness Area and IMPROVE Monitor Site GICL1.

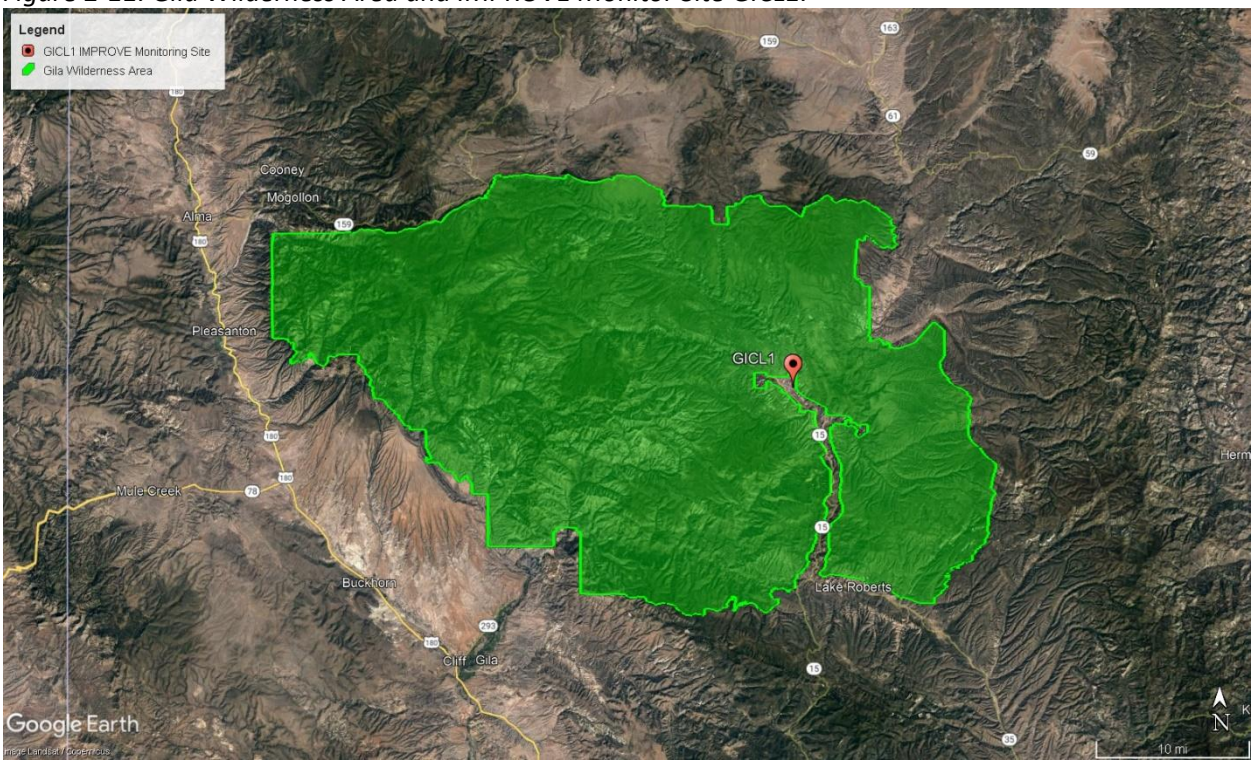


Figure 2-12: Gila Wilderness Area (GICL1) monitor site located in the Gila Wilderness.

Photo by Elizabeth Sorells (courtesy of Anita Rose, USFS).

Pecos Wilderness Area

The Pecos Wilderness Area extends through two Ranger Districts in the Santa Fe National Forest and into the Carson National Forest to the north. Within the boundaries of this expansive area are several landmarks including Truchas Peak, which tops out at 13,103 feet, and the southern stretch of the Rocky Mountains. The terrain varies from open meadows in the Pecos River Valley to the steep canyons of the Sangre de Cristo Mountain Range. Wildlife ranges from deer and elk to bighorn sheep, turkeys, and grouse. It is not uncommon to run into cattle in the Wilderness either. There are 15 lakes and eight major streams that sustain both plant and animal habitats, including the native Rio Grande Cutthroat Trout.

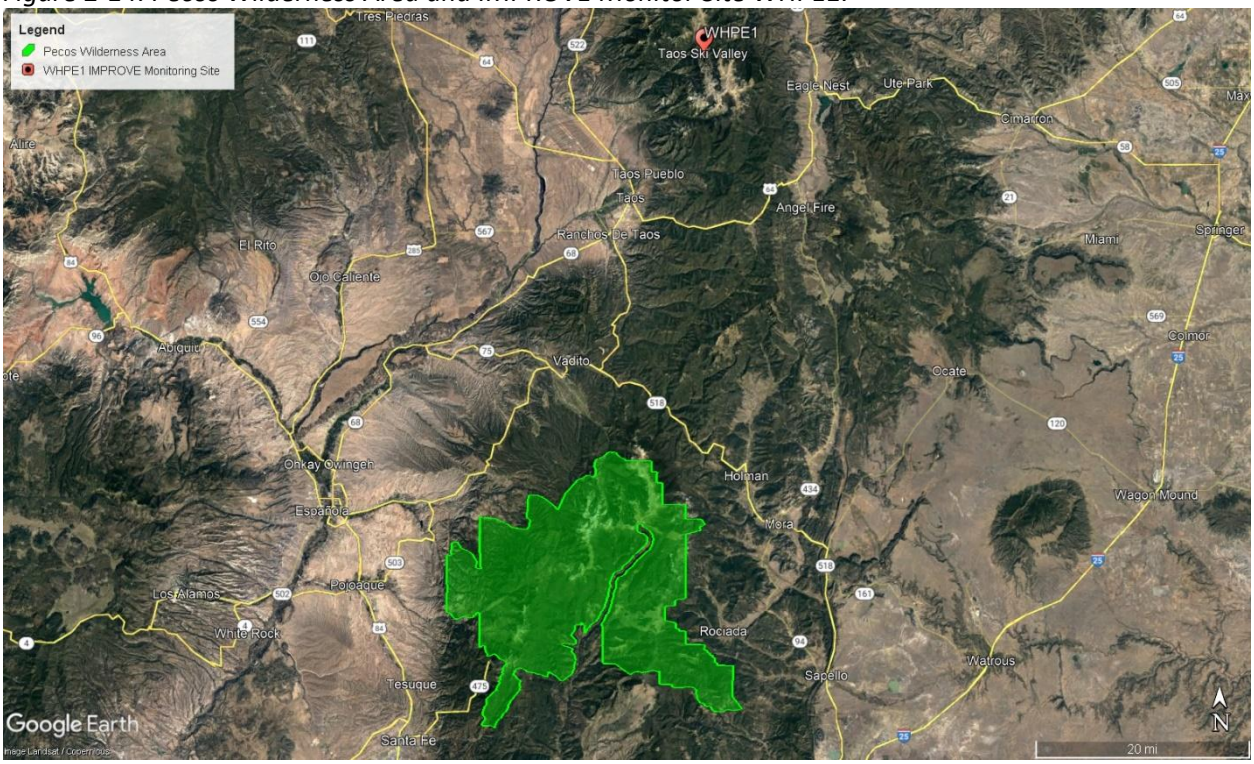
Further information about the area around Pecos Wilderness is available from the US Forest Service at https://www.fs.usda.gov/detail/santafe/ and https://www.fs.usda.gov/detail/carson/.

Figure 2-13: Pecos Wilderness Area Spanning Mora, Rio Arriba, San Miguel, Santa Fe, and Taos Counties, NM.

Photo credit: View of the Pecos Wilderness Area. Photo by Santa Fe National Forest.

The IMPROVE monitor site for the Pecos Wilderness Area is WHPE1 (Wheeler Peak), located about 40 miles to the north near the Wheeler Peak Wilderness Area (described later in this chapter) at an elevation of 11,043 feet. WHPE1 is at a high elevation and should be very representative of visibility conditions at high elevations of the Sangre de Cristo Mountains, including the Pecos Wilderness Area.

Figure 2-14: Pecos Wilderness Area and IMPROVE Monitor Site WHPE1.



Salt Creek Wilderness Area

The Salt Creek Wilderness Area is part of the Bitter Lake National Wildlife Refuge. Salt Creek Wilderness Area consists of river bottomlands, grasslands, sand dunes, and mixed shrub communities and comprises the watershed of Salt Creek, which empties into the Pecos River in southeastern New Mexico. The refuge, Bitter Lake, is located near Roswell, New Mexico, immediately west of the Pecos River. Virtually no waterfowl or water birds use the wilderness area of Salt Creek because it is devoid of wetlands other than the river and a dozen sinkholes. Two or three of the sinkholes contain rare fish: the Pecos gambusia, which is endangered, and the Pecos pupfish, a species of concern. Part of the reason Salt Creek was established as wilderness was to protect the scenic red bluffs on the north side of Salt Creek.

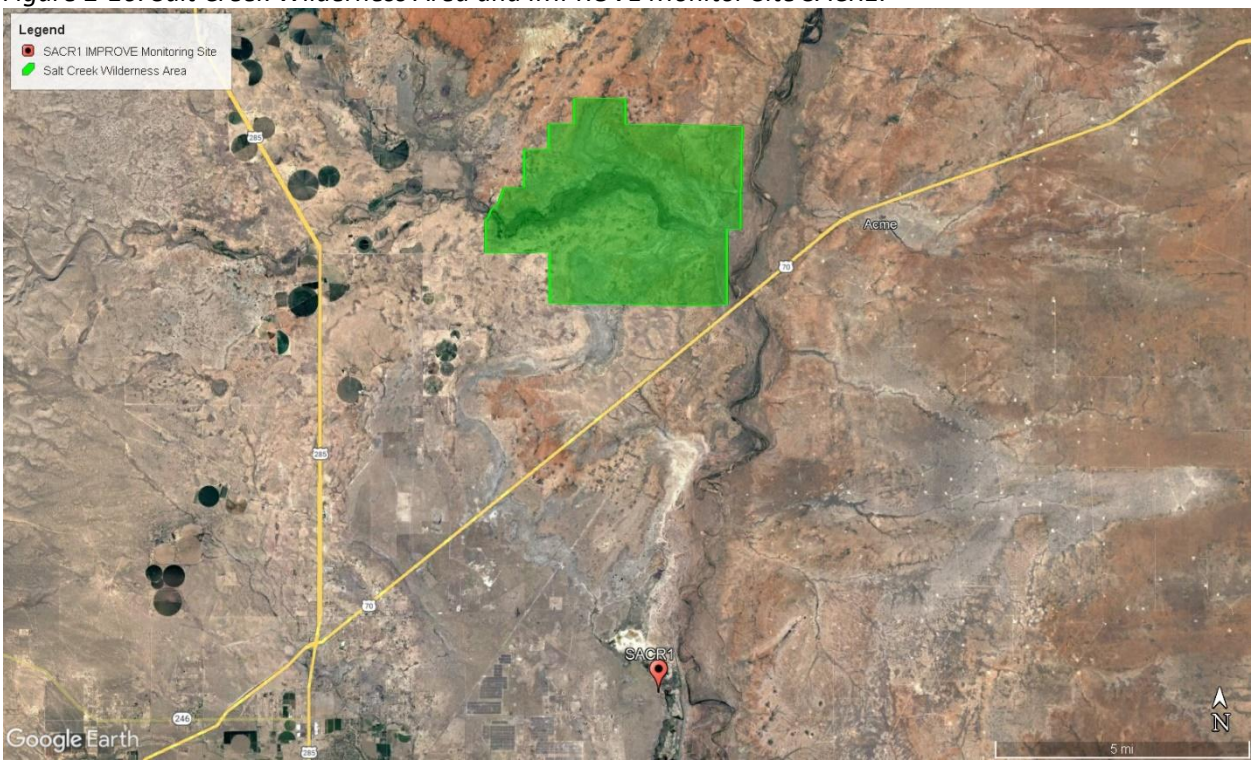
Further information about the area around Salt Creek is available from the U.S. Fish and Wildlife Service at https://www.fws.gov/refuge/bitter_lake/.

Figure 2-15: Salt Creek Wilderness Area in Chaves County, NM.

Photo credit: Jeff Howland, https://wilderness.net/

The IMPROVE monitor site for Salt Creek Wilderness Area is SACR1, located about 6 miles south of the Wilderness at an elevation of 3,518 feet. SACR1 should be very representative of visibility conditions in the Salt Creek Wilderness Area since it is at the same elevation with no intervening terrain.

Figure 2-16: Salt Creek Wilderness Area and IMPROVE Monitor Site SACR1.



San Pedro Parks Wilderness Area

The San Pedro Parks Wilderness Area is on the western edge of the Santa Fe National Forest and part of the Colorado Plateau. It occupies 41,132 acres in Southern Rio Arriba County, New Mexico. It is an alpine site with stands of Engelmann spruce, mixed conifers, and aspen punctuated by grassy meadows. Due to its elevation, on average approximately 10,000 feet, it experiences significant rainfall, particularly in the monsoon season of July - August. It has streams that are abundant with trout and standing bodies of water including the San Gregorio Reservoir. The Wilderness is crossed by the Continental Divide National Scenic Trail.

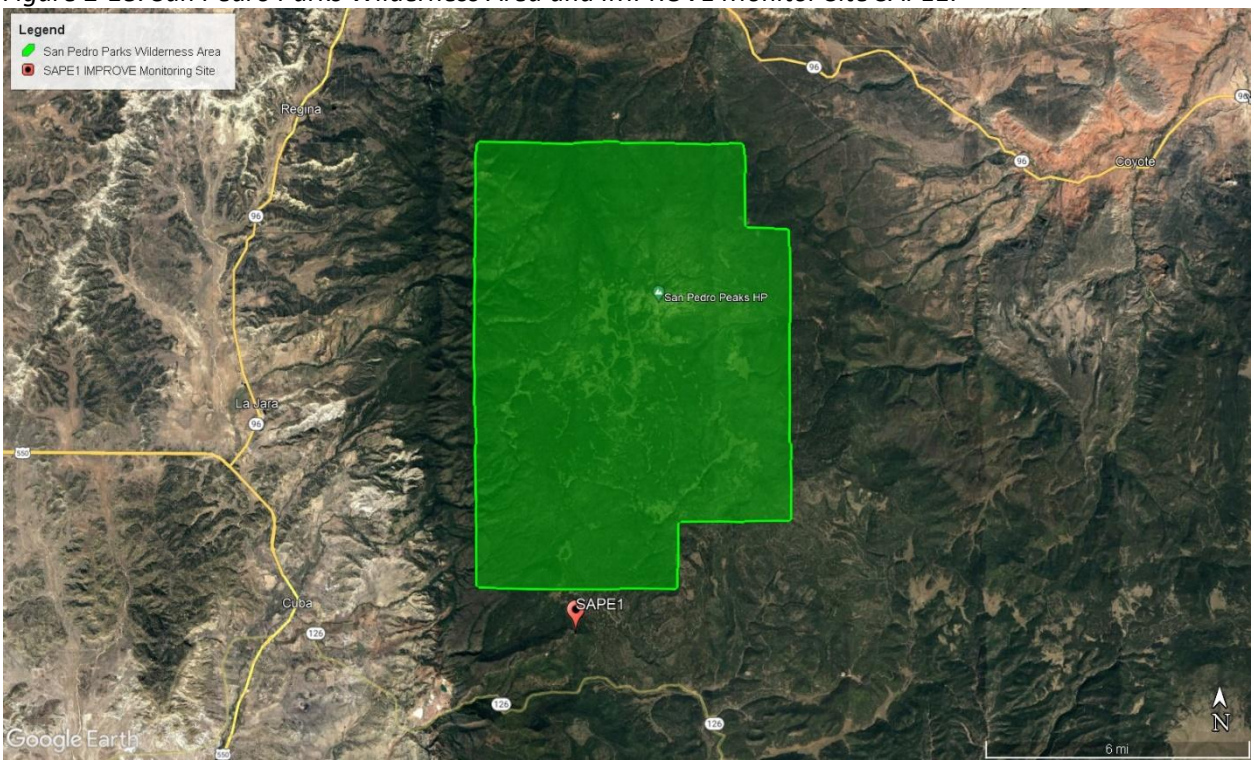
Additional information about the area around San Pedro Parks is available from the U.S. Forest Service at https://www.fs.usda.gov/detail/santafe/.

Figure 2-17: San Pedro Parks Wilderness Area in Southern Rio Arriba County, NM.

Photo Credit: U.S. Forest Service, Aspen trees in the San Pedro Parks Class I Area. Photo by Kerry Jones

The IMPROVE monitor site for San Pedro Parks Wilderness Area is SAPE1, located on a peak approximately 6 miles due east of Cuba, New Mexico at an elevation of 9,629 feet. It is in the middle of the altitude range of the Wilderness and thus should be representative of Wilderness visibility conditions.

Figure 2-18: San Pedro Parks Wilderness Area and IMPROVE Monitor Site SAPE1.



Wheeler Peak Wilderness Area

Lying along the top of the Sangre De Cristo Mountain Range, Wheeler Peak Wilderness Area is characterized by high rugged terrain. Elevations range from a low of 7,650 feet to a high of 13,161 feet at Wheeler Peak, the highest point in the state of New Mexico. Marmots, pikas, elk, mule deer, and golden eagles are found in the Wheeler Peak Wilderness. Above Taos Ski Valley, the Rio Hondo has a natural population of cutthroat trout as does Sawmill Creek. From the cottonwoods along the Rio Hondo to the Bristlecone pines guarding the peaks, Wheeler Peak Wilderness has almost all of the trees native to Northern New Mexico. Engelmann spruce and sub-alpine fir are the predominant tree species. Because Wheeler Peak is so high, it is one of the only places in the state to see a true alpine "mat" as opposed to grasses that grow in other high alpine locales. The "mat" produces beautiful brilliantly colored flowers. The average annual precipitation is 34-40 inches, with about half from summer rains and half from winter snows. Average annual temperatures range between 80° Fahrenheit in the summer to -20° Fahrenheit in the winter.

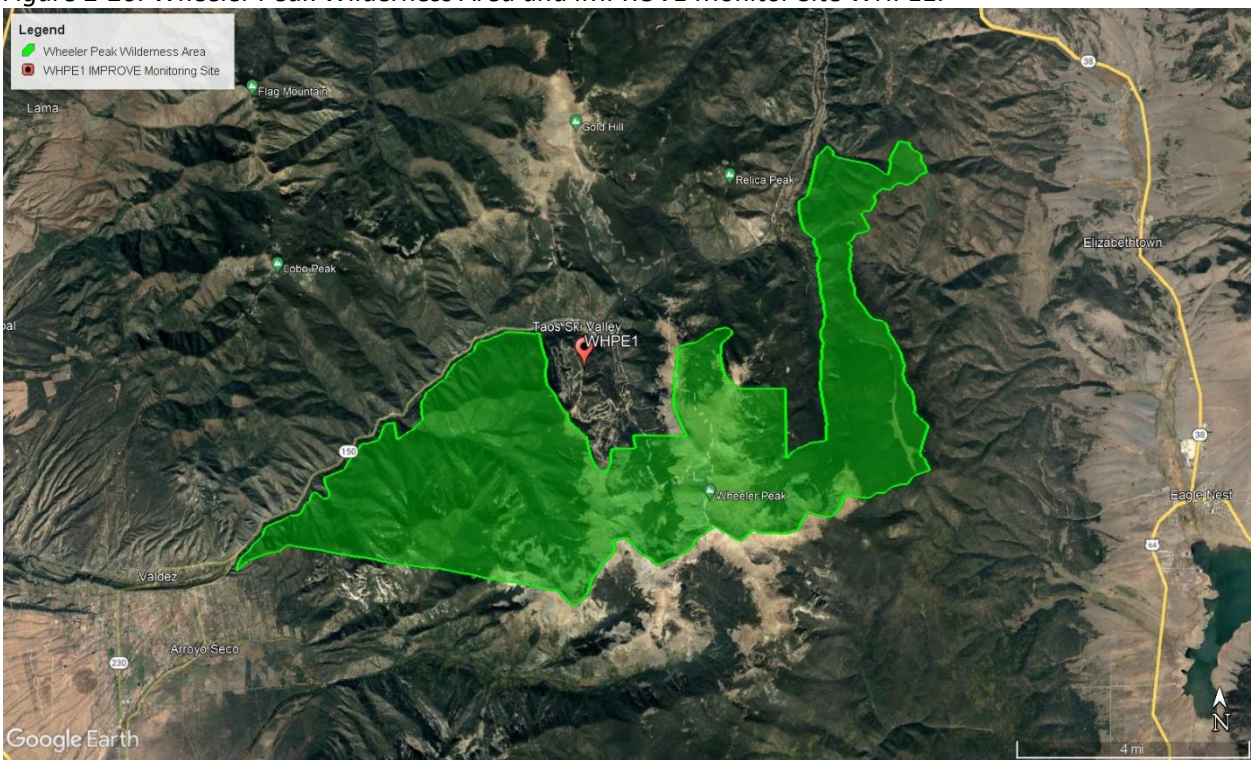
Further information about the area around Wheeler Peak Wilderness is available from the U.S. Forest Service at https://www.fs.usda.gov/detail/carson/.

Figure 2-19: Wheeler Peak Wilderness Area in Taos County, NM.

Photo credit: Mark Jones, NMED.

The IMPROVE monitor site for the Wheeler Peak Wilderness Area is WHPE1, located at a high point just outside the northern Wilderness boundary at an elevation of 11,043 feet. WHPE1 is at a high elevation and should be representative of Wilderness visibility conditions.

Figure 2-20: Wheeler Peak Wilderness Area and IMPROVE Monitor Site WHPE1.



White Mountain Wilderness Area

The White Mountain Wilderness Area lies entirely within the Smokey Bear Ranger District of the Lincoln National Forest. The Wilderness is 12.5 miles long and ranges from 4 to 12 miles wide. The Wilderness consists mainly of a long, northerly running ridge and its branches. The west side of the ridge is steep and extremely rugged with many extensive rock outcroppings. The eastern side is gentler with broader, forested canyons and a few small streams. Elevations range from a low of 6,400 feet at Three Rivers Campground on the west side to a high of 11,580 feet near Lookout Mountain on the south. From Three Rivers to the crest there are four different life zones: piñon-juniper, ponderosa pine, mixed conifer, and sub-alpine forest. Abrupt changes in elevation, escarpments, rock outcrops, and avalanche chutes make for striking contrast and scenery. Interspersed along the crest are several meadows as well as some grass-oak savannahs, which are the result of fires.

Springtime is usually dry and windy throughout the Wilderness. July and August are the rainy months with frequent afternoon showers. In summer, while the desert is sweltering, the high country will likely be cool. Oak, maple and aspen on hillsides feature striking color changes in the autumn when days are usually cool and sunny with little wind. Winter snowfall usually begins in mid- to late November and can continue through June. During the winter months, the higher elevations may be under six or more feet of snow while it is above freezing at lower elevations.

Additional information about the area around White Mountain Wilderness is available from the U.S. Forest Service at https://www.fs.usda.gov/main/lincoln/home.

Figure 2-21: White Mountain Wilderness Area in Lincoln County, NM.

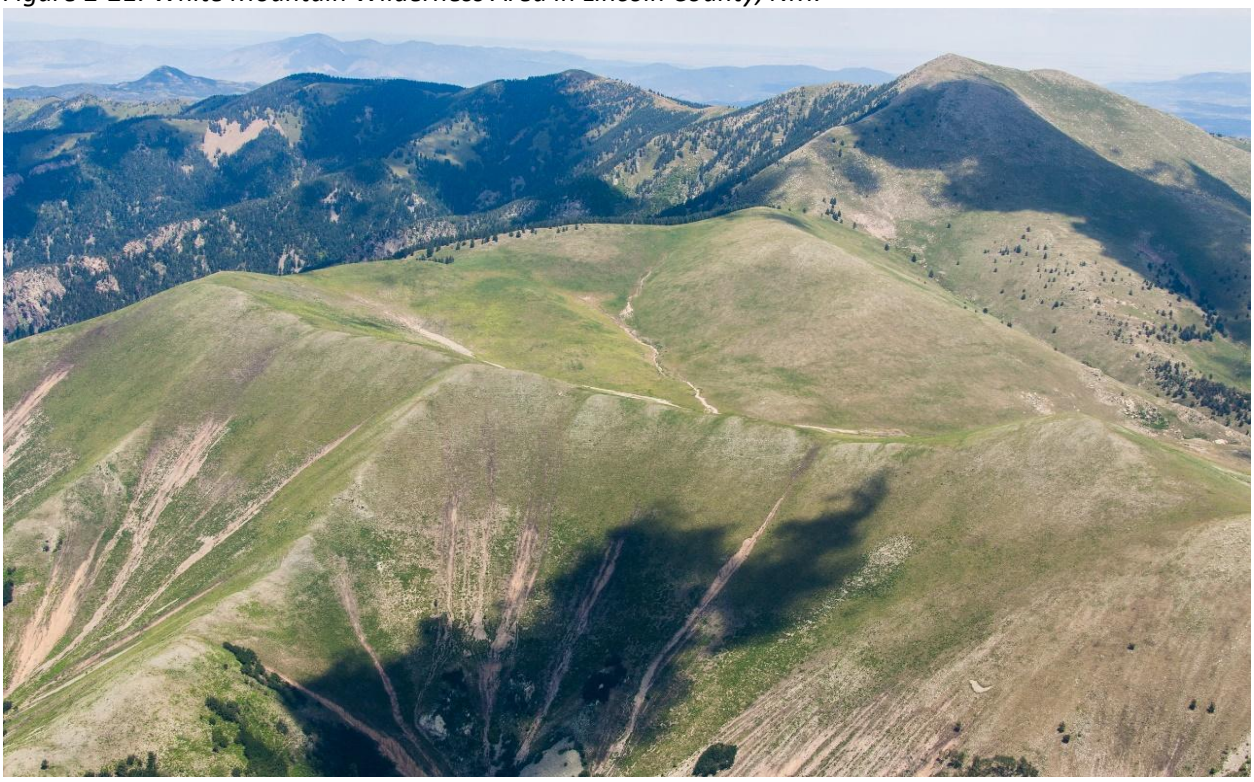
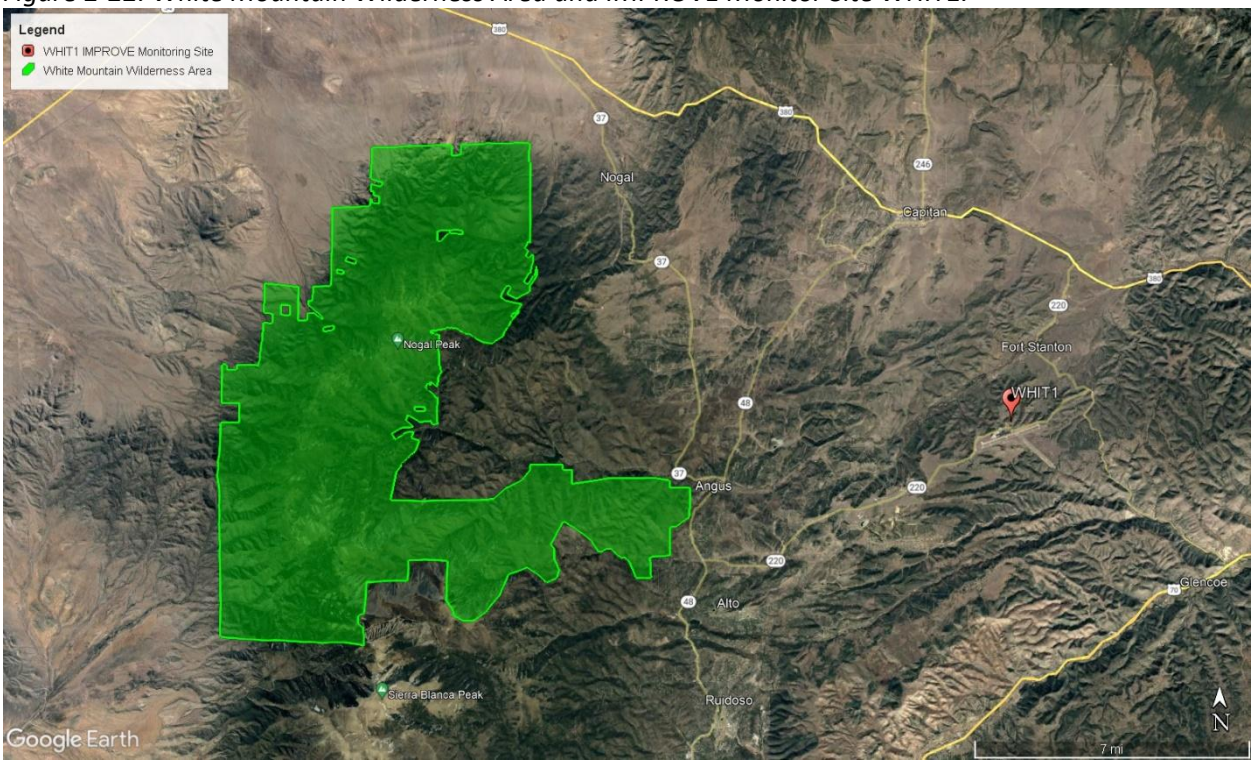


Photo credit: View of White Horse Hill in the White Mountain Wilderness, Lincoln NF. Photograph by Dan Ryerson, USDA Forest Service.

The IMPROVE monitor site for the White Mountain Wilderness Area is WHIT1, located on a low ridge between the Rio Bonito and Little Creek, near the Sierra Blanca regional airport about nine miles east of the Wilderness, at an elevation of 6,770 feet. WHIT1 is on a well-exposed low ridge at an elevation near lower Wilderness elevations, where downslope flow conditions being Wilderness air towards the monitor via the Rio Bonito and Little Creek drainages. As a result, WHIT1 is considered representative of visibility conditions in the wilderness locations.

Figure 2-22: White Mountain Wilderness Area and IMPROVE Monitor Site WHIT1.



2.3 Summary of New Mexico IMPROVE Monitor Sites

The eight IMPROVE network sites located in or near the nine Class I Areas described above span the geography, ecology, and climatology of the state of New Mexico. These monitor sites provide a representative survey of the visual resources of the national parks and wildernesses of the region. The current visibility conditions and trends over the 2000-2018 monitoring period at New Mexico Class I Areas will be discussed in the next chapter of this Regional Haze SIPr Round 2 (2019 – 2028).

Chapter 3: Ambient Monitor Data Analysis

This chapter introduces visibility related concepts and a provides a detailed look at the data, trends and contributors to light extinction at all New Mexico Class I Areas for the Most Impaired and Clearest Days during the baseline period (2000-2004), interim period (2008-2012), and current period (2014-2018), as well as the projections for natural conditions in 2064.

This chapter also provides Regional Haze Rule requirements for ambient monitor data. Unless otherwise noted, all monitor data presented in this chapter comes from the Western Regional Air Partnership (WRAP) Technical Support System (TSS) web site. Important definitions and concepts related to visibility can be found in this Reginal Haze SIPr Round 2 (2019 – 2028), *Ch. 1.1: Definitions of Visibility-Related Concepts* and on the WRAP TSS website.[46]

3.1 Regulatory Requirements

The Regional Haze Rule requires that this Regional Haze SIPr Round 2 (2019-2028) contain the following information about each New Mexico Class I Area:

1) The *baseline visibility conditions* at the site. [47] Baseline visibility conditions are the average of the five annual values for the 20% Most Impaired Days (MID) of the year and 20% Clearest Days of the year during the period from 2000 to 2004.[48]
2) The *natural visibility conditions* at the site. Natural visibility conditions are visibility that would exist at a Class I Area when only natural causes of visibility impairment, not anthropogenic causes, are present, on either the 20% Most Impaired or 20% Clearest Days of the year, as estimated by appropriate data analysis techniques. [49]
3) The *current visibility conditions* at the site. Current visibility conditions are the average of the five annual values for the 20% Most Impaired Days of the year and 20% Clearest Days of the year during the most recent five-year period for which data are available, which for this Regional Haze SIPr Round 2 (2019 – 2028) is the period 2014-2018.[50]
4) *Progress to date for Most Impaired and Clearest Days.* This information consists of the progress made toward natural visibility conditions since the baseline period, including during the

[46] https://views.cira.colostate.edu/tssv2/Lists/Glossary.aspx.
[47] The deciview (dv) or "haze index" is the unit of measurement of haze. It is a measure of visibility derived from light extinction that is designed so that incremental changes in the index correspond to uniform incremental changes in visual perception, across the entire range of conditions from pristine to highly impaired. The index (in units of dv) is calculated directly from the total light extinction (b_{ext} expressed in inverse megameters (Mm^{-1})) as follows: deciviews = 10 ln (b_{ext}/10). The index will be less than 0 for b_{ext} values below 10. All visibility conditions discussed here and elsewhere in this Regional Haze SIPr Rd 2 (2019 – 2028) are expressed in deciviews unless otherwise noted.
[48] 40 CFR §§ 51.301, 51.308(f)(1)(i).
[49] 40 CFR §§ 51.301, 51.308(f)(1)(ii). The provisions of the Regional Haze Rule cited do not specify a time period over which individual daily values must be averaged. The provisions also allow a choice of whether such averaging will occur on the Most Impaired Days "or" the Clearest Days. Based on EPA guidance, WRAP has developed an approach to this feature of the rule, which is discussed in the course of this chapter.
[50] 40 CFR §§ 51.301, 51.308(f)(1)(iii).

previous planning period, for the 20% most impaired days of the year and 20% clearest days of the year. [51] WRAP addresses this requirement in part by providing monitor data for an interim period from 2008 to 2012.

5) Difference between current visibility conditions and natural visibility conditions for the most impaired days and clearest days.[52]

In addition to the above requirements, the U.S. Environmental Protection Agency's (EPA) August 2019 *Guidance on Regional Haze State Implementation Plans for the Second Implementation Period* indicates that a Regional Haze State Implementation Plan (SIP) may, but is not required to, include an extinction budget for each Class I Area.[53] An extinction budget shows specific pollutants causing anthropogenic visibility impairment at a Class I Area and the extent to which each is responsible for that impairment.

This chapter presents the above-described regulatory information for each of New Mexico's Class I Areas. This information includes the mandatory information regarding visibility conditions described in items 1 through 5, above, as well as optional information related to extinction budgets.

Table 3-1, below, lists the types of aerosol species measured by the Interagency Monitoring of Protected Visual Environments (IMPROVE) monitor sites in New Mexico and elsewhere. The table also presents the mechanism by which they form in the atmosphere and provides examples of the key sources of each aerosol species. Some of these sources are the result of human activities like industry or transportation, while others occur naturally. Each species listed in the table is part of a broader class of pollutant tracked by EPA for multiple regulatory purposes: particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$). For comparison, a human hair is about 50 to 70 microns in diameter. EPA provides additional background information about particulate matter at https://www.epa.gov/pm-pollution/particulate-matter-pm-basics.

[51] 40 CFR § 51.308(f)(1)(iv).
[52] 40 CFR § 51.308(f)(1)(v).
[53] EPA, Guidance on Regional Haze State Implementation Plans for the Second Implementation Period, August 20, 2019 ("EPA Regional Haze SIP Guidance"), p. D-2.

Table 3-1: Aerosol Species Measured by IMPROVE Monitors

Aerosol species	Alternate names for aerosol	Formation mechanism	Examples of key sources
Fine soil	Soil dust, fine mode mineral dust, windblown dust	Wind effects on earth's surface (global scale)	Long-range transport from global desert areas; dust from construction sites or unpaved road traffic; land areas disturbed from human or natural events
Coarse mass	Coarse particulate matter, mineral dust, "CM"	Wind effects on earth's surface (local to regional)	Windblown dust from arid regions; dust from construction sites or unpaved road traffic; land areas disturbed from human or natural events
Elemental carbon	Light absorbing carbon, "EC"	Combustion of carbon containing fuels	Fossil fuel combustion sources; on and off-road mobile engine sources, e.g. cars, trucks, construction equipment; biofuel and biomass (wildfires) burning
Organic mass	Organic carbon, particulate organic mass, particulate organic matter, "OC," "POM"	Combustion of carbon containing fuels, biological processes	Fossil fuel-fired electrical generators; internal combustion engines; biogenic sources (forested areas); biofuel and biomass (wildfires) burning
Ammonium nitrate	Amm. Nitrate NH_4NO_3	Conversion of nitrogen oxide emissions from combustion processes	Coal and natural gas-fired electric power plants; large industrial facilities like Portland cement plants; on and off-road mobile sources, e.g. cars, trucks, construction equipment; small industrial equipment like engines used for oil and gas production
Ammonium sulfate	Amm. Sulfate $(NH_4)_2 SO_4$	Conversion of sulfur dioxide emissions from combustion processes	Coal-fired electric power plants; other fuel combustion sources; large industrial facilities such as pulp and papermills, smelters, refineries and Portland cement plants; on and off-road mobile sources, e.g. cars, trucks, construction equipment.
Sea salt		Wind effects on earth's surface (local to global)	Wind over ocean surface, dry lake beds or playas; generally negligible at New Mexico Class I Areas.

Additional information on the above species and on related scientific and technical information may be found on the EPA web page on visibility protection at https://www.epa.gov/visibility.

3.2 Trends in Visibility Conditions

This section presents information to satisfy the requirements of 40 CFR § 51.308(f)(1)(i) through (v). These provisions require a Regional Haze SIPr to present monitor data on visibility conditions for each New Mexico Class I Area during prescribed time periods to demonstrate progress toward natural visibility conditions. The information that must be presented is as follows:

- Visibility on the 20% Most Impaired Days and 20% Clearest Days for the baseline period (2000-2004), interim period (2008-2012), and current period (2014-2018)[54].

- End point visibility conditions, meaning natural visibility conditions for 2064.

- Changes from the baseline period to the current period and from the interim period to the current period, and the difference between current and end point visibility conditions.

Table 3-2: Visibility Conditions by Time Period, 20% Most Impaired Days (in dv) Reference WRAP TSSv2 - URL)* and Table 3-3 present the information discussed above. As these tables show, all New Mexico IMPROVE monitor sites showed improvement in visibility conditions from the baseline period to the interim period and from the interim period to the current period during both the most impaired and clearest days. For the current period, visibility conditions in dv for both the most impaired and clearest days for all New Mexico IMPROVE monitor sites are below the corresponding dv values for the baseline period. These current period visibility conditions in dv are also below the corresponding dv values for the interim period.[55]

[54] EHD and NMED County chose to use the 2014-2018 time period for current conditions because 2018 represents the end of the first planning period and 2019 is the beginning of the second planning period.

[55] The Regional Haze Rule does not require a comparison of DV values for the current period (2014 - 2018) to DV values for the baseline or interim periods. 40 CFR § 51.308(f)(1)(i) to (f)(1)(v). This section of the chapter presents such a comparison to put the monitor data in context and give the reader a sense of visibility progress achieved to date.

Table 3-2: Visibility Conditions by Time Period, 20% Most Impaired Days (in dv) [Reference WRAP TSSv2 - URL][*]

Class 1 Area	IMPROVE Monitor Site	Baseline Period Visibility (2000-2004 avg)	Interim Period Visibility (2008-2012 avg)	Current Period Visibility (2014-2018 avg)	End Point Visibility (2064 Natural Conditions)	Change from Baseline Period to Current Period	Change from Interim Period to Current Period	Difference Between Current and End Point Visibility
Bandelier Wilderness	BAND1	9.7	9.3	8.4	4.6	-1.3	-0.9	-3.8
Bosque del Apache Wilderness	BOAP1	11.6	11.2	10.5	5.4	-1.1	-0.7	-5.1
Carlsbad Caverns National Park	GUMO1	14.6	12.9	12.6	4.8	-2.0	-0.3	-7.8
Gila Wilderness	GICL1	9.0	8.3	7.6	4.2	-1.4	-0.7	-3.4
Pecos Wilderness	WHPE1	7.3	6.7	6.0	3.5	-1.3	-0.7	-2.5
Salt Creek Wilderness	SACR1	16.5	15.3	15.0	5.5	-1.5	-0.3	-9.5
San Pedro Parks Wilderness	SAPE1	7.7	7.0	6.4	3.3	-1.3	-0.6	-3.1
Wheeler Peak Wilderness	WHPE1	7.3	6.7	6.0	3.5	-1.3	-0.7	-2.5
White Mountain Wilderness	WHIT1	11.3	10.5	10.0	4.9	-1.3	-0.5	-5.1

[*]The data in this table addresses requirements of 40 CFR § 51.308(f)(1)(i) through (f)(1)(v).

Table 3-3: Visibility Changes by Time Period, 20% Clearest Days (in dv) Reference WRAP TSSv2 - URL)[*]

Class 1 Area	IMPROVE Monitor Site	Baseline Period Visibility (2000-2004 avg)	Interim Period Visibility (2008-2012 avg)	Current Period Visibility (2014-2018 avg)	End Point Visibility (2064 Natural Conditions)	Change from Baseline Period to Current Period	Change from Interim Period to Current Period	Difference Between Current and End Point Visibility
Bandelier Wilderness	BAND1	5.0	3.9	3.0	1.3	-2.0	-0.9	-1.7
Bosque del Apache Wilderness	BOAP1	6.3	5.6	4.6	2.2	-1.7	-1.0	-2.4
Carlsbad Caverns National Park	GUMO1	5.9	5.2	4.7	1.0	-1.2	-0.5	-3.7
Gila Wilderness	GICL1	3.3	2.5	2.1	0.5	-1.2	-0.4	-1.6
Pecos Wilderness	WHPE1	1.2	0.6	0.3	-0.6	-0.9	-0.2	-0.9
Salt Creek Wilderness	SACR1	7.8	7.2	6.6	2.1	-1.2	-0.6	-4.5
San Pedro Parks Wilderness	SAPE1	1.5	1.1	0.4	-0.7	-1.10	-0.7	-1.1
Wheeler Peak Wilderness	WHPE1	1.2	0.6	0.3	-0.6	-0.9	-0.3	-0.9
White Mountain Wilderness	WHIT1	3.6	3.3	2.5	0.7	-1.1	-0.8	-1.8

[*]The data in this table addresses requirements of 40 CFR § 51.308(f)(1)(i) through (f)(1)(v).

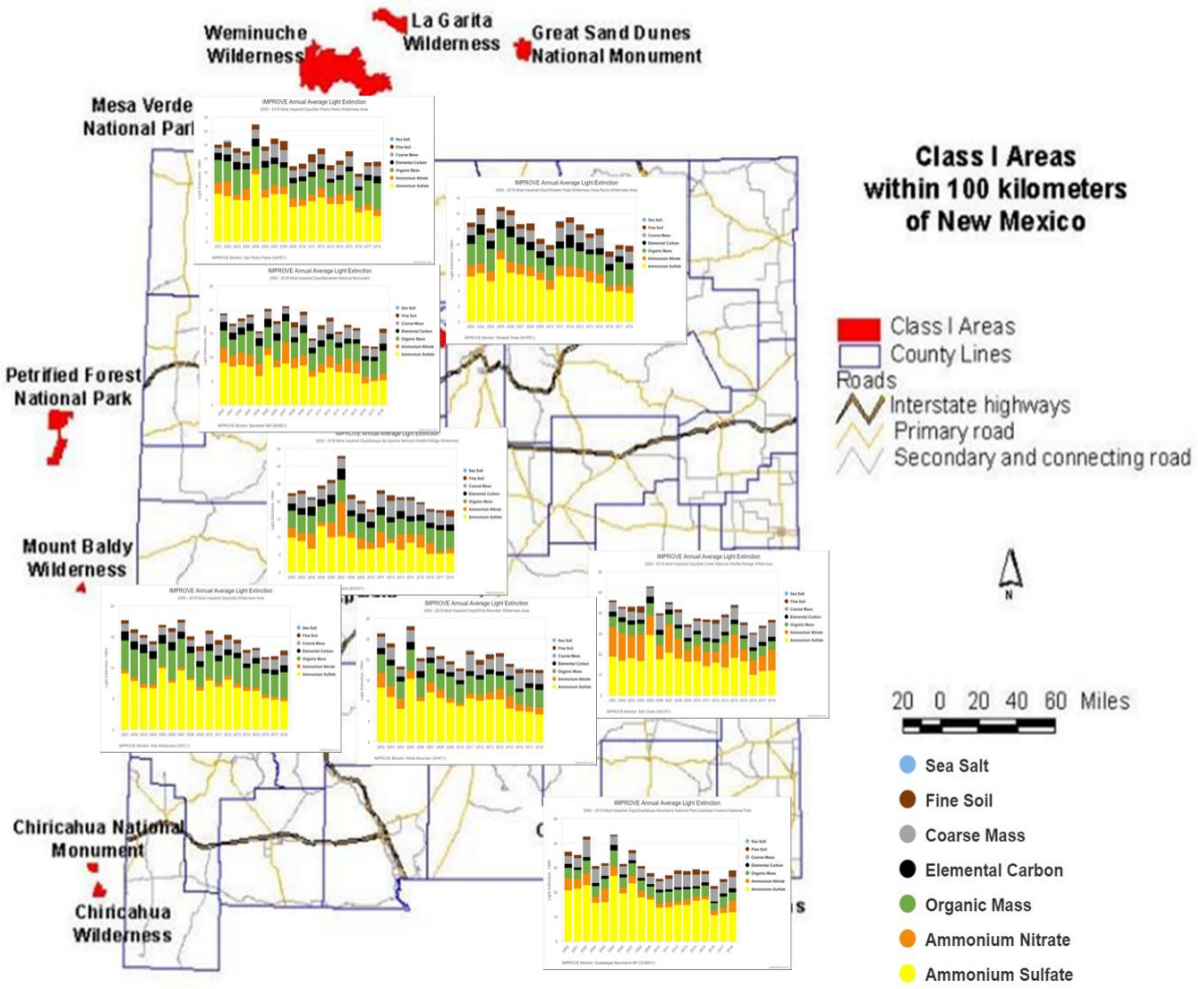
3.3 New Mexico IMPROVE Network Light Extinction Trends Analysis

Figure 3-1 provides an overview of the annual changes in the extinction magnitude and species contributors at all New Mexico IMPROVE monitor sites. All sites have shown visibility improvement over the monitoring period, as indicated by the downward slope of the uppermost boundary of the bars. The graphs super-imposed over the map are meant to provide only a quick visual reference, not a full-sized rendition of each graph with complete notation. Full versions of the bar graphs in this map, and other detailed visualizations of monitor trends, are available at the WRAP TSS.

Figures 3-2 through Figure 3-9 show the aerosol species contributing to light extinction at each New Mexico IMPROVE monitor site on the Most Impaired Days and the Clearest Days during the baseline period (2000-2004), interim period (2008-2012), and current period (2014-2018), as well as the contributing species under natural conditions in 2064. The stacked bar charts give speciated contributions, which sum to the total particle light extinction coefficient. Note that the contributions to

light extinction by each species are measured in inverse megameters. The total visibility conditions in deciviews appear above each bar for each five-year period represented. Contributions to light extinction from individual species are color-coded and presented in the following order: sea salt (light blue), fine soil (maroon), coarse mass (gray), organic mass from carbon (green), elemental carbon (black), ammonium nitrate (orange), and ammonium sulfate (yellow). Note that the dv value includes the Rayleigh Scattering[56] contribution at each site.

Figure 3-1: Map Overview of New Mexico and Adjacent Class I Areas and Progression of Speciated Visibility on Most Impaired Days over the2000-2018 Monitoring Period. Wheeler Peak Wilderness and Pecos Wilderness share a single monitor (WHPE1) as do Carlsbad Caverns NP and Guadalupe Mountains NP (GUMO1).



Bandelier Wilderness Area

Figure 3-2: Contributors to Light Extinction, Most Impaired and Clearest Days, Bandelier Wilderness Area.

[56] The scattering of light by particles much smaller than the wavelength of the light, e.g., molecular scattering in the natural atmosphere. (https://www.nps.gov/subjects/air/glossary.htm)

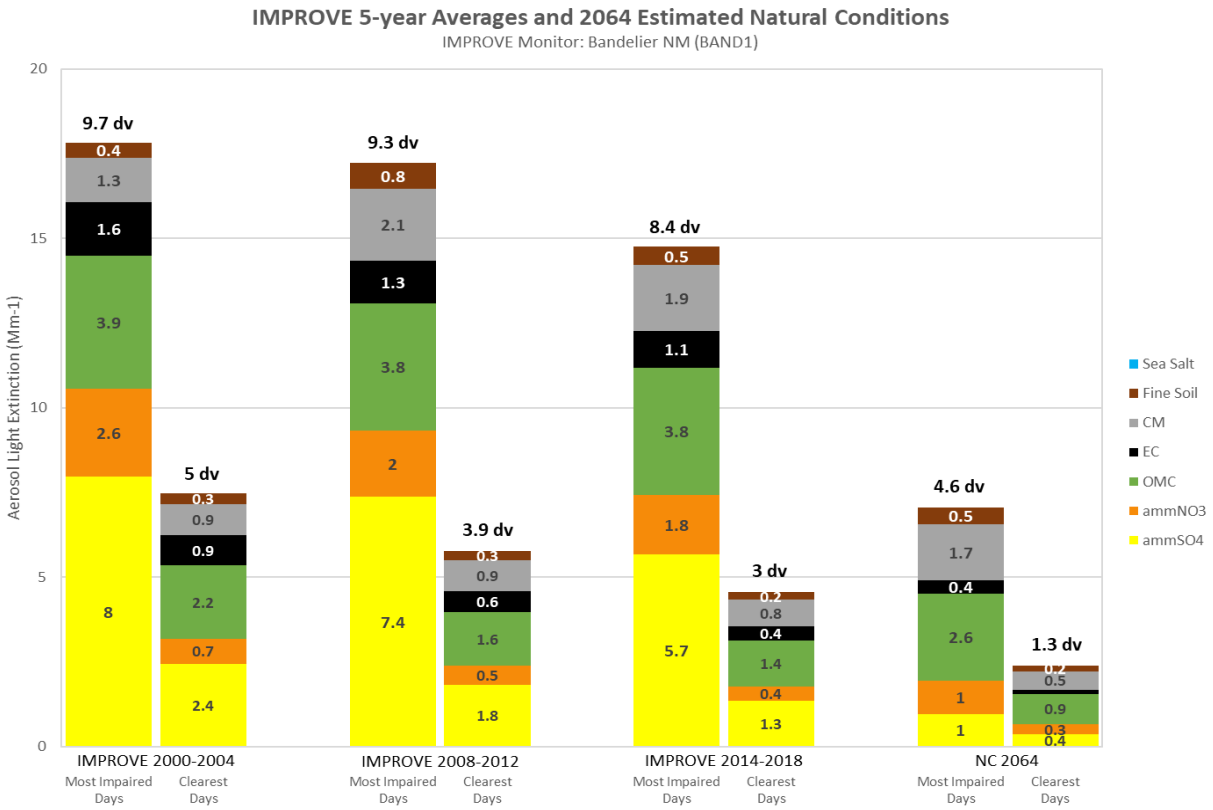


Figure 3-2 shows the speciated contributors to visibility impairment for this site for Most Impaired and Clearest Days, respectively, over the indicated time periods. We see progress toward the Rule goal of reducing visibility impairment on both Most Impaired and Clearest Days. Monitor data trends at the site generally follow network-wide trends described above. One noteworthy trend specific to this site is the overall increase in coarse mass and fine soil contribution to light extinction on the Most Impaired Days even though that contribution is still lower than other species. Much of the increase in coarse mass and fine soil could be related to increased drought and wildfire in the state, though not directly related to anthropogenic sources of visibility impairment.

2019 IMPROVE data at BAND1 shows a lower overall deciview value (7.54) on the most impaired days and a similar deciview value to 2014-2018 (2.9) on the clearest days. Fine soil went down on all days in 2019, as well organic mass, coarse mass, and elemental carbon. Ammonium nitrate and ammonium sulfate both went up slightly on all days in 2019.

As with all New Mexico IMPROVE sites, to view the most recent visibility trend charts in more detail, please visit the link described at the beginning of Section 3.3.

Bosque del Apache Wilderness Area

Figure 3-3: Contributors to Light Extinction, Most Impaired and Clearest Days, Bosque del Apache Wilderness Area.

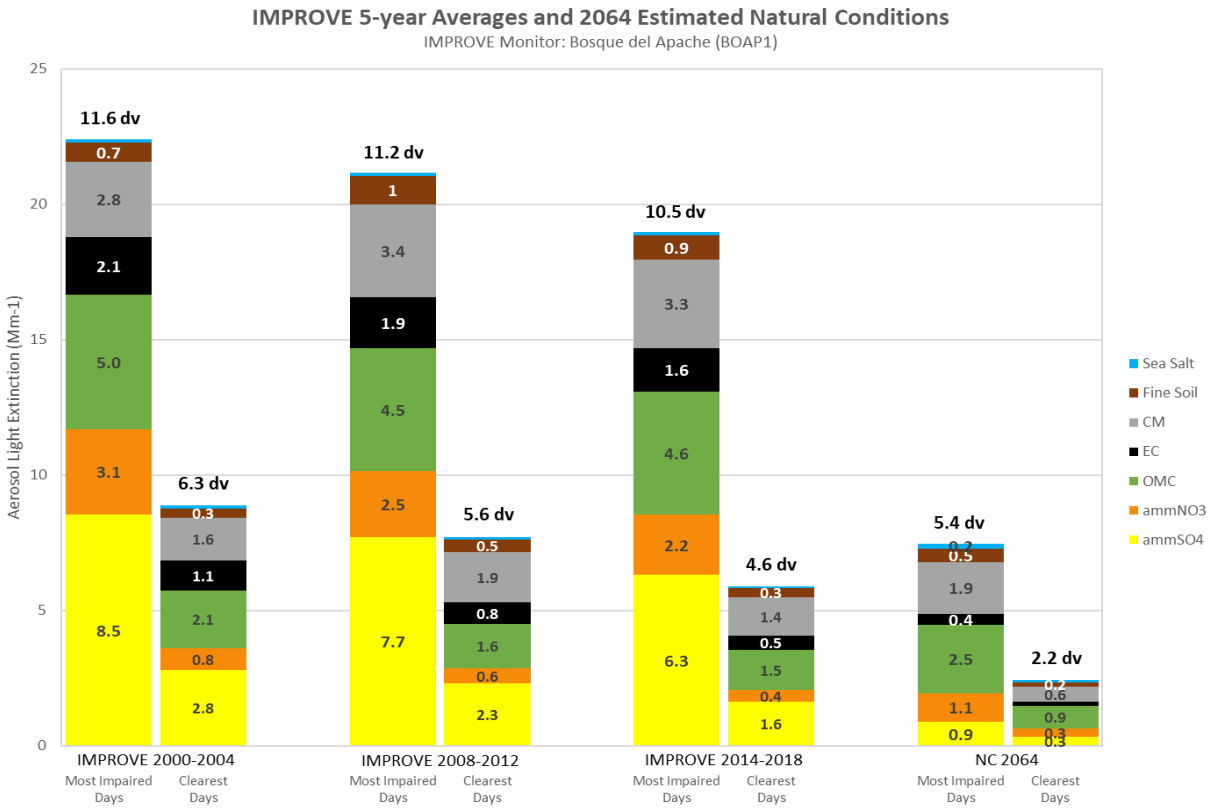


Figure 3-3 shows the speciated contributors to visibility impairment for this site and show improved visibility on both the Most Impaired and Clearest Days. Monitor data at the site generally followed network trends described above. The interim (2008 - 2012) and current (2014 - 2018) periods show greater coarse mass and fine soil contributions to the extinction budget on the most impaired days, compared to the baseline period (2000 - 2004). This increase in extinction due to coarse mass and fine soil offsets the decreases in other species.

2019 IMPROVE data at BOAP1 shows a slight increase, but still general decrease in the overall deciview value from the 2014-2018 period on the most impaired days and a slight decrease in the overall deciview value on the clearest days. One noteworthy trend for 2019 was the decrease in fine soil and the increase in coarse mass on all days.

Carlsbad Caverns National Park

Figure 3-4: Contributors to Light Extinction, Most Impaired and Clearest Days, Carlsbad Caverns National Park.

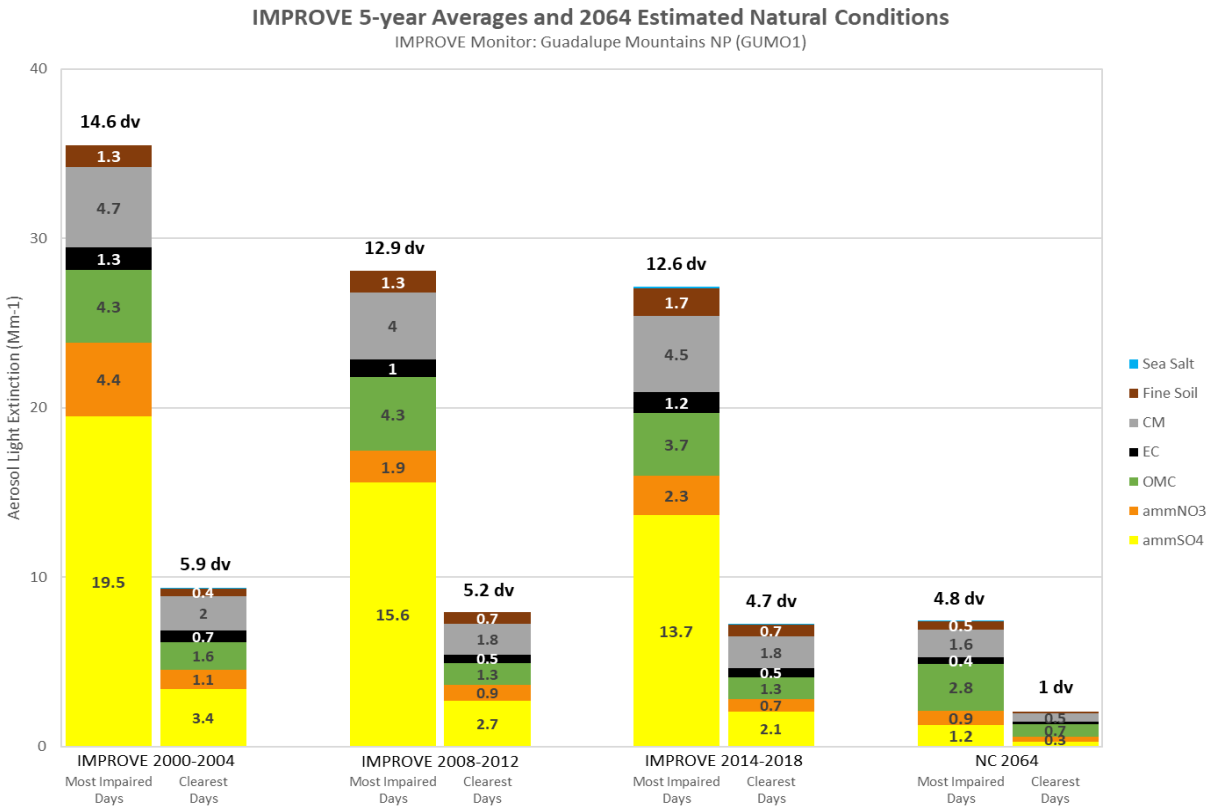


Figure 3-4 shows a decrease in ammonium sulfate and ammonium nitrate from the baseline period. 2019 IMPROVE data showed an overall slight decrease in deciviews on all days.

Gila Wilderness Area

Figure 3:5: Contributors to Light Extinction, Most Impaired and Clearest Days, Gila Wilderness Area.

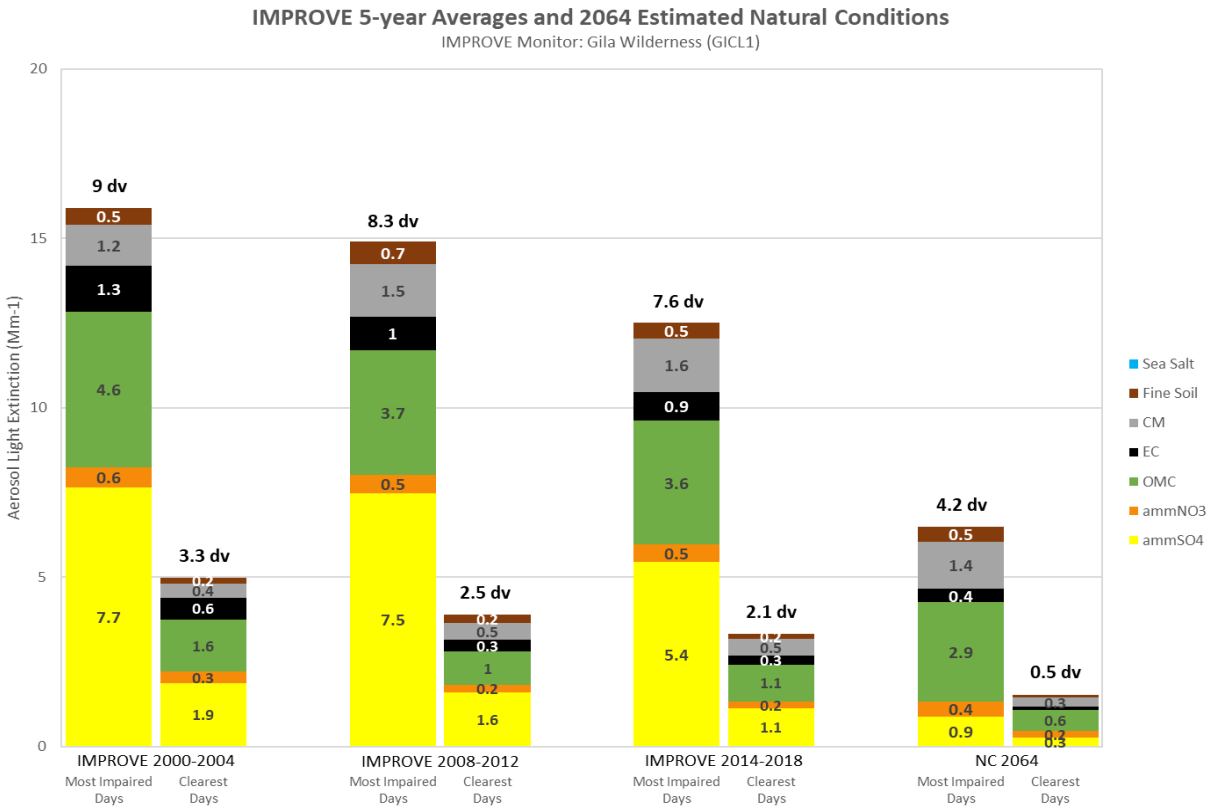


Figure 3-5 shows a decrease in most visibility impairing species in 2014-2018 compared to the baseline. 2019 IMPROVE data showed little change from the IMPROVE numbers for 2018. Thus, the numbers from 2018 are also representative for 2019.

<u>Pecos Wilderness Area and Wheeler Peak Wilderness Area</u>

Figure 3-6: Contributors to Light Extinction, Most Impaired and Clearest Days, Pecos Wilderness Area and Wheeler Peak Wilderness Area.

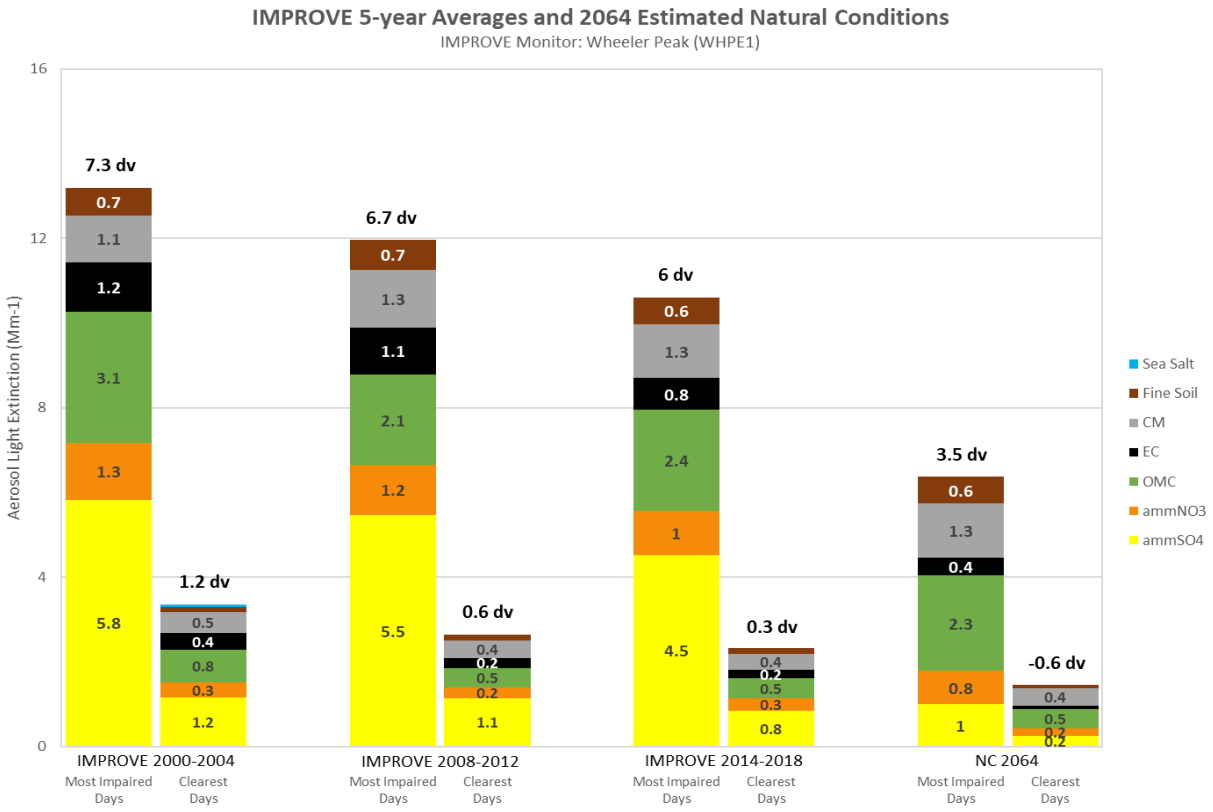


Figure 3-6 below shows a decrease in all visibility impairing species in 2014-2018 from the baseline with the exception of coarse mass. There was no notable change in deciview values on all days for 2019 as compared to the 2014-2018 period, so the 2014-2018 period is also representative of 2019.

Salt Creek Wilderness Area

Figure 3-7: Contributors to Light Extinction, Most Impaired and Clearest Days, Salt Creek Wilderness Area.

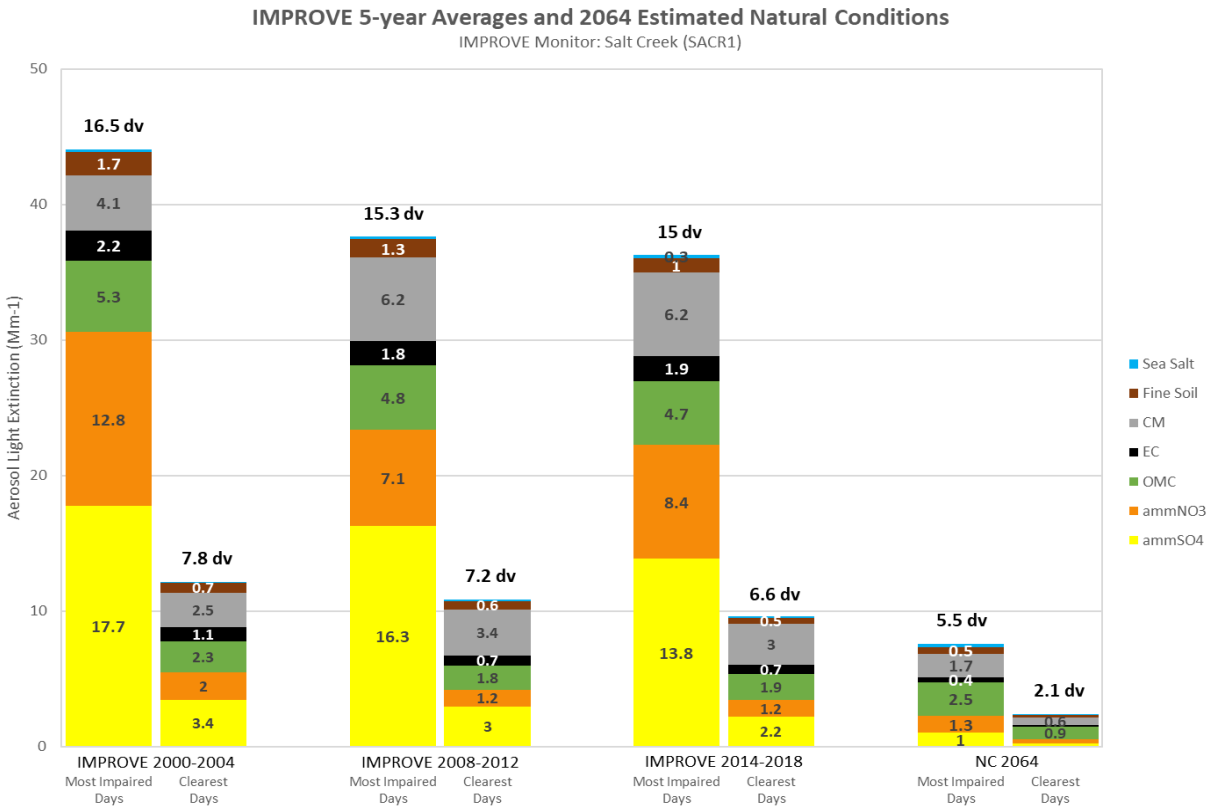


Figure 3-7 shows much of the 2014-2018 numbers holding steady from 2008-2012, with an increase in ammonium nitrate and decrease in ammonium sulfate. 2019 IMPROVE data showed little difference in visibility impairing species since 2014-2018, with the exception of an increase in course mass.

San Pedro Parks Wilderness Area

Figure 3-8: Contributors to Light Extinction, Most Impaired and Clearest Days, San Pedro Parks Wilderness Area.

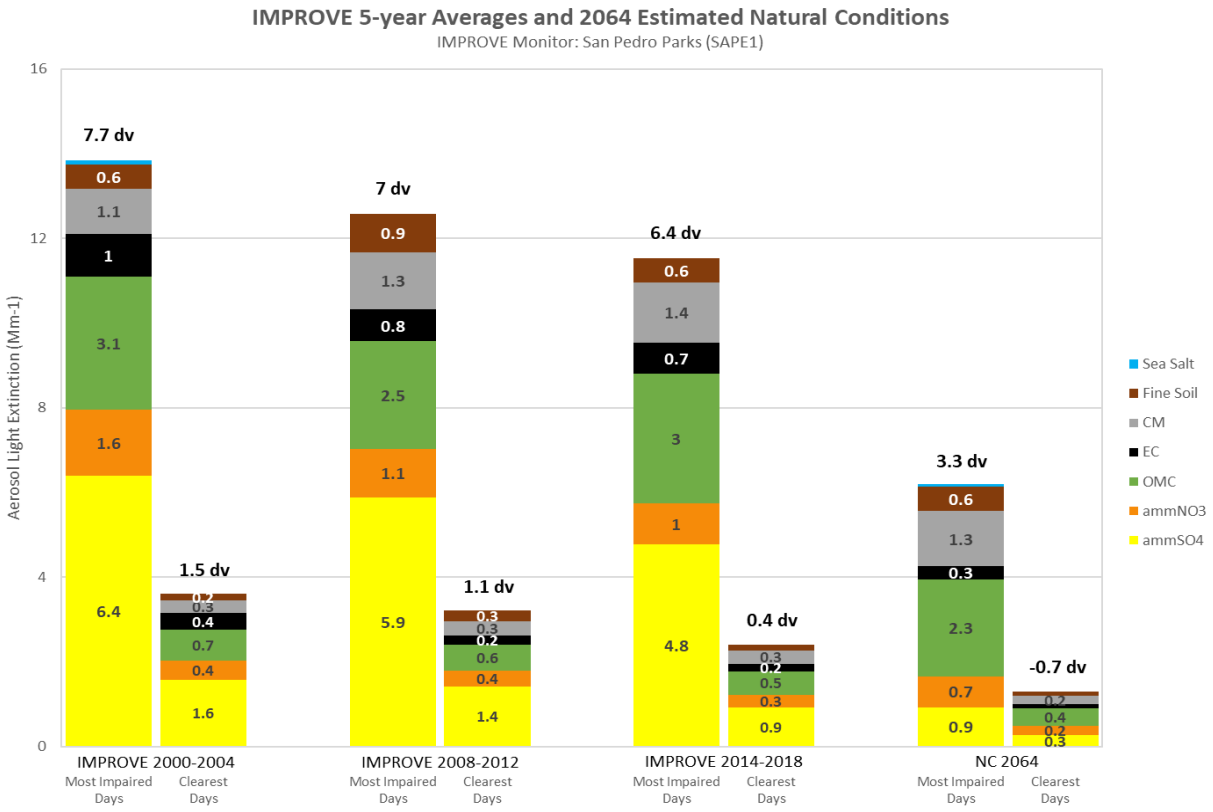


Figure 3-8 shows a decrease in visibility impairing species since the baseline period with the exception of coarse mass. 2019 IMPROVE data showed a slight increase in visibility impairing species since the 2018-2014 period (4.14 dv). Notable was an increase in elemental carbon (0.81 dv) on all days and a decrease in coarse mass (0.97 dv) on all days.

White Mountain Wilderness Area

Figure 3-9: Contributors to Light Extinction, Most Impaired and Clearest Days, White Mountain Wilderness Area.

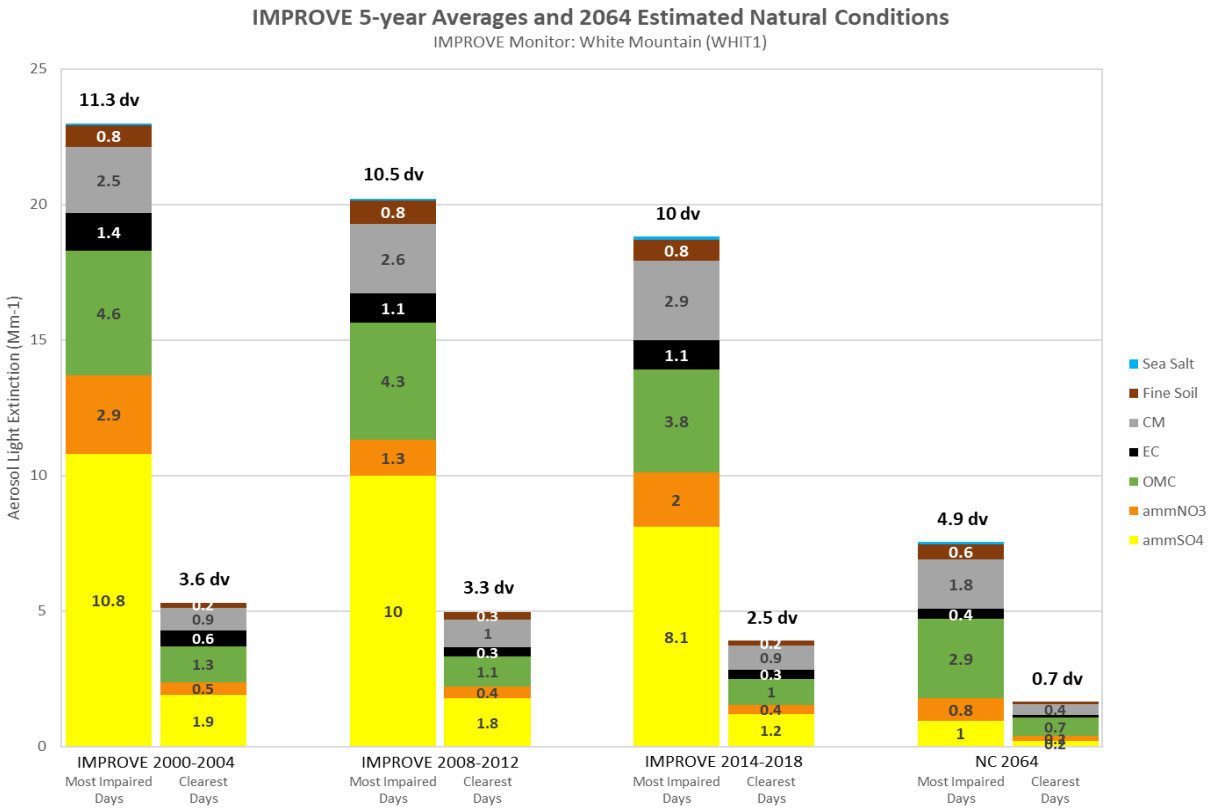


Figure 3-9 shows a general decrease in visibility impairing species since the baseline period, with the exception of ammonium nitrate. 2019 IMPROVE data showed an overall decrease in visibility impairing species since 2018 (6.43 dv). Notable was a decrease in coarse mass (2.14 dv), but otherwise 2014-2018 values are representative of the values for 2019.

3.4 Monitoring Data Summary

Figure 3-2 through Figure 3-9 show the monitoring data from the baseline period (2000-2004) through the current period (2014-2018) and natural visibility conditions in 2064 at New Mexico Class I Areas. 2019 data is also mentioned in the summaries. All network sites showed improving visibility and progress toward the Regional Haze Rule goals of reducing impacts on the most impaired days while not backtracking during the clearest days.

Noteworthy trends across the network during the current period (2014-2018) include:

1) Ammonium sulfate was the primary driver of light extinction at all New Mexico Class I Areas during Most Impaired Days. During Clearest Days, all sites were dominated by ammonium sulfate except for Gila Wilderness and Bandelier Wilderness, where organic mass made an equal or slightly larger contribution to light extinction, and Salt Creek Wilderness, where coarse mass and made the largest contribution.

2) Though the order changed from site to site, the top three contributors to light extinction at New Mexico Class I Areas were ammonium sulfate, organic mass, and coarse mass on both the most impaired days and clearest days. The only exceptions to this were Salt Creek Wilderness during

Most Impaired Days and San Pedro Parks Wilderness during clearest days, when ammonium nitrate was one of the top three contributors instead of either organic mass or coarse mass.

3) The combined ammonium sulfate and ammonium nitrate contribution to light extinction make up approximately half of the total contribution at all sites through to the current period (2014-2018) on both the most impaired days and the clearest days. Sulfur dioxide (SO_2) and nitrogen oxides (NO_x) are precursors to ammonium sulfate and ammonium nitrate.
4) The largest haze reductions over time (i.e., the largest reduction in individual species' contributions to light extinction) are generally associated with ammonium sulfate and ammonium nitrate, which have likely occurred due to reduced SO_2 and NO_X emissions since EPA first promulgated the Regional Haze Rule in 1999.

3.5 Tracking Visibility Progress Regulatory Requirements

The Regional Haze Rule requires calculation of a Uniform Rate of Progress (URP) for each Class I Area in the state.[57] Though Bernalillo County does not have any Class 1 areas, since it is located within the State of New Mexico, which does, the URP glidepath calculations are provided below for context regarding impacts to Class 1 areas in New Mexico.

To calculate the URP, the state must compare baseline visibility conditions for the Most Impaired Days to natural visibility conditions for the Most Impaired Days in the mandatory Class I Area and determine the uniform rate of visibility improvement (measured in deciviews of improvement per year) that would need to be maintained during each planning period in order to attain natural visibility conditions by the end of 2064.

As part of its Regional Haze SIP submission, a state is allowed to propose:

1) an adjustment to the URP for a mandatory Class I Area to account for impacts from anthropogenic sources outside the United States;[58] and
2) an adjustment to the URP for the mandatory Class I Area to account for impacts from wildland prescribed fires that were conducted with the objective to establish, restore, and/or maintain sustainable and resilient wildland ecosystems, to reduce the risk of catastrophic wildfires, and/or to preserve endangered or threatened species during which appropriate basic smoke management practices were applied.[59]

The WRAP contractor, Ramboll, developed adjustments for both allowances for all Class I Areas in WRAP states. The methods Ramboll used to calculate these adjustments are provided in Appendix B.[60] NMED decided to use both of these adjustments for all of New Mexico's Class I Areas, and EHD will reference those adjustments as well to be consistent.[61]

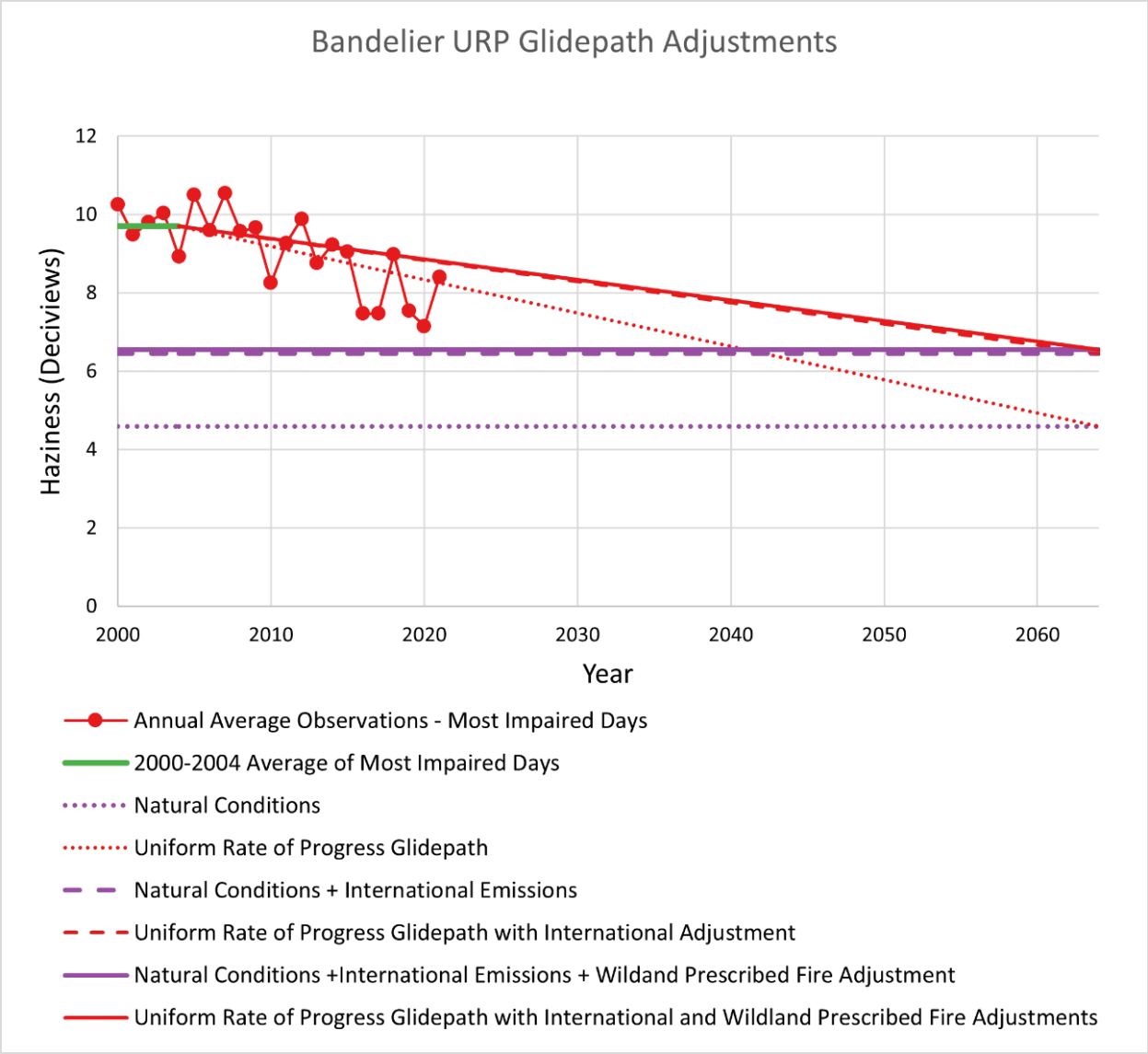
[57] 40 CFR § 51.308(f)(1)(vi)(A).
[58] 40 CFR § 51.308(f)(1)(vi)(B).
[59] Id.
[60] *See* Section 9.0, Adjustments to the Uniform Rate of Progress Glidepath.
[61] URP glidepath adjustments for New Mexico Class I Areas are available on the Modeling Data Analysis page of the WRAP TSS (https://views.cira.colostate.edu/tssv2/Express/ModelingTools.aspx). *See* Product #5 under Visibility Progress and Projections.

3.6 Uniform Rate of Progress (URP) for New Mexico Class I Areas

Figures 3-10 through Figure 3-17 show the adjusted URP (accounting for impacts from anthropogenic sources outside the U.S. and wildland prescribed fires) for all New Mexico Class I Areas.

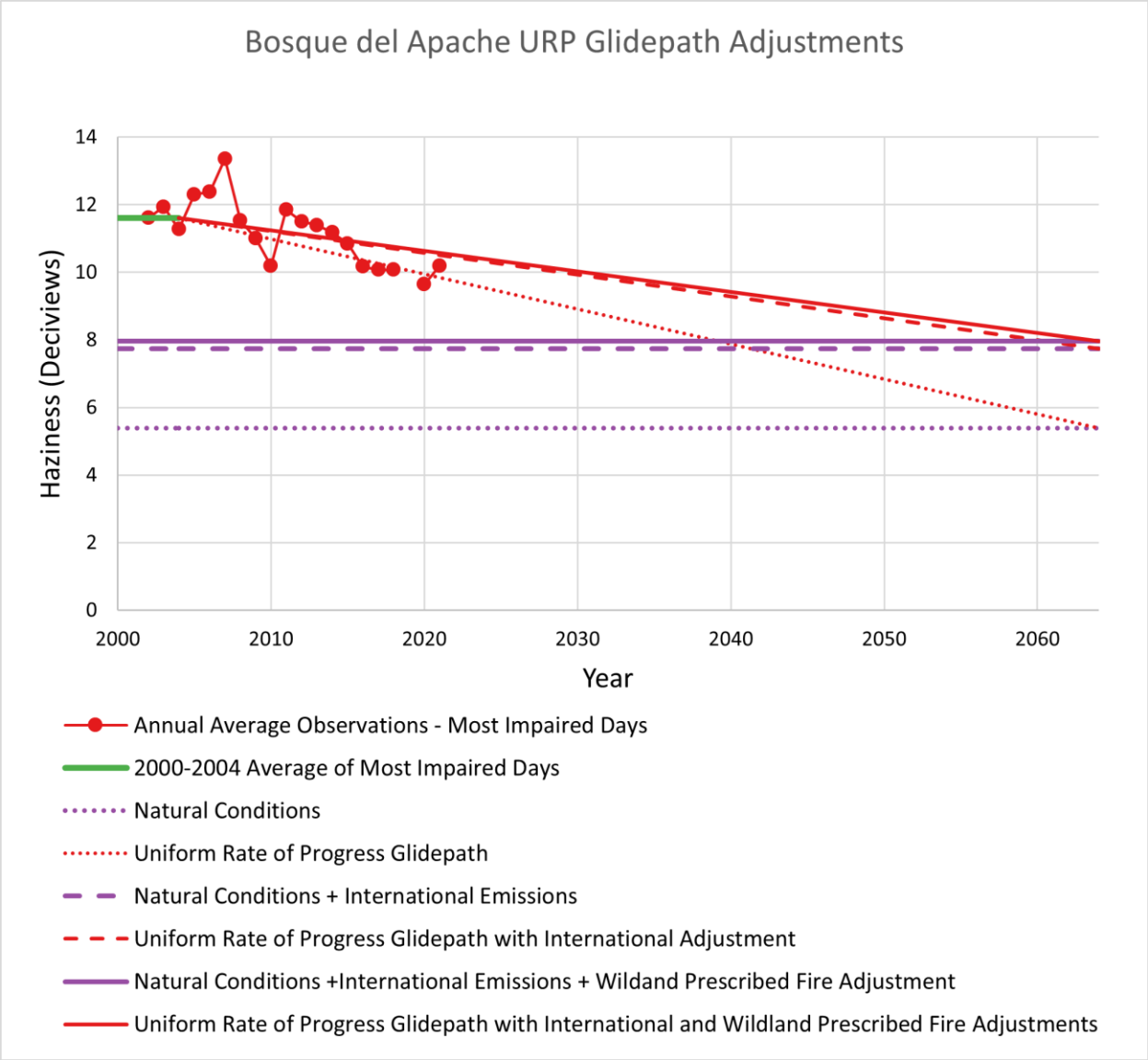
Bandelier Wilderness Area Adjusted URP

Figure 3-10: BAND1 Adjusted URP.



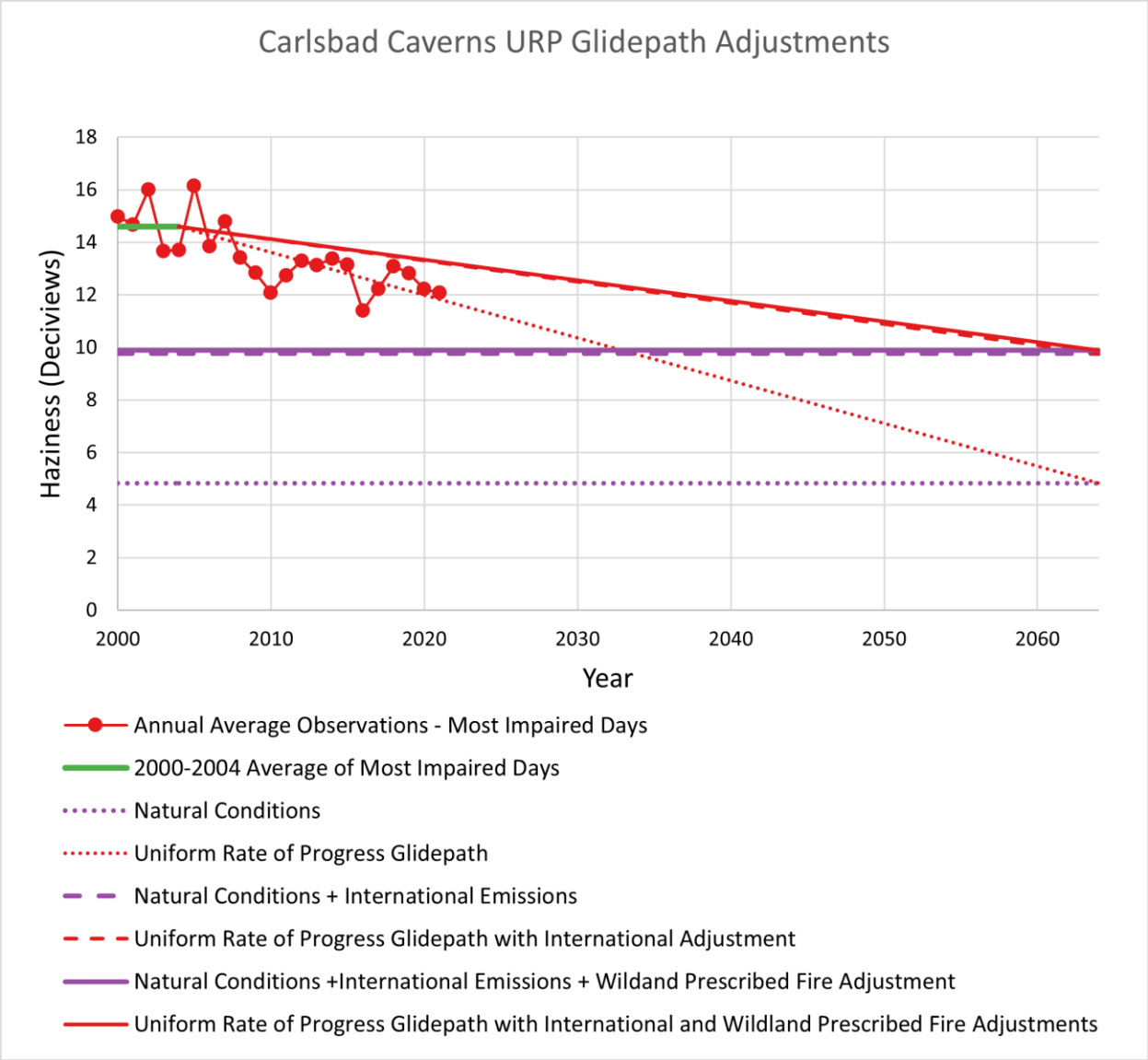
Bosque del Apache Wilderness Area Adjusted URP

Figure 3-11: BOAP1 Adjusted URP.



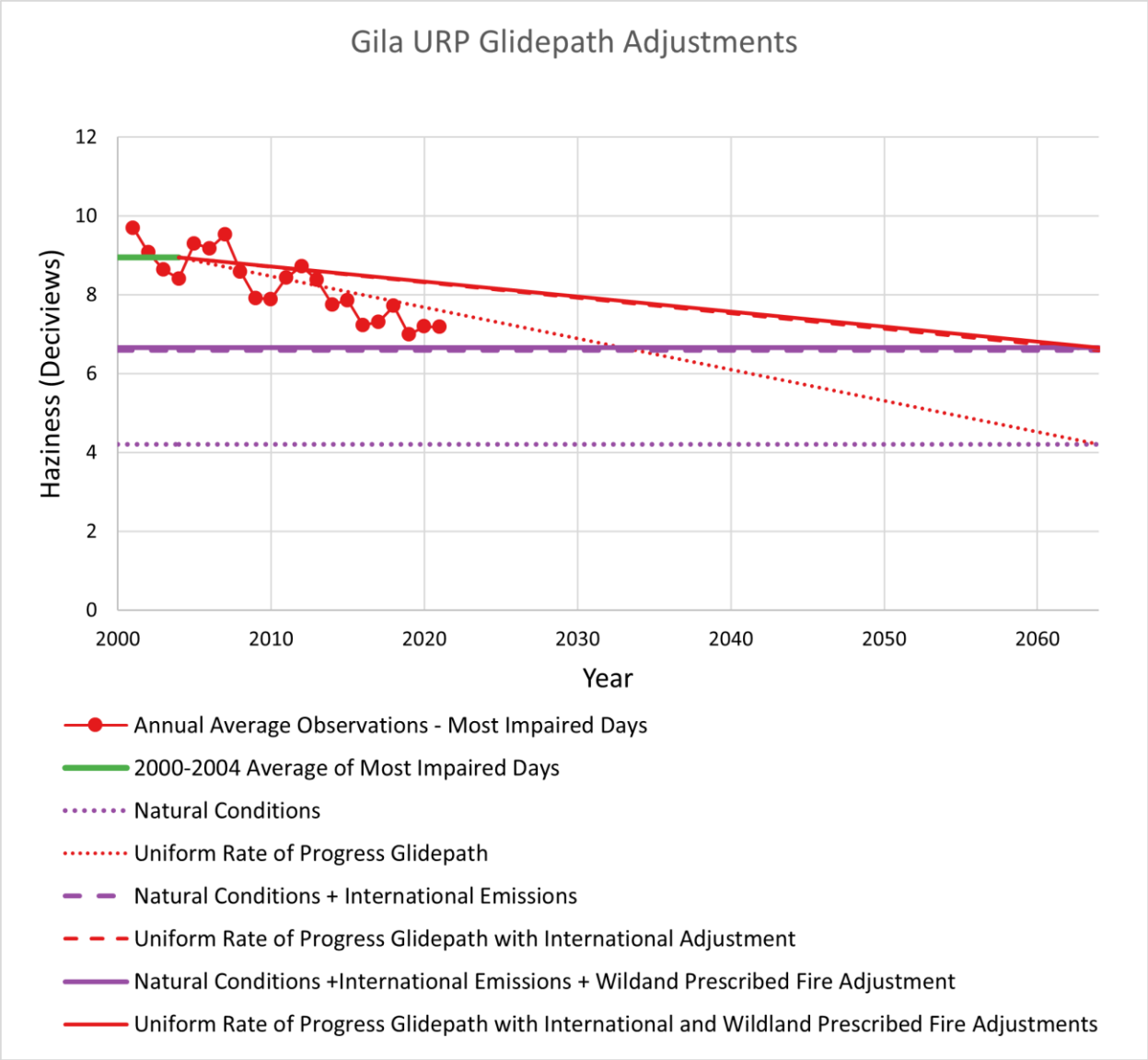
Carlsbad Caverns National Park Adjusted URP

Figure 3-12: GUMO1 Adjusted URP.



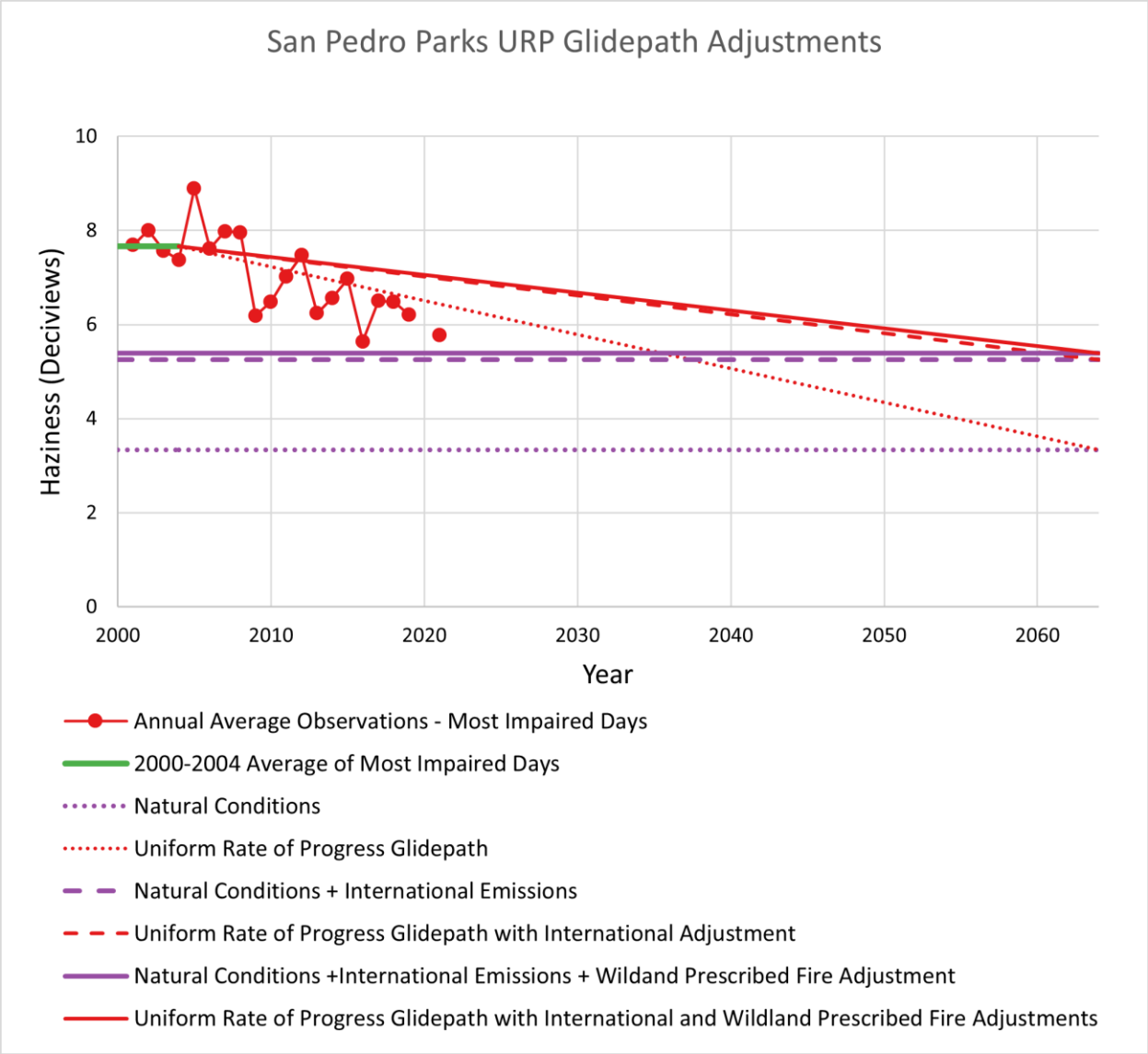
Gila Wilderness Area Adjusted URP

Figure 3-13: GICL1 Adjusted URP.



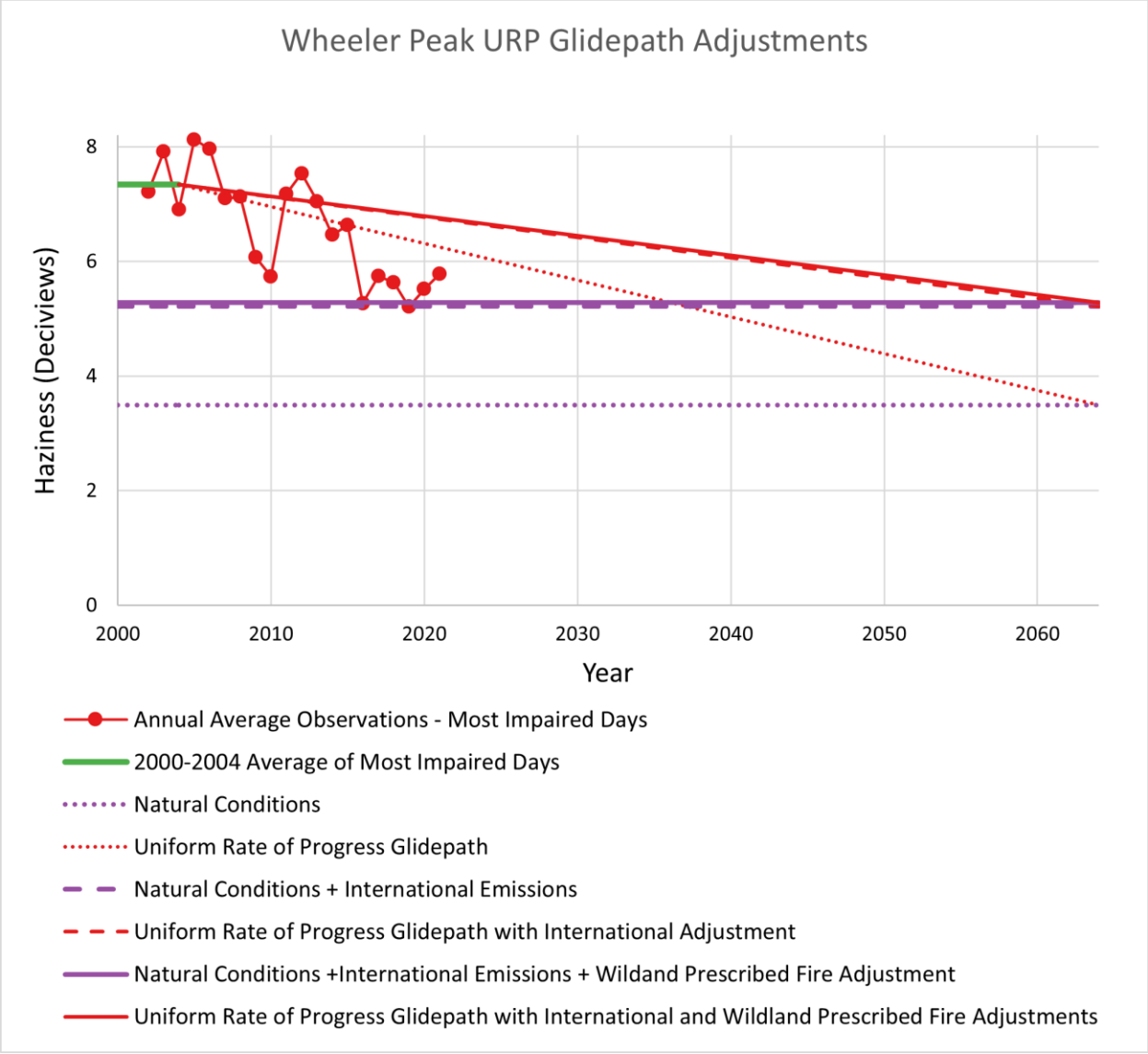
San Pedro Parks Wilderness Area Adjusted URP

Figure 3-14: SAPE1 Adjusted URP.



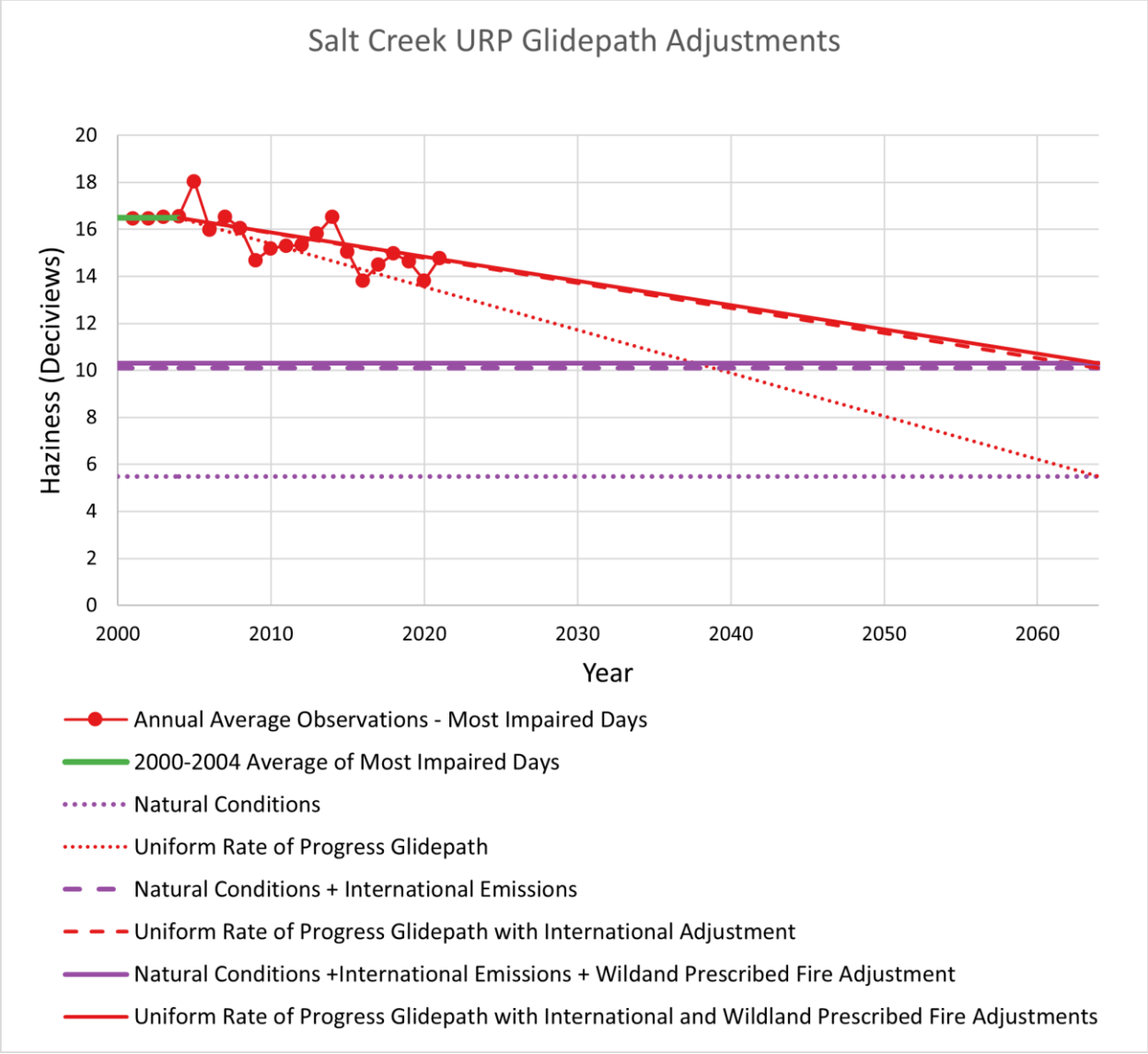
Pecos Wilderness Area & Wheeler Peak Wilderness Area Adjusted URP

Figure 3-15: WHPE1 Adjusted URP.



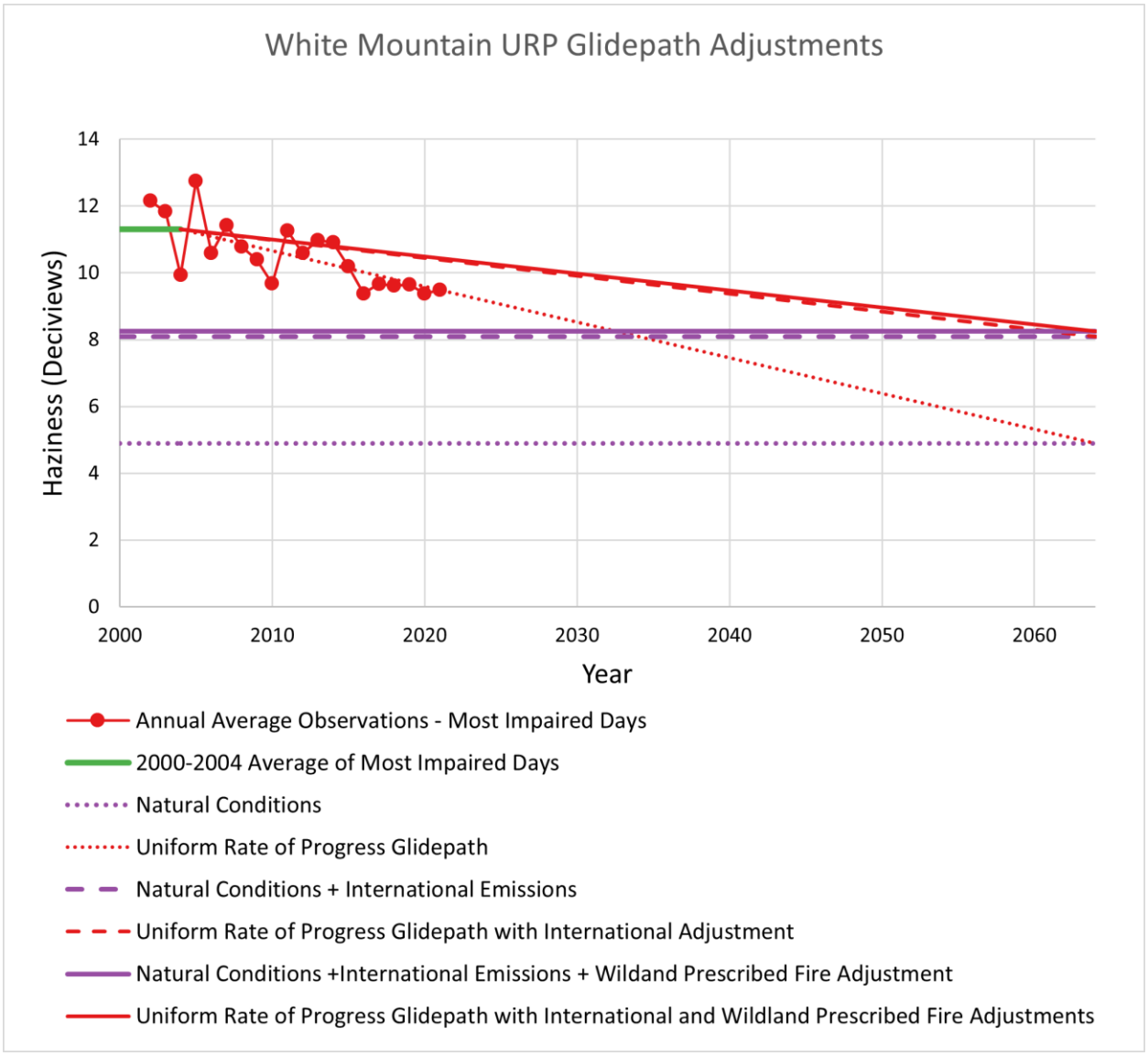
Salt Creek Wilderness Area Adjusted URP

Figure 3-16: SACR1 Adjusted URP.



White Mountain Wilderness Area Adjusted URP

Figure 3-17: WHIT1 Adjusted URP.


White Mountain URP Glidepath Adjustments
Haziness (Deciviews)
14
12
10
8
6
4
2
0
2000
2010
2020
2030
2040
2050
2060
Year
Annual Average Observations - Most Impaired Days
2000-2004 Average of Most Impaired Days
Natural Conditions
Uniform Rate of Progress Glidepath
Natural Conditions + International Emissions
Uniform Rate of Progress Glidepath with International Adjustment
Natural Conditions +International Emissions + Wildand Prescribed Fire Adjustment
Uniform Rate of Progress Glidepath with International and Wildland Prescribed Fire Adjustments

Chapter 4: Determination of Affected Class 1 Areas in Other States

The Regional Haze Rule (Rule) requires that each State assess whether or not its emissions may affect Class I Areas in other States. The Rule further requires that each State adopt control measures necessary to address these impacts as part of the state's long-term strategy to make reasonable progress toward natural visibility conditions in 2064.

This chapter addresses potential visibility impacts of Albuquerque - Bernalillo County emissions on Class I Areas in states other than New Mexico. Please refer to the NMED SIP for data and an analysis of impacts from New Mexico in areas outside of Bernalillo County to other states.

Note that EHD cooperated with NMED to consult with air quality agencies in other States regarding interstate visibility impacts. Chapter 11 of this SIP describes EHD's participation in these state-to-state consultations.

For additional information and data about the potential impact of cross-state emissions on Class I Areas within and beyond New Mexico, please see the SIP prepared by NMED and adopted by the State of New Mexico EIB.

4.1 Regulatory requirements

This chapter addresses specific regulatory provisions in the Regional Haze Rule regarding the potential impact of Albuquerque - Bernalillo County emissions on Class I Areas in other States.

Overview

The Rule, by its very nature, addresses visibility impacts across state boundaries. The Rule addresses "regional" human-caused visibility impairment, defining "regional haze" as "visibility impairment that is caused by the emission of air pollutants from numerous anthropogenic sources located over a wide geographic area" 40 CFR § 51.301. Therefore, States must assess the impact of their emissions not only within their own boundaries, but also across those boundaries. The Rule requires States to provide data in their SIPs addressing how their emissions affect visibility in Class I Areas in other States. This chapter satisfies that requirement.

Specific regulatory provisions

This chapter addresses the following provisions:

- A Regional Haze SIP must address visibility impacts "in each mandatory Class I Federal area located outside the State that may be affected by emissions from within the State." 40 CFR § 51.308(f).
- A Regional Haze SIP must provide technical documentation to support its assessment of control measures necessary to make reasonable progress, including measures addressing potential impacts across State boundaries. 40 CFR § 51.308(f)(2)(iii).

Thus, the SIP must present technical documentation to support possible interstate emissions impacts on Class I Areas. That documentation of cross-state emission impacts appears in this chapter.

The Rule also requires States to consult with each other on potential visibility impacts on Class I Areas across State boundaries, as follows:

- "The State must consult with those States that have emissions that are reasonably anticipated to contribute to visibility impairment in... [each] mandatory Class I Federal area to develop coordinated emission management strategies containing the emission reductions necessary to make reasonable progress." 40 CFR § 51.308(f)(2)(ii).

This chapter focuses on data regarding potential impacts of Albuquerque - Bernalillo County emissions; Chapter 11 of this SIP will discuss the state-to-state consultations required by the above-referenced provision.

4.2 Assessment of potential interstate impacts of Albuquerque - Bernalillo County emissions

This section presents data compiled by the Western Regional Air Partnership (WRAP) regarding potential visibility impacts of Albuquerque - Bernalillo County emissions in other States.

Q/d assessment

In September 2020, Weighted Emissions Potential (WEP) and Area of Influence (AOI) products were made available for Regional Haze planning in the western U.S. by WRAP. The analysis was performed for the Most Impaired Days (MID) during each year of the 5-year period from 2014 through 2018 at 76 IMPROVE monitoring sites representing 116 Class I Areas in the 13 contiguous WESTAR-WRAP states and neighboring states. While this is also useful information in determining whether EHD and NMED's Q/d assessment captured point sources that had relative potential to impact Class I Areas in neighboring states, the information was not available to states in mid-2019 when the WRAP Regional Haze Planning Work Group Control Measures Subcommittee developed the source screening methodology discussed in section 0. Since this information was not available when WRAP states, including New Mexico, selected facilities to perform a four-factor analysis, it did not inform EHD and NMED's selection of facilities or individual equipment that would ultimately undergo a four-factor analysis for this Regional Haze SIPr Round 2 (2019-2028). WEP and AOI products from the WRAP were viewed as additional weight of evidence considerations when determining proposed control measure determinations at the facility and equipment level.

For the source selection, EHD and NMED collaborated on an approach that utilized the Q/d screening method. The Q/d method looks at impacts to nearby Class 1 Areas by determining the ratio of emissions from the facility (Q) and distance (D) to the Class 1 Area[62]. For more information about the Q/d

62 https://views.cira.colostate.edu/data/tss/ramboll/WRAP_Q_Over_D_Analyses/Task5_WRAP_RH_Source_Screening_Methodology_FINAL.pdf

screening method, see Footnote 61. Data supporting the Q/d screening were included in the final submittal as Appendix YY and Appendix ZZ.

Other WRAP assessment tools

The WRAP TSS provides source apportionment data, WEP and AOI data, and rank/point compilation of the WEP data. Below is an analysis of Bernalillo County's impacts to out-of-state Class 1 areas as determined from the WRAP TSS.

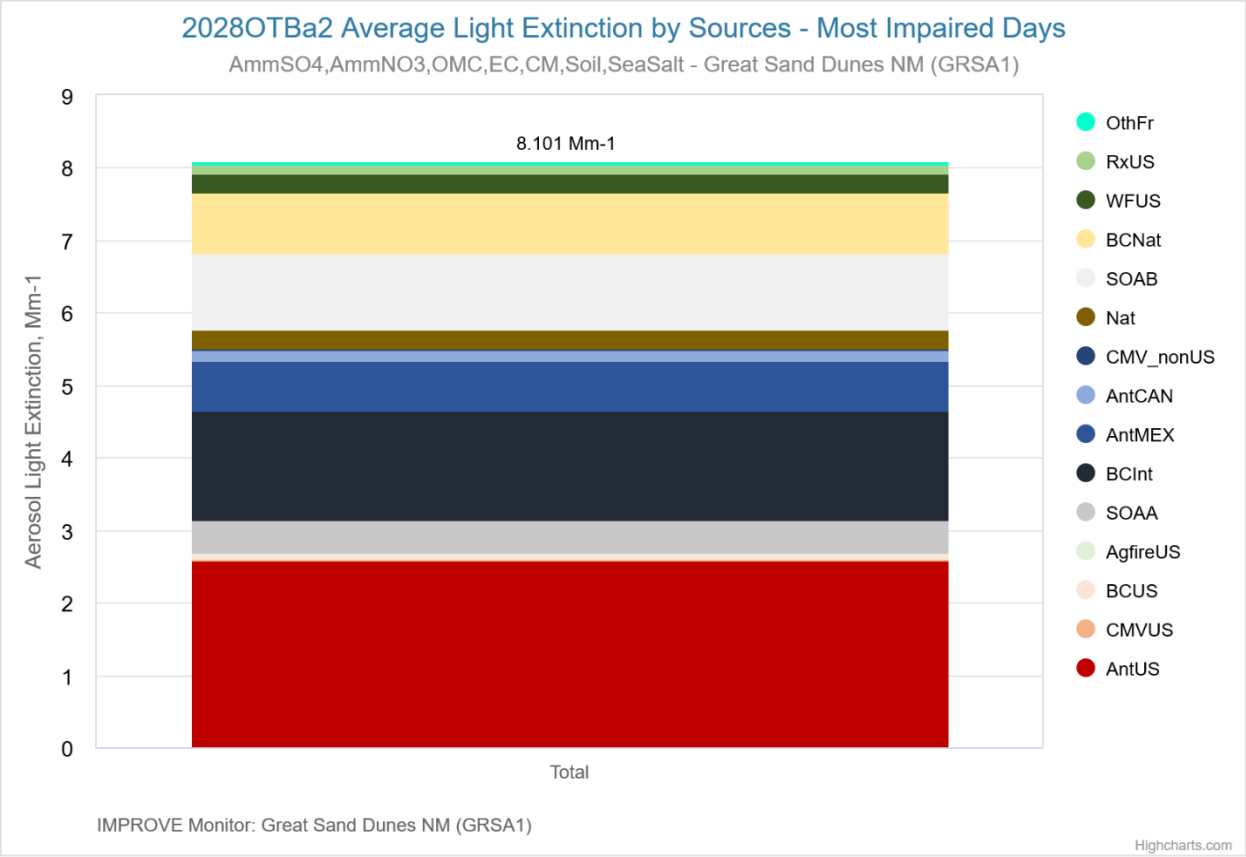
4.3 Geographic Areas of Greatest Emissions Influence

WRAP TSS data provides numerous tools to assess visibility impacts in other states. In order to assess any impact from Bernalillo County on other states, weighted emission potential analysis results have been included below for Class 1 Areas in other states that showed impact from Bernalillo County.

Great Sand Dunes Wilderness Area

Great Sand Dunes Wilderness Area is a Class I Area in Southern Colorado managed by the U.S National Park Service and represented by IMPROVE monitor GRSA1. It comprises 33,450 acres (52 square miles) and is located near Alamosa, Colorado, approximately 48 miles from the Colorado-New Mexico border. *Figure 4-1* (TSS 2028 On The Books a2 (2028OTBa2) Source Apportionment) shows that U.S. anthropogenic emissions are projected to account for 2.589 Mm^{-1}, or 31.96% of average aerosol light extinction at GRSA1 on the most impaired days (MID) in 2028 assuming implementation of all on-the-books controls by that time.

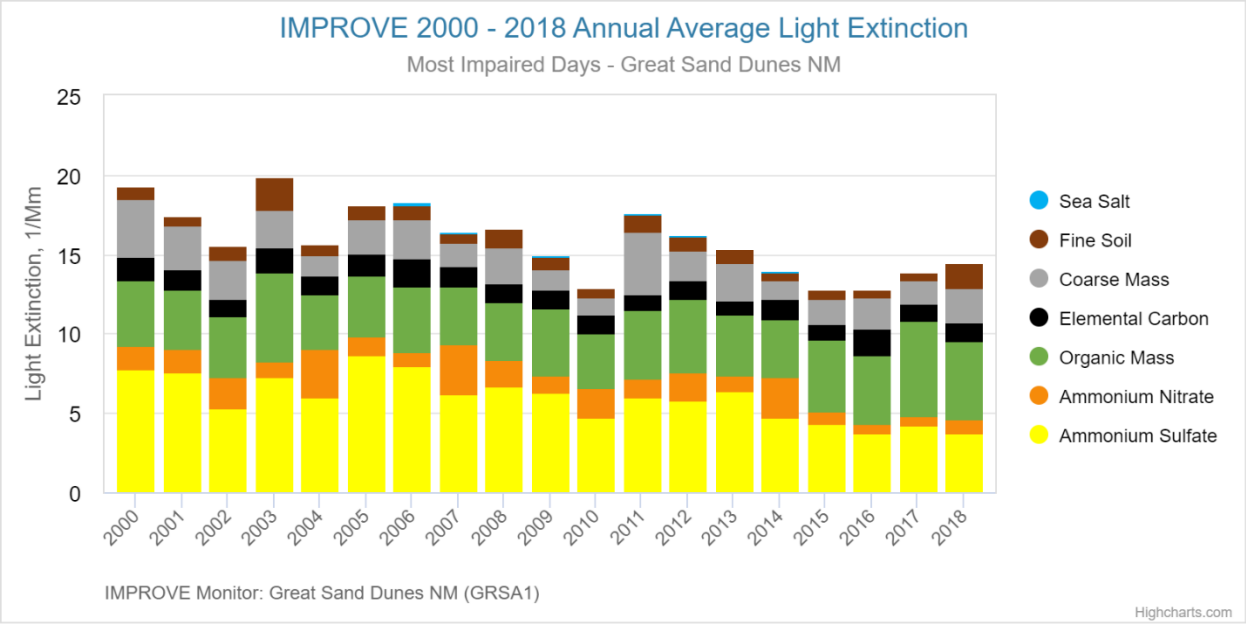
Figure 4-1: Source contributions to aerosol light extinction at GRSA1 on the most impaired days for the 2028OTBa2 model scenario. Contributions from U.S. anthropogenic emissions ("AntUS") are shown in red.



Measured Contributions of NH_4NO_3 and NH_4SO_4 from 2000-2018

Figure (TSS Annual 2000-2018 Improve Monitoring MID Extinction Composition) shows that the average annual average MID light extinction at GRSA1 during the current period (2014-2018) was 13.6 Mm^{-1}, with ammonium nitrate (NH_4NO_3) comprising 4-18% of the annual average light extinction and ammonium sulfate (NH_4SO_4) comprising 26-34%.

Figure 4-2: Aerosol contributions to light extinction for the annual average of most impaired days at GRSA1 for 2000-2018.



New Mexico's Anthropogenic Contribution of NH_4NO_3 and NH_4SO_4

Figure (TSS State Source Group Contributions – U.S. Anthropogenic NH_4NO_3) shows individual state contributions, broken down by source sector, to the 2028OTBa2 modeled anthropogenic visibility impairment attributed to NH_4NO_3 at GRSA1 on the most impaired days. New Mexico as a whole contributes approximately 31% of anthropogenic NH_4NO_3. The largest source-sector contributions of anthropogenic NH_4NO_3 at GRSA1 are Oil and Gas (42%), Mobile (28%), and EGU (13%).

Figure 4-3: State and source sector contributions to 2028 modeled anthropogenic visibility impairment attributed to NH_4NO_3 at GRSA1 on the most impaired days.

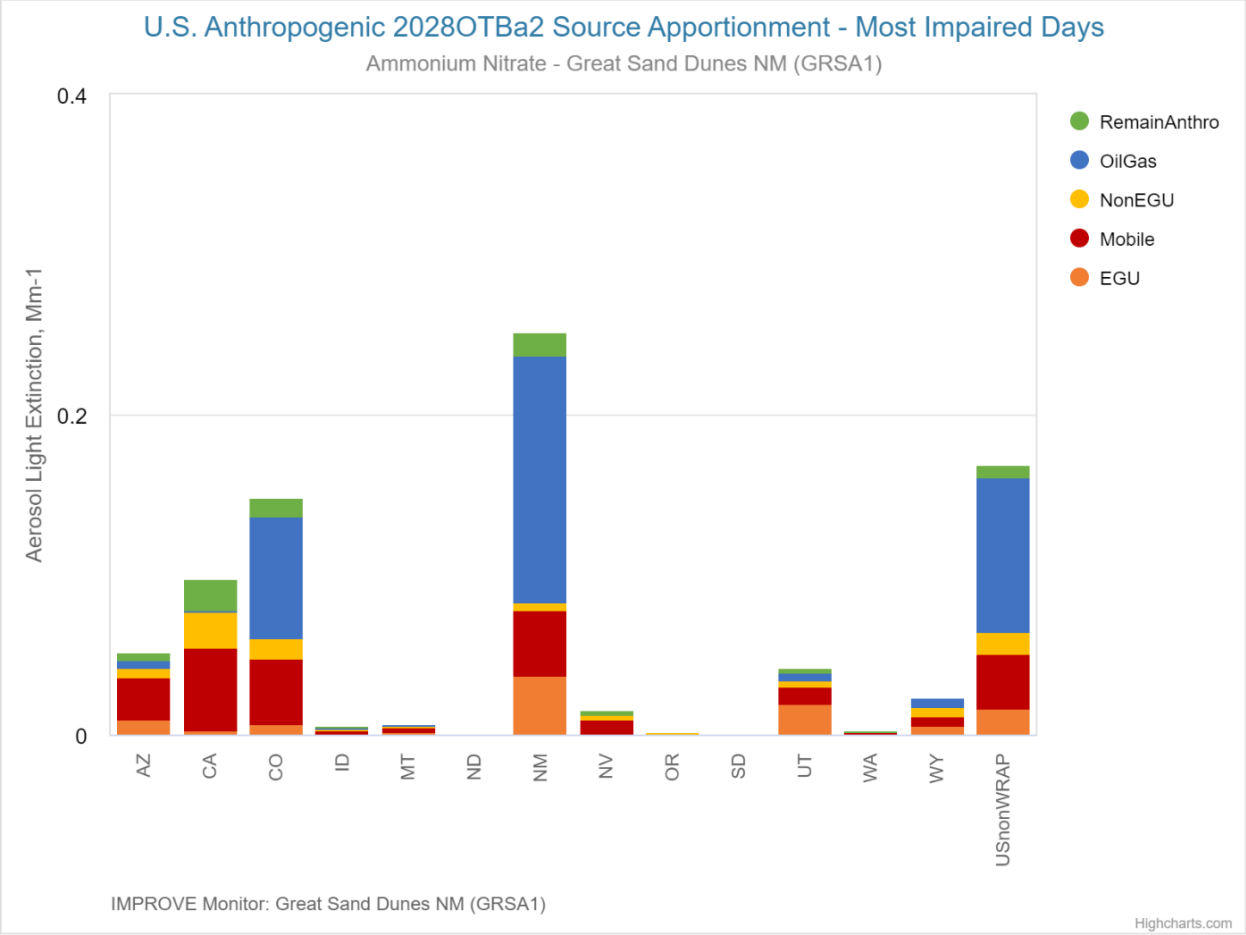
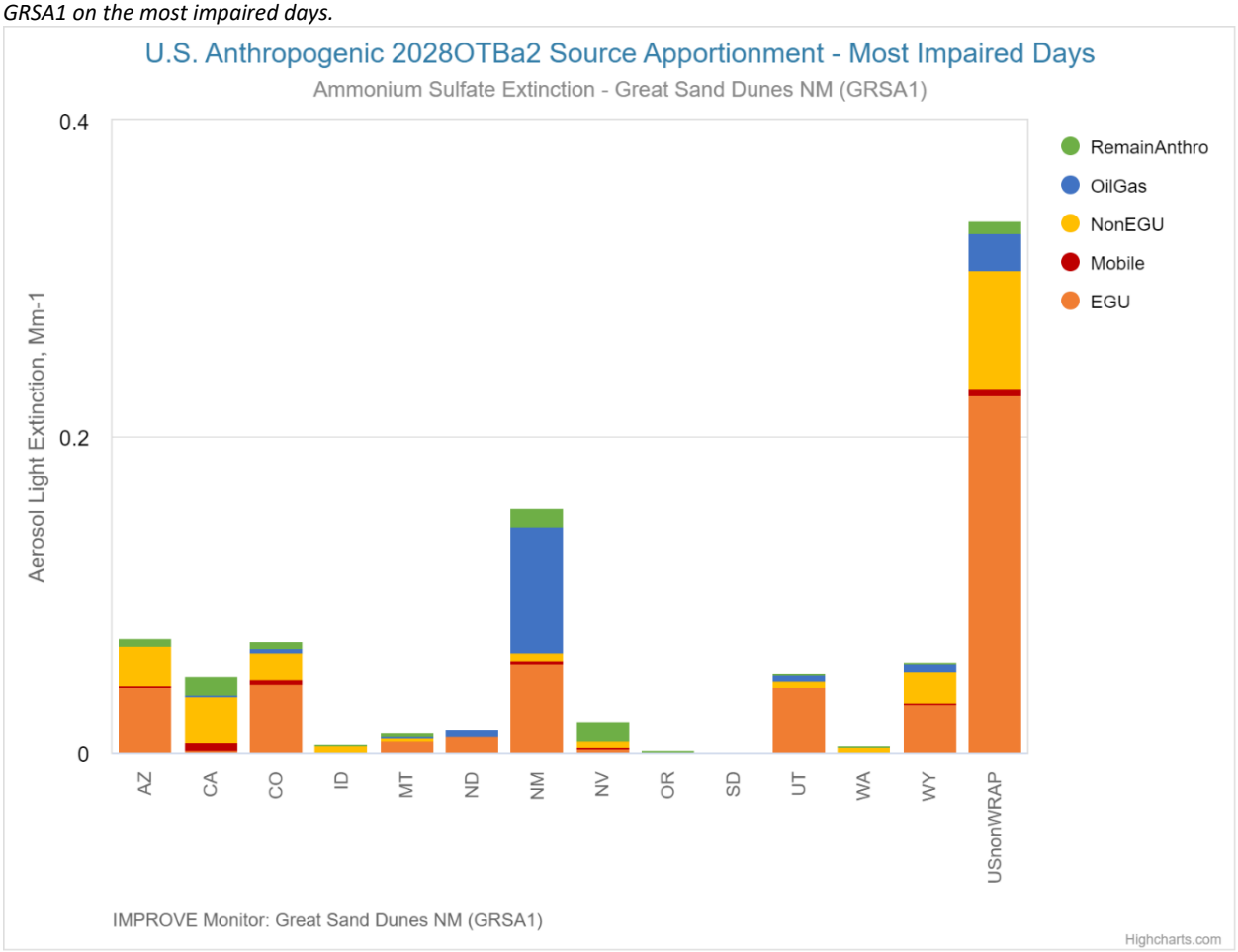


Figure (TSS State Source Group Contributions – U.S. Anthropogenic NH_4SO_4) shows individual state contributions, broken down by source sector, to the 2028OTBa2 modeled anthropogenic visibility impairment attributed to NH_4SO_4 at GRSA1 on the most impaired days. New Mexico as a whole contributes approximately 18% of anthropogenic NH_4SO_4. The largest source-sector contributions of NH_4SO_4 are EGU (54%), non-EGU (22%), and Oil and Gas (14%).

Figure 4-4: State and source sector contributions to 2028 modeled anthropogenic visibility impairment attributed to NH_4SO_4 at GRSA1 on the most impaired days.



Geographic Areas of Greatest Emissions Influence

Figure (EWRT) show that air mass masses reaching GRSA1 on the most impaired days with the highest relative NH_4NO_3 contributions spend close to equal amounts of time in Colorado and New Mexico.

Figure 4-5: GRSA1 - NH_4NO_3 Extinction Weighted Residence Times.

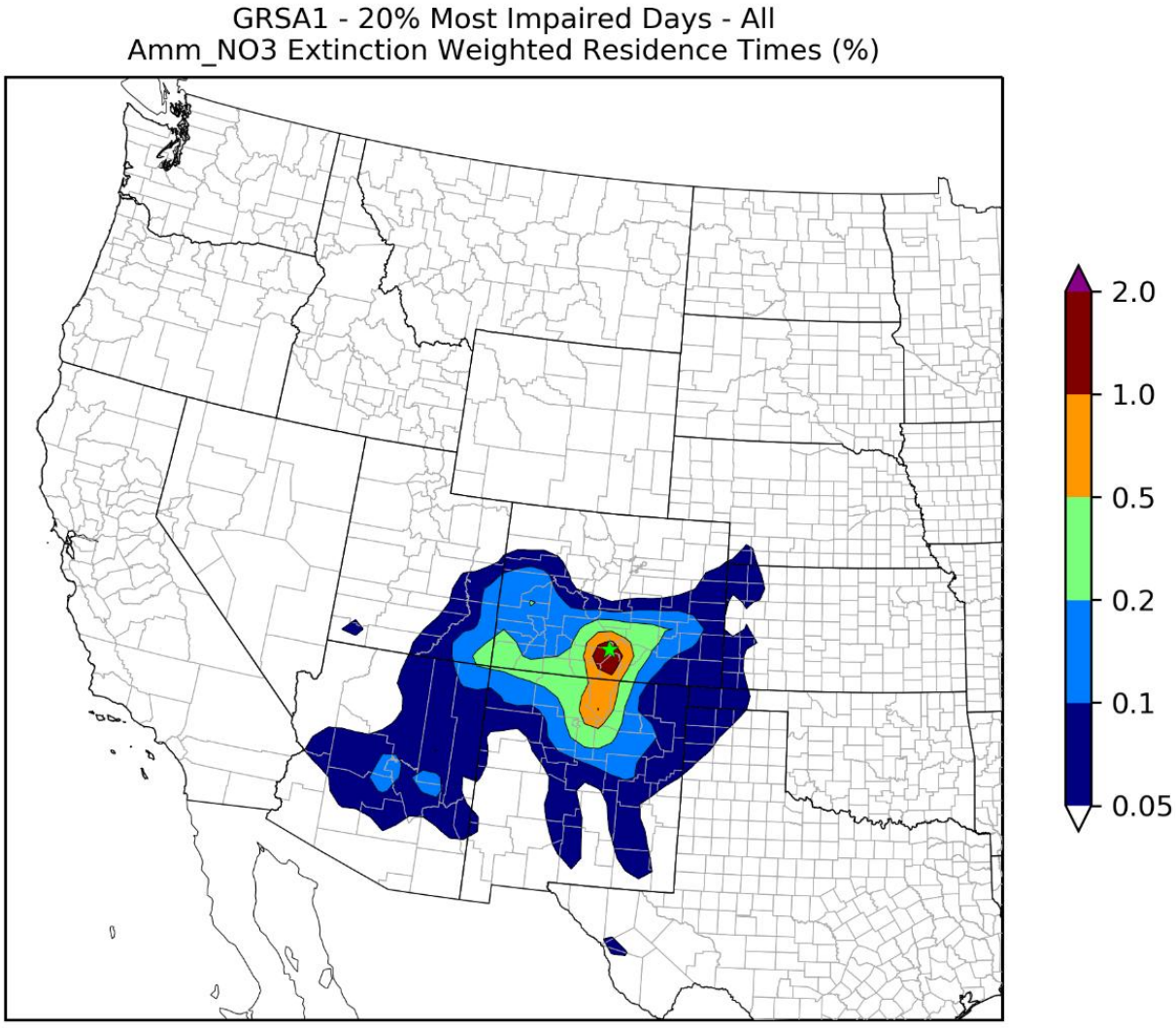


Figure 4-6, Figure 4-7, Figure 4-8, and Figure (WEP ALL/WEP O&G/WEP EGU/WEP Non-EGU) show the WEP for NO_x for all anthropogenic emissions, Oil and Gas emissions, EGU emissions, and non-EGU point source emissions, respectively. The WEP figures show that New Mexico has NO_x emissions affect visibility at GRSA1. Oil and Gas emission sources impacting visibility at GRSA1 are predominantly in the San Juan and Permian Basins in New Mexico. Bernalillo County's role is minimal, as the 0.1% area of influence contour line only goes through a portion of the county. The WEPs for EGU point sources and non-EGU point sources show that there are small impacts on visibility from New Mexico sources of NO_x on GRSA1.

Figure 4-6: GRSA1 - NO_x Weighted Emissions Potential for All Anthropogenic Sources.

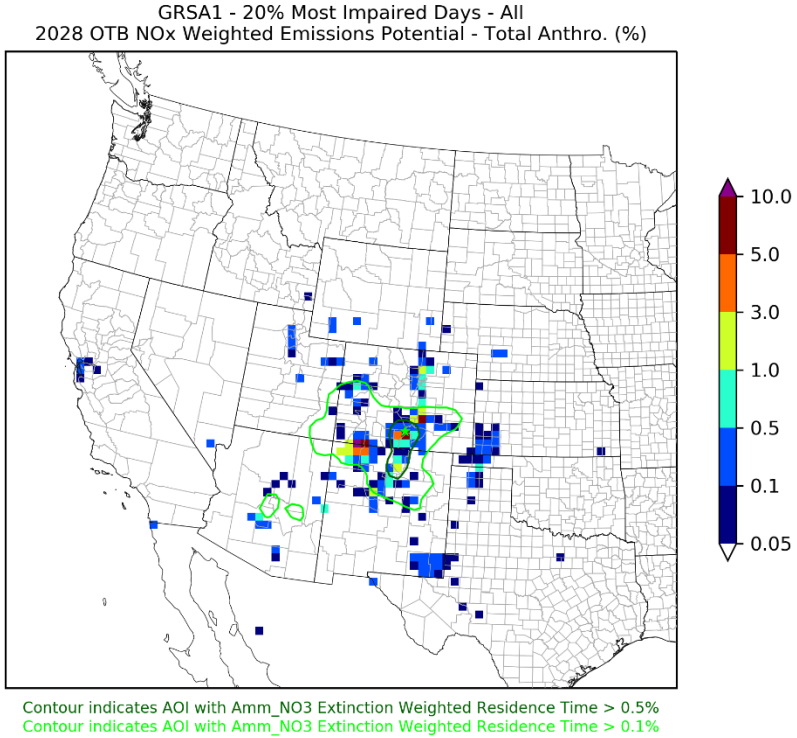


Figure 4-7: GRSA1 - NO_x Weighted Emissions Potential for Oil and Gas Sources.

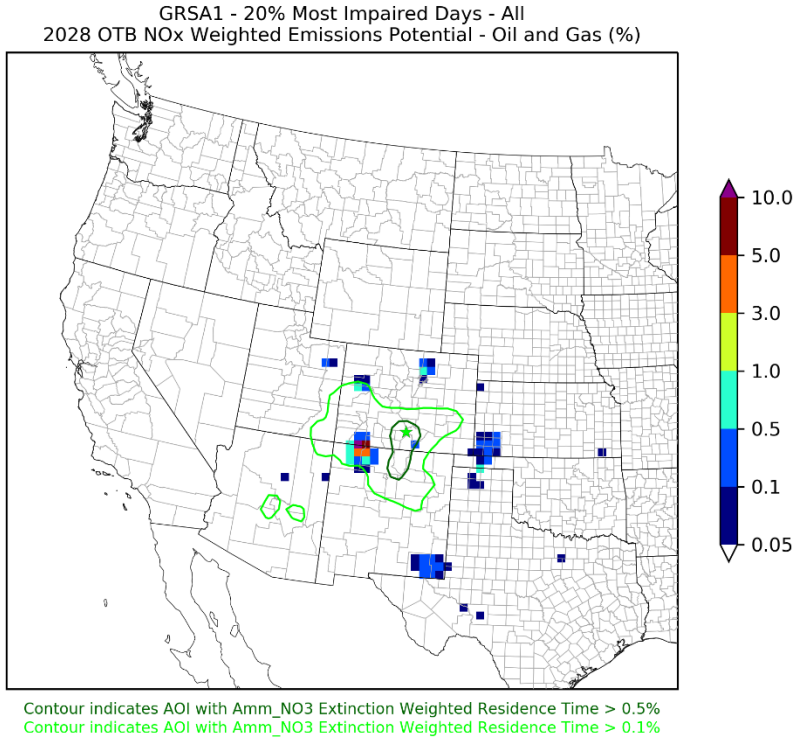


Figure 4-8: GRSA1 - NO_x Weighted Emissions Potential for EGU Point Sources.

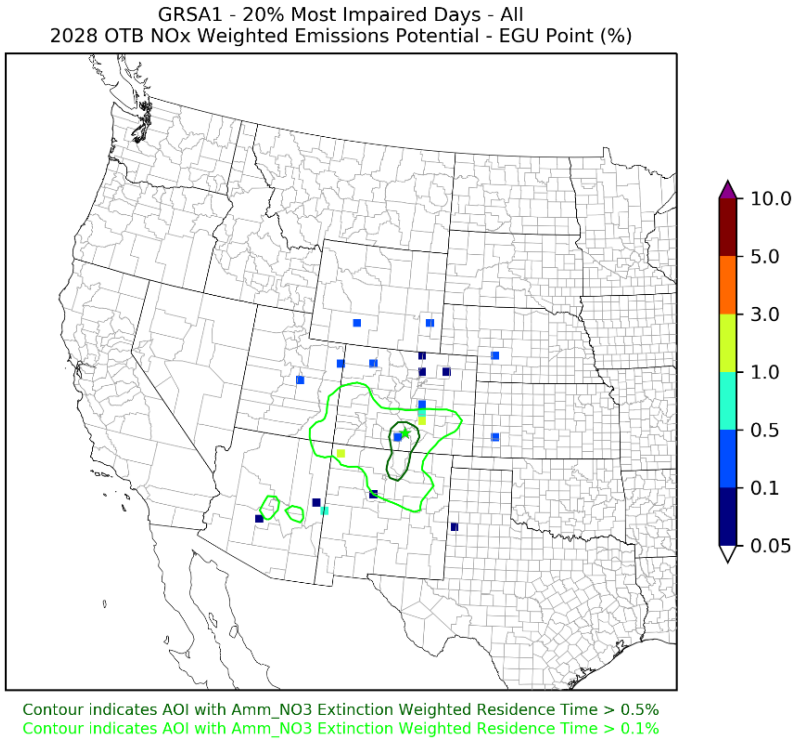


Figure 4-9: GRSA1 - NO_x Weighted Emission Potential for Non-EGU Point Sources.

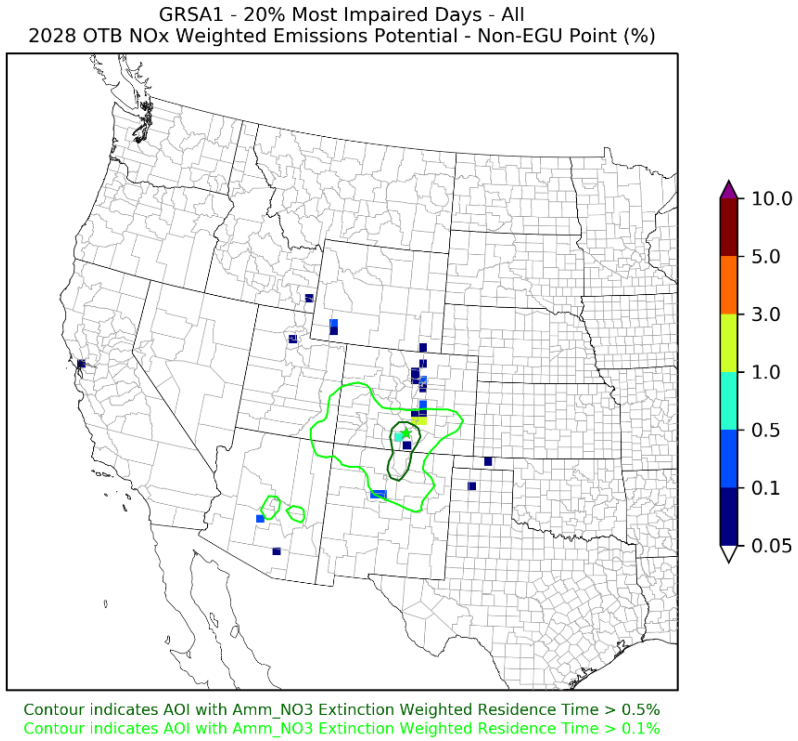


Figure (EWRT) shows that air masses reaching GRSA1 on the most impaired days with the highest relative NH_4SO_4 contributions spend close to equal amounts of time in Colorado and New Mexico, with the amount of time in Bernalillo County being small in comparison.

Figure 4-10: GRSA1 – NH_4SO_4 Extinction Weighted Residence Times.

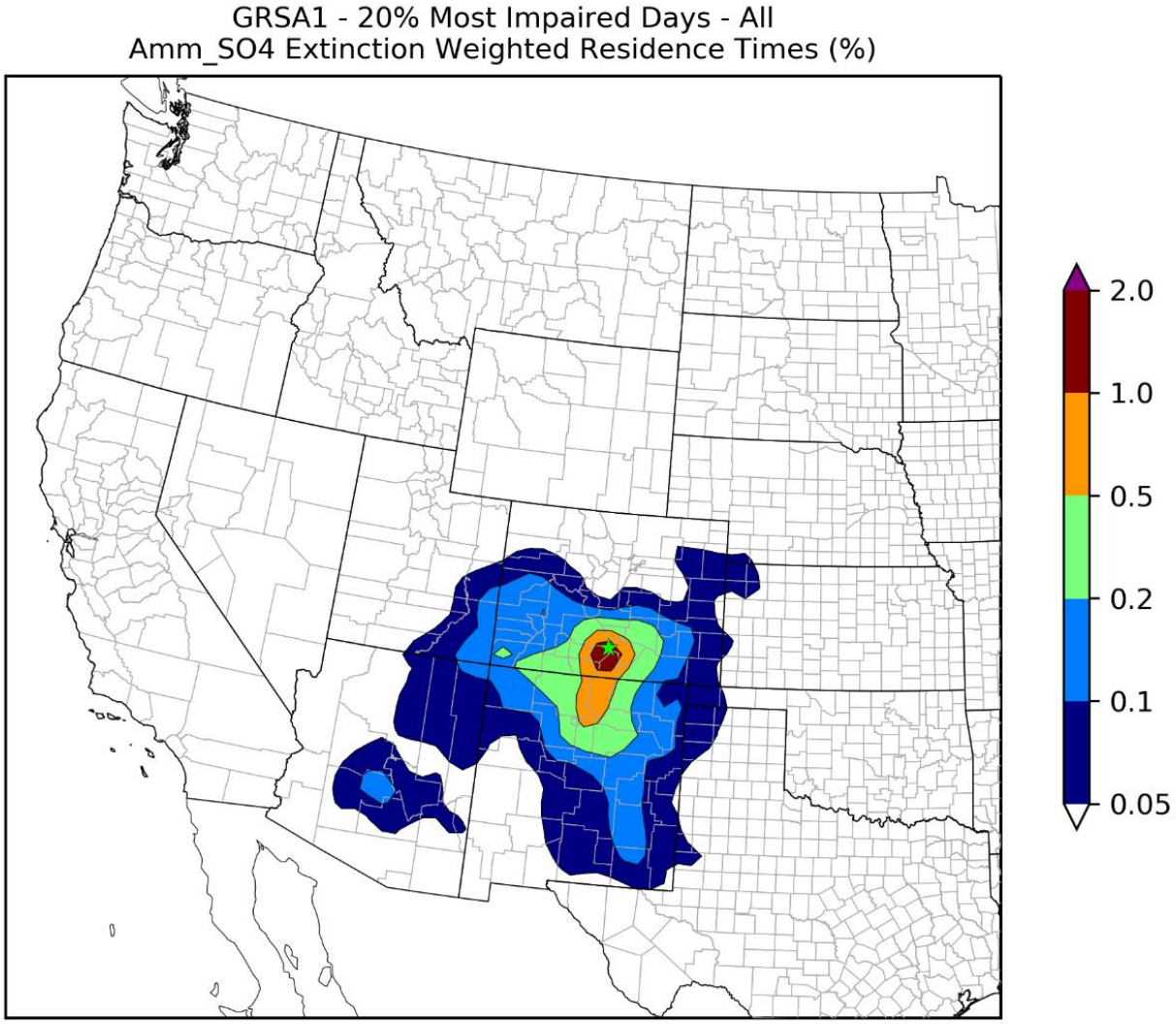


Figure , Figure , Figure , and Figure (WEP ALL/WEP O&G/WEP EGU/WEP Non-EGU) show the WEP for NO_x for all anthropogenic emissions, Oil and Gas emissions, EGU emissions, and non-EGU point source emissions, respectively. The WEP figures show that New Mexico has SO_x emissions affecting visibility at GRSA1. Oil and Gas emission sources impacting visibility at GRSA1 are in the San Juan and Permian Basins in New Mexico. One grid cell in northwest New Mexico contains EGU sources of SO_x affecting GRSA1. The WEP for non-EGU point sources shows that there are small impacts from New Mexico non-EGU point sources at GRSA1. Bernalillo County's contribution is minimal.

Figure 4-11: GRSA1 – SO_x Weighted Emissions Potential for All Anthropogenic Sources.

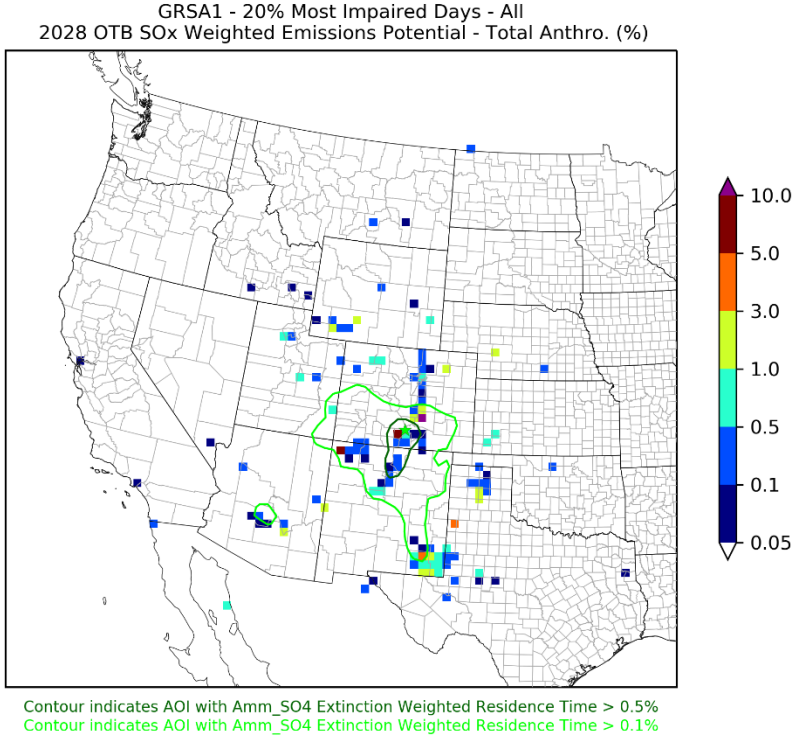


Figure 4-12: GRSA1 – SO_x Weighted Emissions Potential for Oil and Gas Sources.

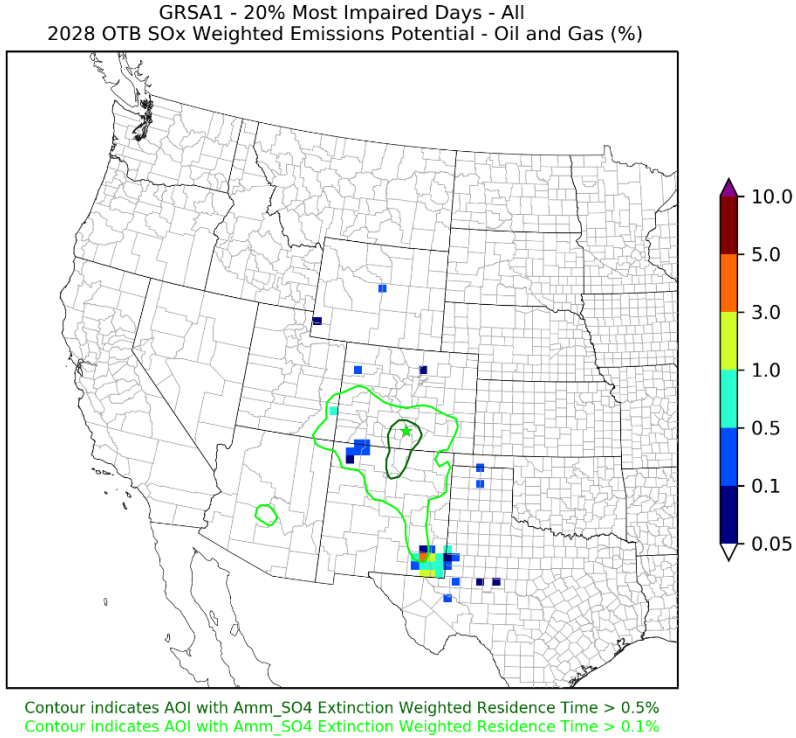


Figure 4-13: GRSA1 – SO_x Weighted Emissions Potential for EGU Point Sources.

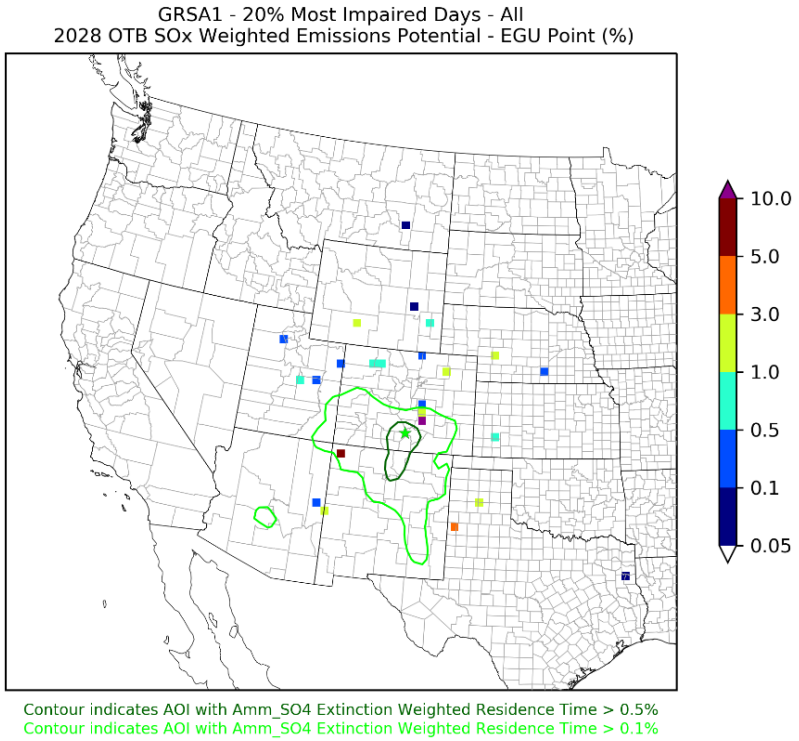
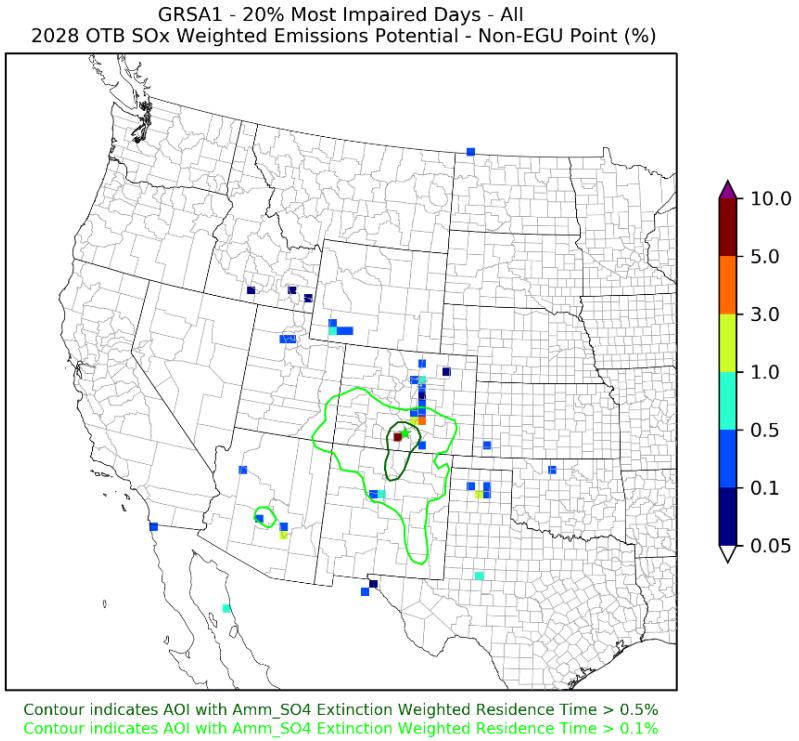


Figure 4-14: GRSA1 – SO_x Weighted Emission Potential for Non-EGU Point Sources.



Summary

Monitoring and modeling data show that a substantial portion of visibility impairment at GRSA1 is due to anthropogenic sources of NO_x and SO_2. Nitrates and Sulfates are both significant contributors to visibility impairment. Source sector apportionment results, EWRT, and WEP show anthropogenic emissions significant to GRASA1 originate mostly from New Mexico and Colorado.

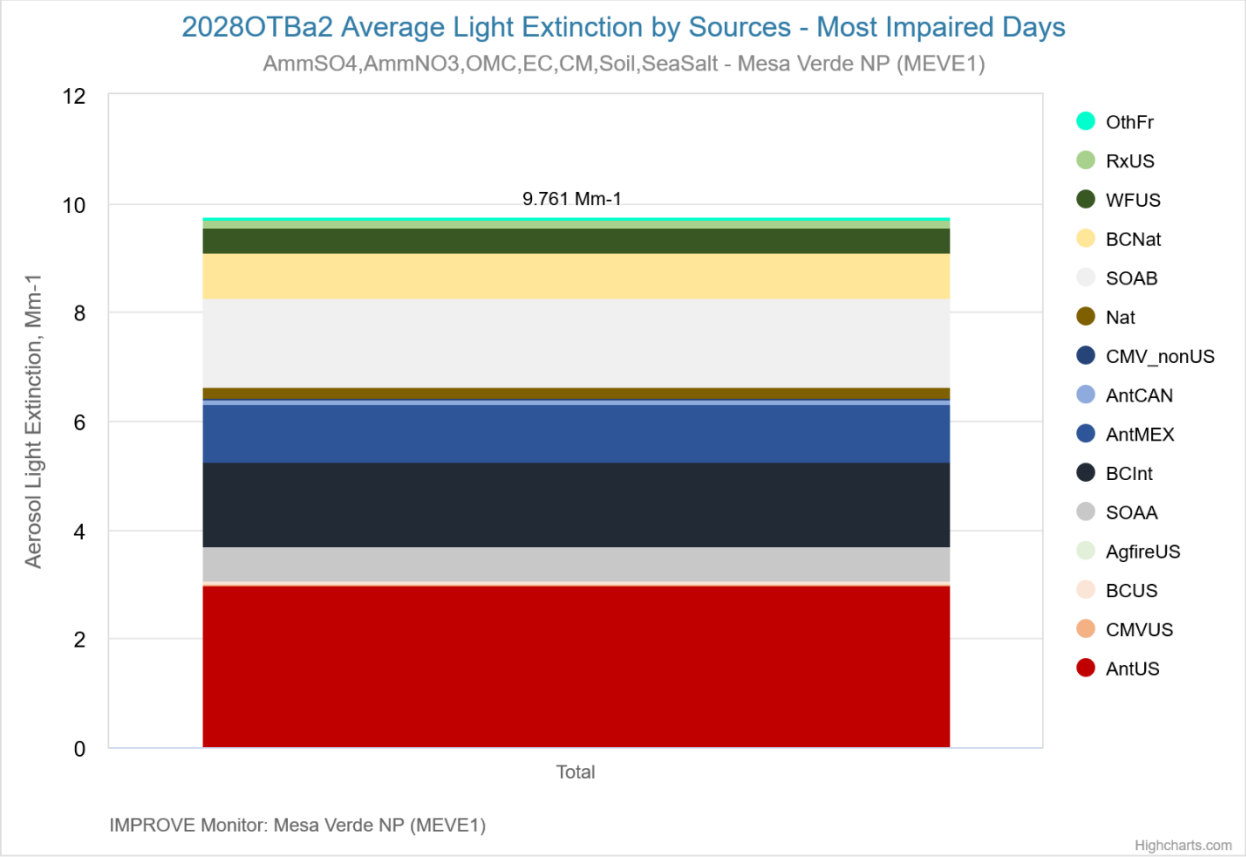
WEP data shows that air masses reaching GRAS1 on the most impaired days with the highest relative contribution of NOx originate mostly in the four corners area of NW New Mexico, with the area of influence extinction weighted residence time in Bernalillo County around 0.1% or less.

WEP figures for EGU and non-point EGU emissions sources show they are spread throughout the WRAP states but are most abundant within Colorado. Using a 0.5% threshold to assess WEP contribution, the rank point data (TSS Rank Point Results – CO) show the point source facilities that have a relative impact on GRSA1.

Mesa Verde National Park

Mesa Verde National Park is a Class I Area in southwestern Colorado managed by the U.S National Park Service and represented by IMPROVE monitor MEVE1. It comprises 51,488 acres (80 square miles) and is located near Cortez, Colorado, approximately 11 miles from the Colorado-New Mexico Border. *Figure 4-15* (TSS 2028 On The Books a2 (2028OTBa2) Source Apportionment) shows that U.S. anthropogenic emissions are projected to account for 2.995 Mm^{-1}, or 30.68% of average aerosol light extinction at MEVE1 on the most impaired days (MID) in 2028 assuming implementation of all on-the-books controls by that time.

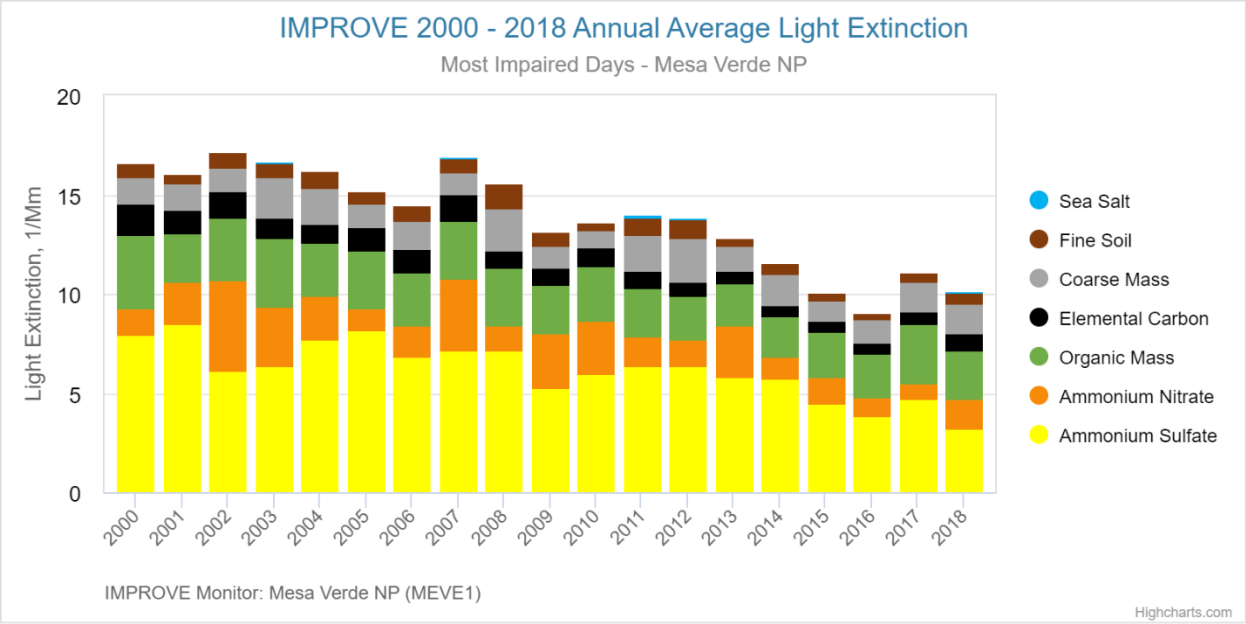
Figure 4-15: Source contributions to aerosol light extinction at MEVE1 on the most impaired days for the 2028OTBa2 model scenario. Contributions from U.S. anthropogenic emissions ("AntUS") are shown in red.



Measured Contributions of NH_4NO_3 and NH_4SO_4 from 2000-2018

Figure (TSS Annual 2000-2018 Improve Monitoring MID Extinction Composition) shows that the average annual average MID light extinction at MEVE1 during the current period (2014-2018) was 10.4 Mm^{-1}, with ammonium nitrate (NH_4NO_3) comprising 7-14% of the annual average light extinction during that period and ammonium sulfate (NH_4SO_4) comprising 32-49%.

Figure 4-16: Aerosol contributions to light extinction for the annual average of most impaired days at MEVE1 for 2000-2018.



New Mexico's Anthropogenic Contribution of NH_4NO_3 and NH_4SO_4

Figure (TSS State Source Group Contributions – U.S. Anthropogenic NH_4NO_3) shows individual state contributions, broken down by source sector, to the 2028OTBa2 modeled anthropogenic visibility impairment attributed to NH_4NO_3 at MEVE1 on the most impaired days. New Mexico contributes approximately 35% anthropogenic NH_4NO_3. Arizona, California, Colorado, Utah, and US non-WRAP are other states that have 7% - 17% contribution. The largest source-sector contributions of anthropogenic NH_4NO_3 at MEVE1 are Oil and Gas (45%), Mobile (25%), and EGU (14%).

Figure 4-17: State and source sector contributions to 2028 modeled anthropogenic visibility impairment attributed to NH_4NO_3 at MEVE1 on the most impaired days.

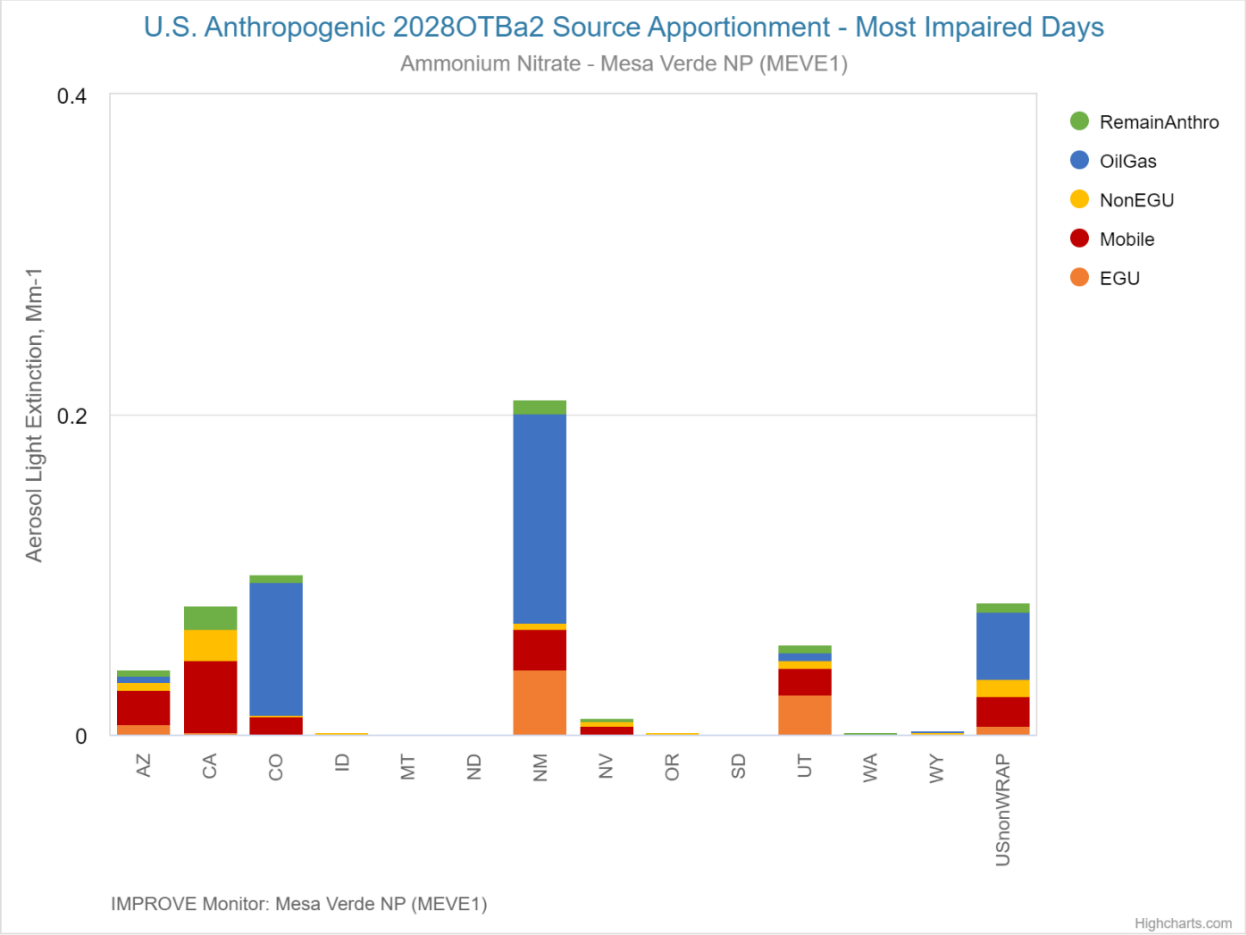
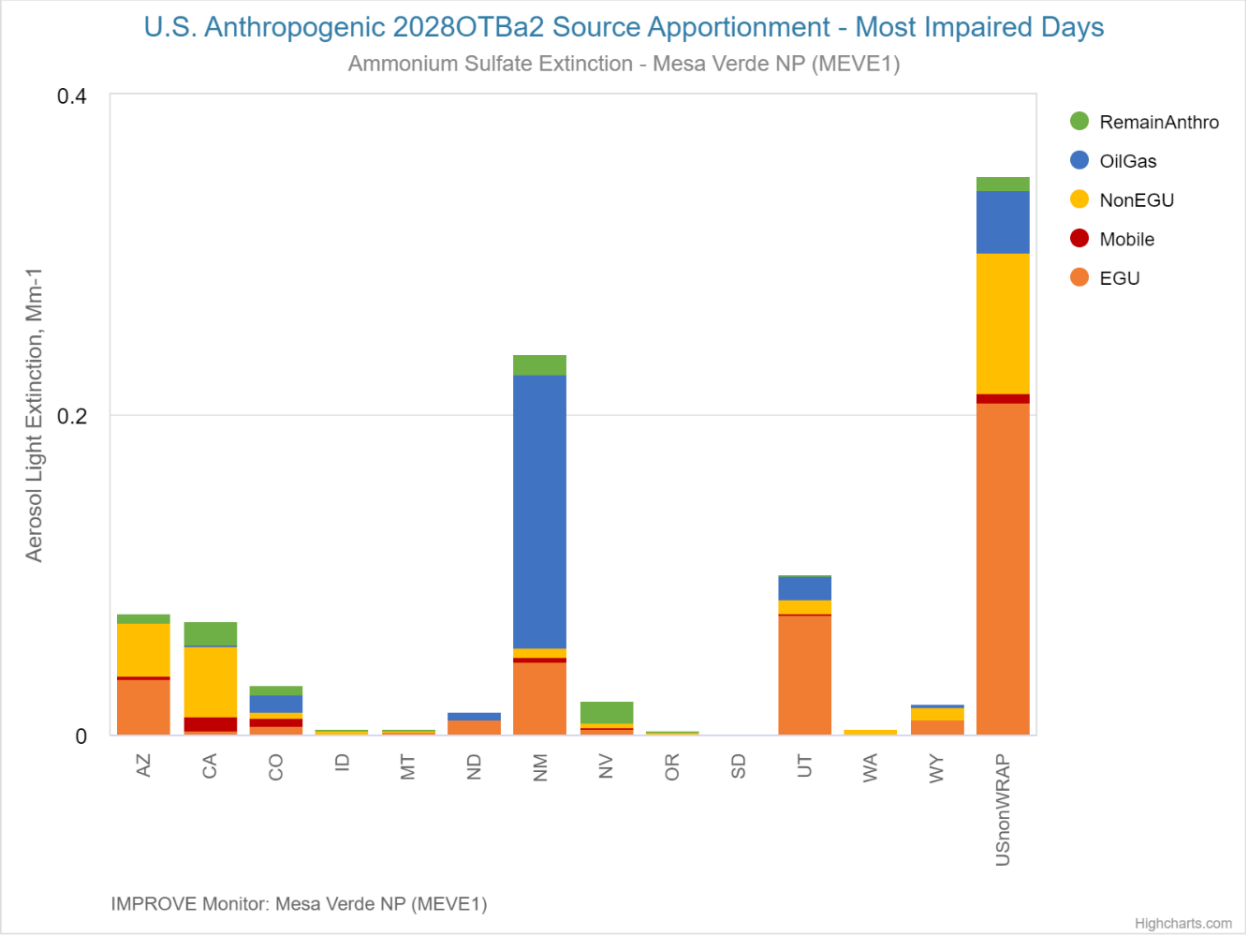


Figure (TSS State Source Group Contributions U.S. Anthropogenic NH_4SO_4) shows individual state contributions, broken down by source sector, to the 2028OTBa2 modeled anthropogenic visibility impairment attributed to NH_4SO_4 at MEVE1 on the most impaired days. New Mexico contributes approximately 25% of anthropogenic NH_4SO_4. The largest regional source-sector contributions of NH_4SO_4 are EGU (42%), Oil and Gas (26%) and non-EGU (22%).

Figure 4-18: State and source sector contributions to 2028 modeled anthropogenic visibility impairment attributed to NH_4SO_4 at MEVE1 on the most impaired days.



Geographic Areas of Greatest Emissions Influence

Figure (EWRT) show that air mass masses reaching MEVE1 on the most impaired days with the highest relative NH_4NO_3 contributions spend time in all Four Corners states as well as California and Mexico. The amount of time air masses spend in Bernalillo County is minimal in comparison to the Four Corners region.

Figure 4-19: MEVE1 - NH_4NO_3 Extinction Weighted Residence Times.

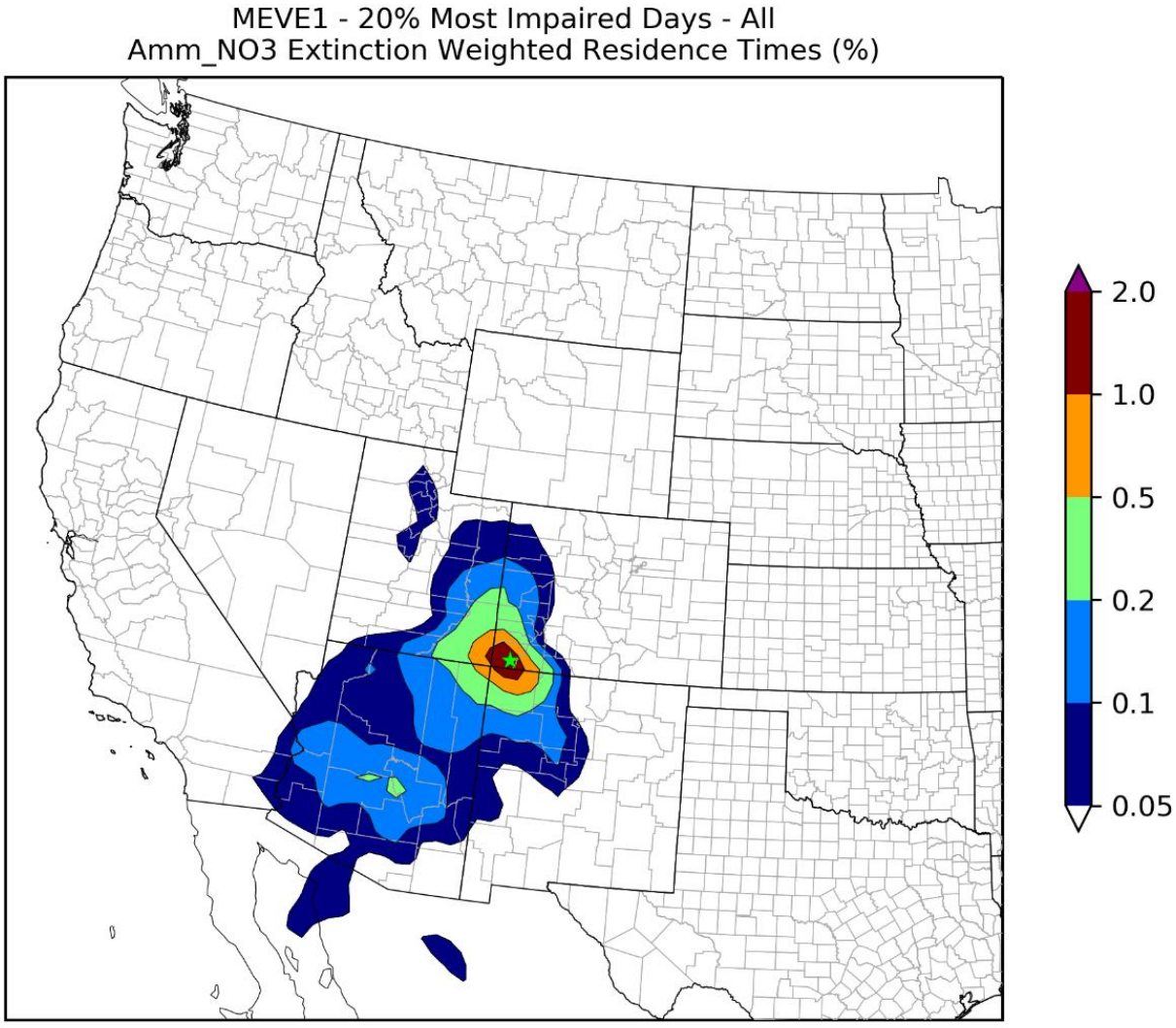


Figure , *Figure* , *Figure* , and *Figure* (WEP ALL/WEP O&G/WEP EGU/WEP Non-EGU) show the WEP for NO_x for all anthropogenic emissions, Oil and Gas emissions, EGU emissions, and non-EGU point source emissions, respectively. The WEP figures show that anthropogenic NO_x from New Mexico has substantial effects on visibility at MEVE1. Oil and Gas sources impacting visibility at MEVE1 are predominantly in the San Juan Basin in New Mexico. The WEPs for EGU point sources and non-EGU point sources show that there are small impacts on visibility from New Mexico sources of NO_x on MEVE1. A portion of Bernalillo County is barely within the contour line with an extinction weighted residence time of greater than 0.1%.

Figure 4-20: MEVE1 - NO_x Weighted Emissions Potential for All Anthropogenic Sources.

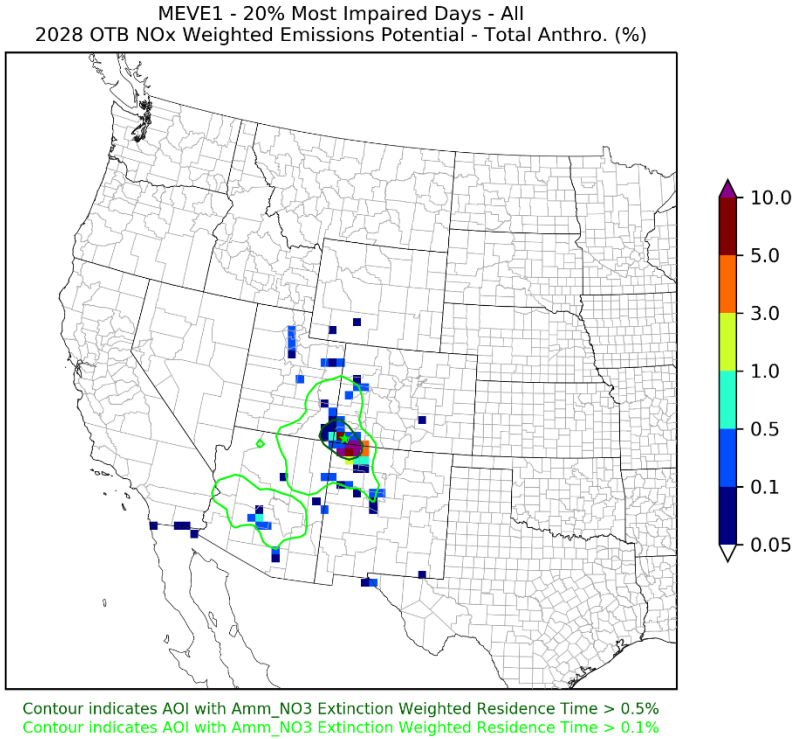


Figure 4-21: MEVE1 - NO_x Weighted Emissions Potential for Oil and Gas Sources.

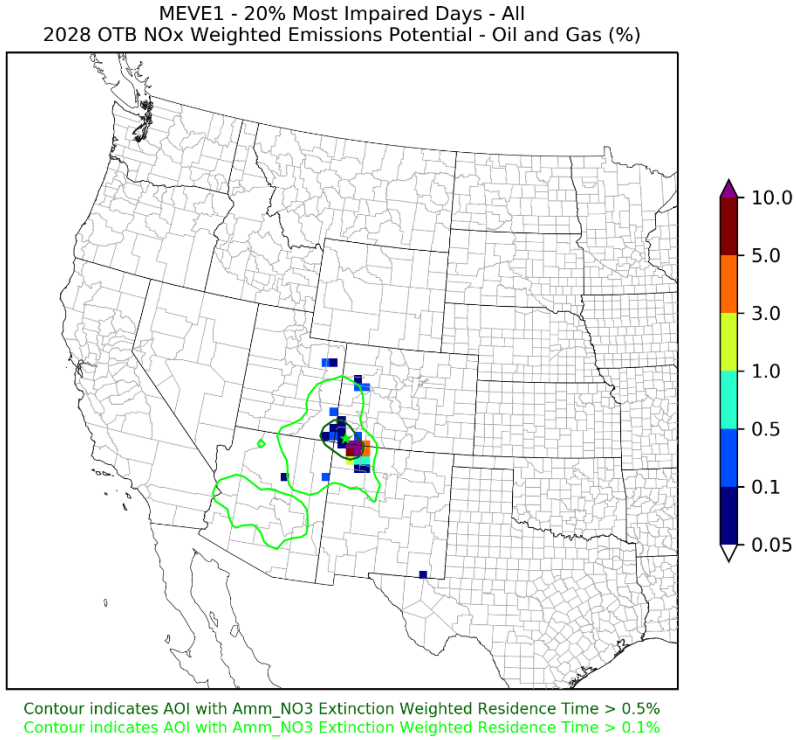


Figure 4-22: MEVE1 - NO_x Weighted Emissions Potential for EGU Point Sources.

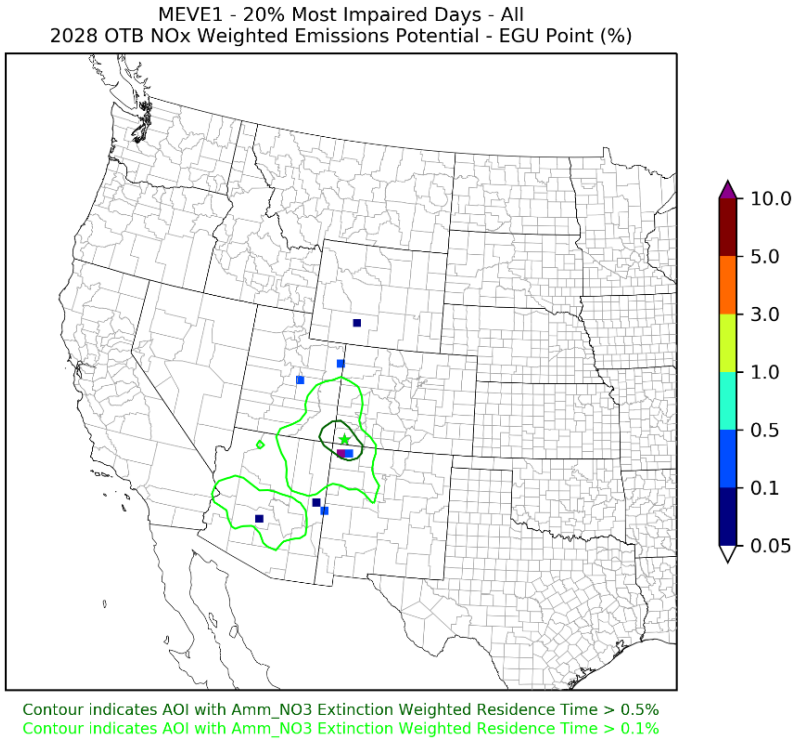


Figure 4-23: MEVE1 - NO_x Weighted Emission Potential for Non-EGU Point Sources.

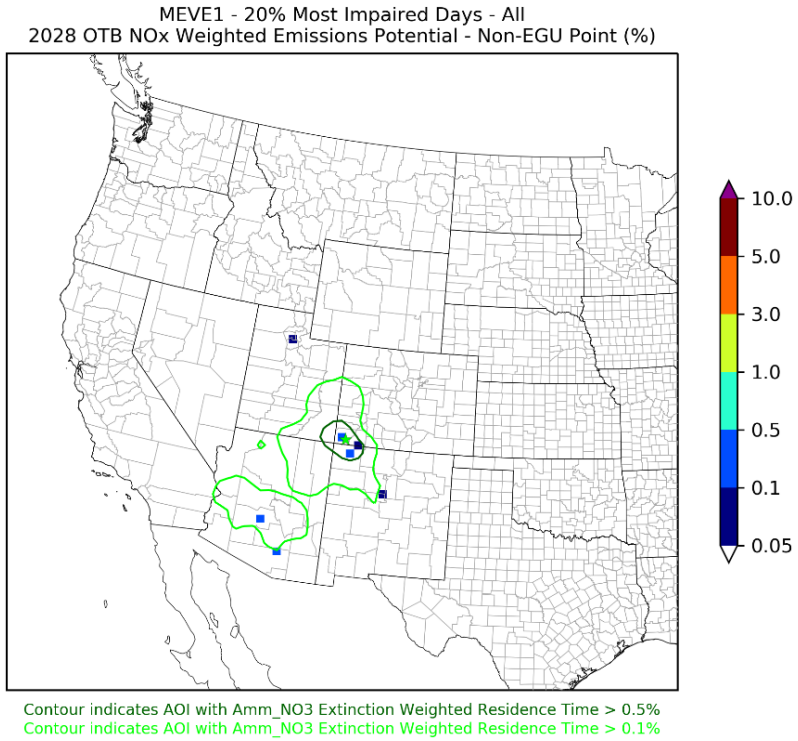


Figure (EWRT) shows that air masses reaching MEVE1 on the most impaired days with the highest relative NH_4SO_4 contributions spend most of their time in Utah and Arizona, but also time in northwestern New Mexico and Colorado. Air mass time in Bernalillo County is minimal in comparison to the Four Corners region.

Figure 4-24: MEVE1 - NH_4SO_4 Extinction Weighted Residence Times.

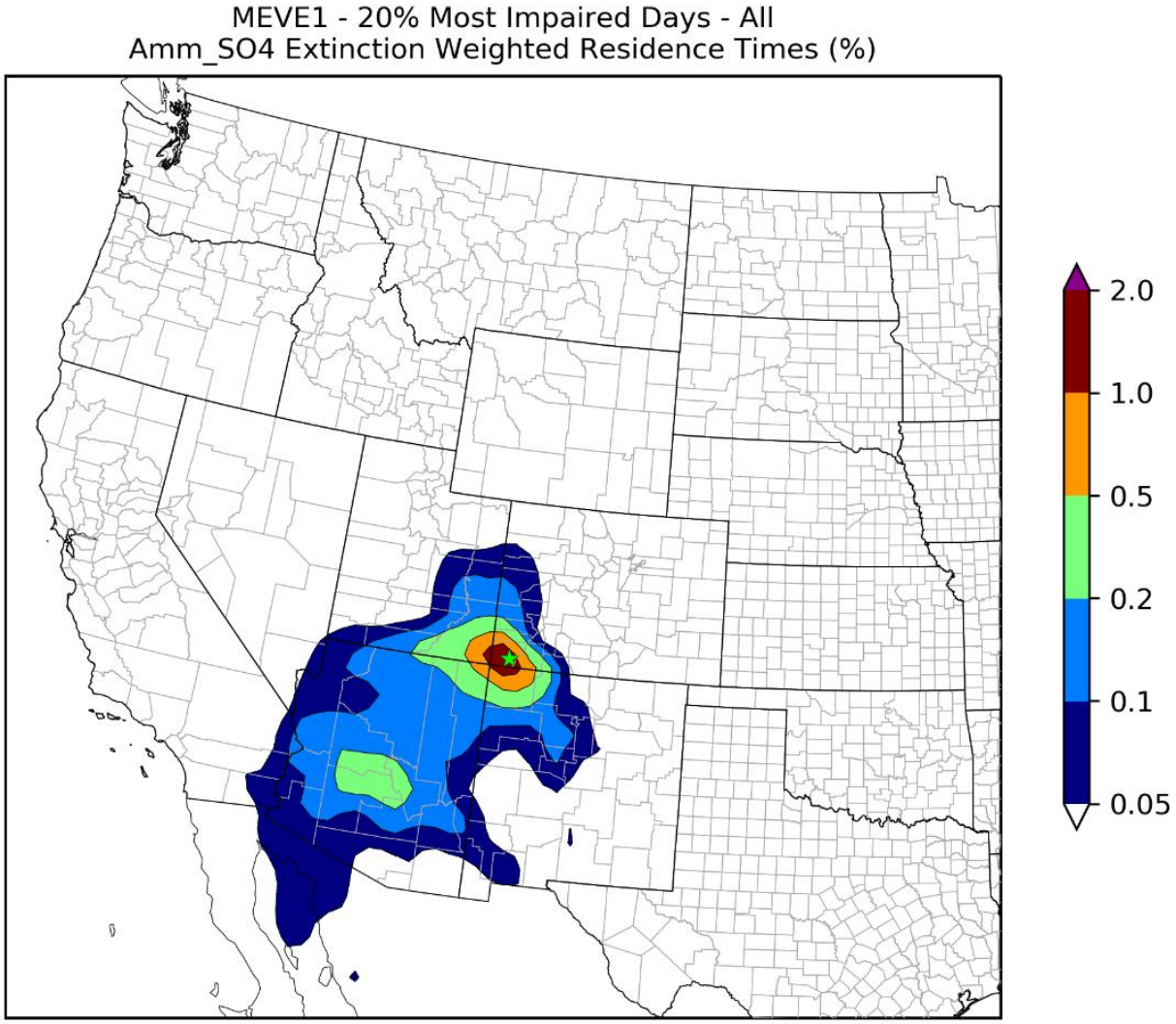


Figure *4-25*, Figure *4-26*, Figure *4-27*, and Figure (WEP ALL/ WEP O&G/WEP EGU/WEP Non-EGU) show the WEP for SO_x for all anthropogenic emissions, Oil and Gas emissions, EGU emissions, and non-EGU point source emissions, respectively. The WEP figures shows that there are substantial anthropogenic SO_x emissions affecting visibility at MEVE1 from New Mexico. Oil and Gas sources impacting visibility at MEVE1 are predominantly in the San Juan Basin in New Mexico. The WEPs for EGU point sources and non-EGU point sources show that there are small impacts on visibility from New Mexico sources of SO_x on MEVE1. Bernalillo County is barely within the contour line with an extinction weighted residence time of greater than 0.1%.

Figure 4-25: MEVE1 - SO_x Weighted Emissions Potential for All Anthropogenic Sources.

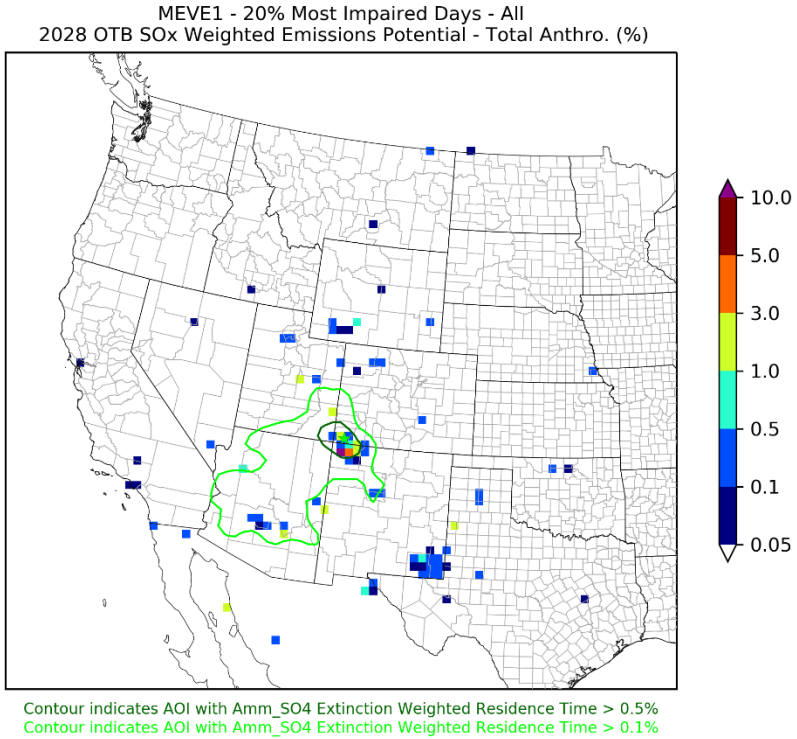


Figure 4-26: MEVE1 - SO_x Weighted Emissions Potential for Oil and Gas Sources.

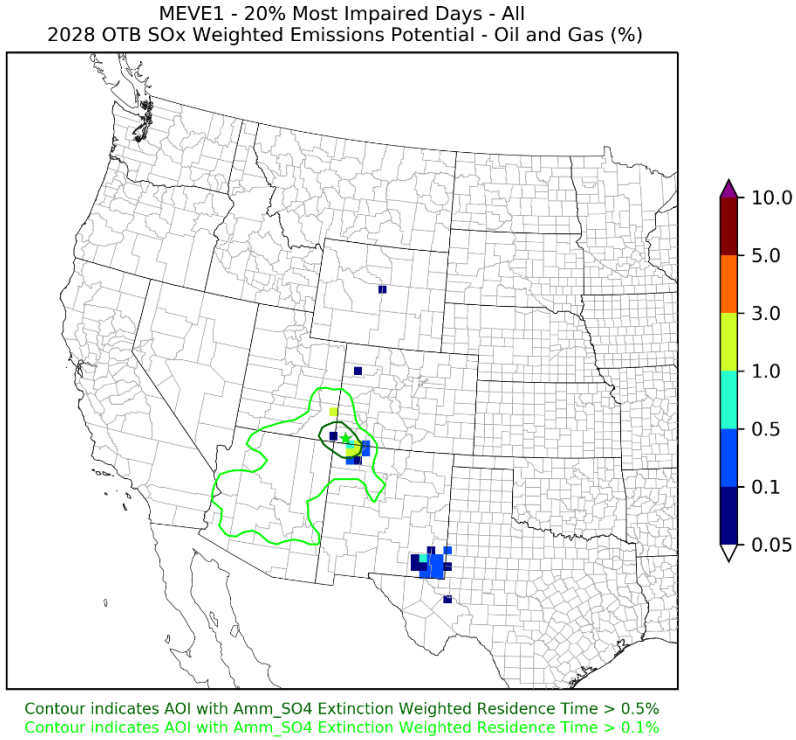


Figure 4-27: MEVE1 - SO_x Weighted Emissions Potential for EGU Point Sources.

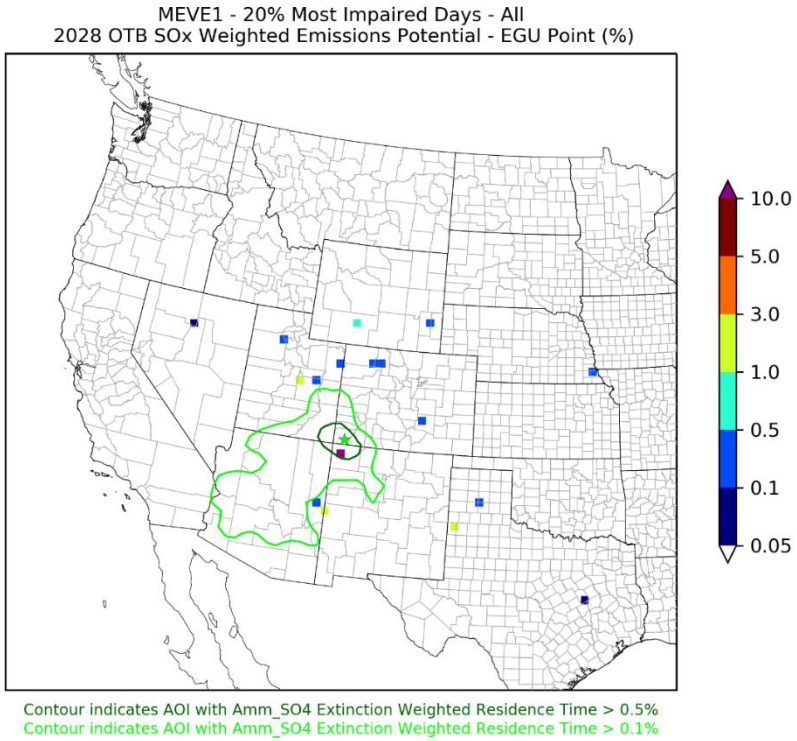
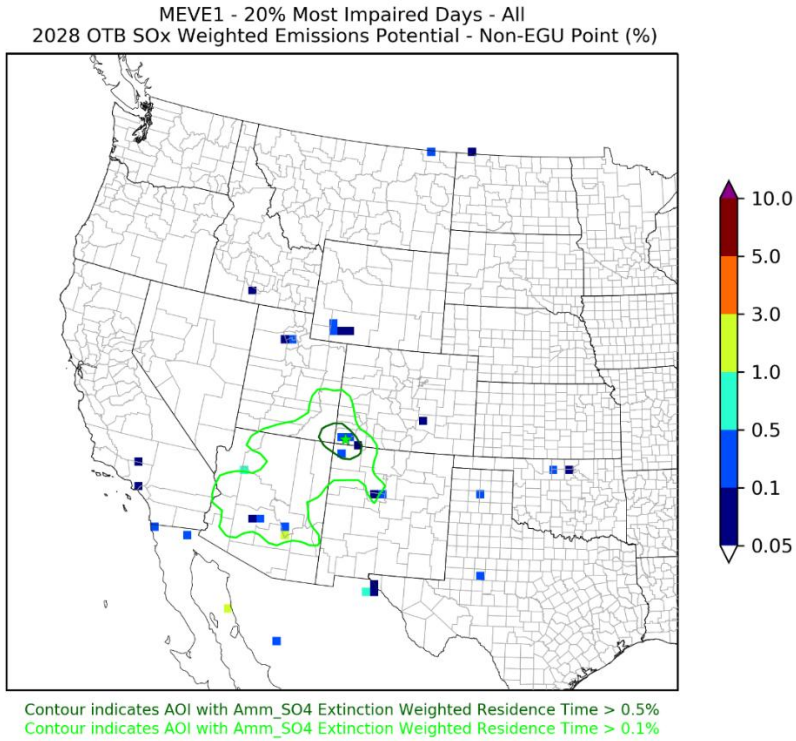


Figure 4-28: MEVE1 - SO_x Weighted Emission Potential for Non-EGU Point Sources.



Summary

Monitoring and modeling data show that a substantial portion of visibility impairment at MEVE1 is due to anthropogenic sources of NO_x and SO_2. Nitrates and sulfates are both significant contributors to visibility impairment with sulfates showing more impacts. Source sector apportionment results, EWRT, and WEP show that anthropogenic emissions significant to MEVE1 originate mostly in New Mexico and other Four Corners states. Bernalillo County's contribution to the anthropogenic emissions is minimal as shown in the above charts.

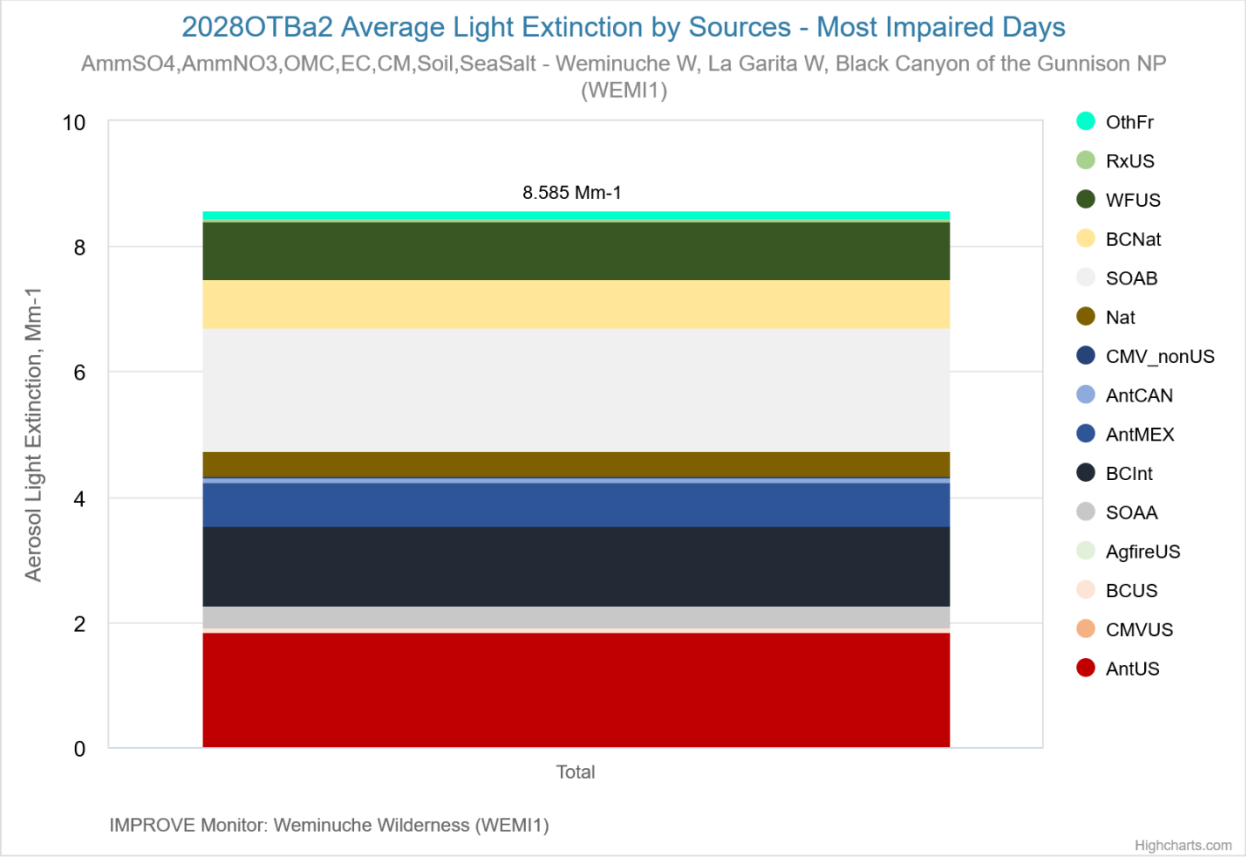
Using a 0.5% threshold to assess WEP contribution, the rank point data (TSS Rank Point Results – CO) show the point sources that may have the highest potential impacts at MEVE1 on MID.

Weminuche Wilderness Area and La Garita Wilderness Area

Weminuche Wilderness Area is a Class I Area in southwestern Colorado managed by the U.S Forest Service. It comprises 499,771 acres (781 square miles) and is located between Silverton and South Fork, Colorado, approximately 28 miles from the Colorado-New Mexico Border. La Garita Wilderness Area is a nearby Class I Area also managed by the U.S. Forest Service. It comprises 48,486 acres (76 square miles) and is located immediately north of Weminuche Wilderness Area.

Both areas are represented by IMPROVE monitor WEMI1, which also represents Black Canyon of the Gunnison Wilderness Area to the north. *Figure* (TSS 2028 On The Books a2 (2028OTBa2) Source Apportionment) shows that U.S. anthropogenic emissions are projected to account for 1.84 Mm^{-1}, or 21.43% of average aerosol light extinction at WEMI1 on the most impaired days (MID) in 2028 assuming implementation of all on-the-books controls by that time.

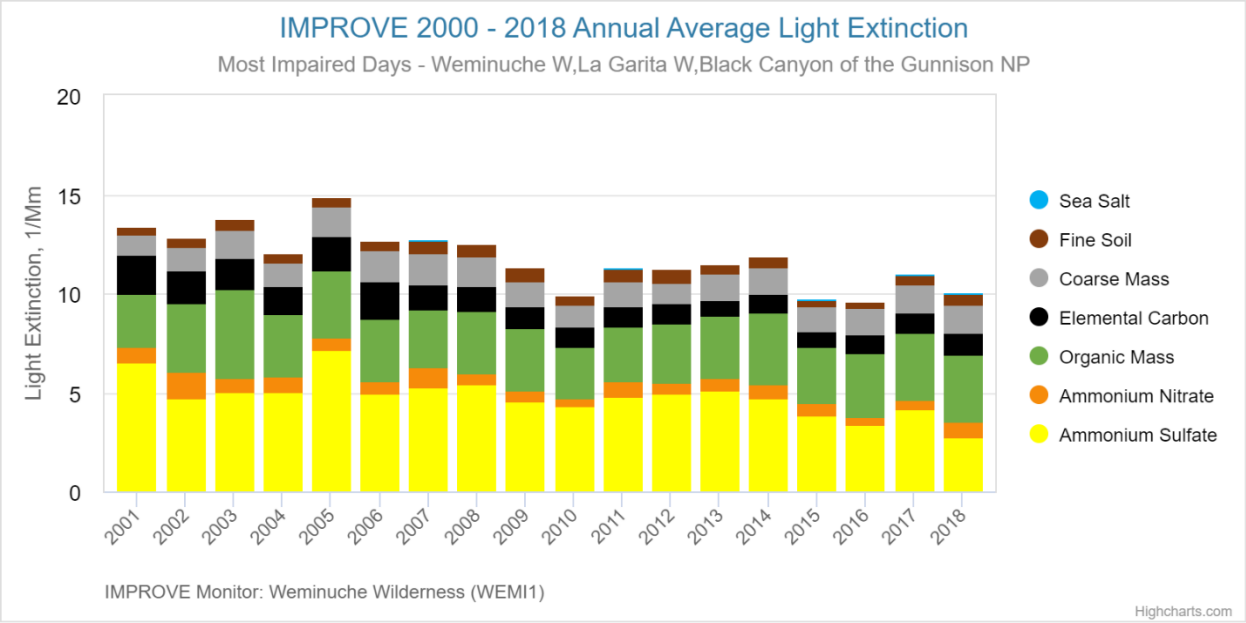
Figure 4-29: Source contributions to aerosol light extinction at WEMI1 on the most impaired days for the 2028OTBa2 model scenario. Contributions from U.S. anthropogenic emissions ("AntUS") are shown in red.



Measured Contributions of NH_4NO_3 and NH_4SO_4 from 2000-2018

Figure 4-29 (TSS Annual 2000-2018 Improve Monitoring MID Extinction Composition) shows that the average annual average MID light extinction at WEMI1 during the current period (2014-2018) was 10.5 Mm^{-1}, with ammonium nitrate (NH_4NO_3) comprising 4-8% of the annual average light extinction during that period and ammonium sulfate (NH_4SO_4) comprising 27-40%.

Figure 4-30: Aerosol contributions to light extinction for the annual average of most impaired days at WEMI1 for 2000-2018.



New Mexico's Anthropogenic Contribution of NH_4NO_3 and NH_4SO_4

Figure 4-30 (TSS State Source Group Contributions – U.S. Anthropogenic NH_4NO_3) shows individual state contributions, broken down by source sector, to the 2028OTBa2 modeled anthropogenic visibility impairment attributed to NH_4NO_3 at WEMI1 on the most impaired days. New Mexico contributes approximately 34% of anthropogenic NH_4NO_3. The largest source-sector contributions of anthropogenic NH_4NO_3 at WEMI1 are Oil and Gas (44%), Mobile (30%), and EGU (11%).

Figure 4-31: State and source sector contributions to 2028 modeled anthropogenic visibility impairment attributed to NH_4NO_3 at WEMI1 on the most impaired days.

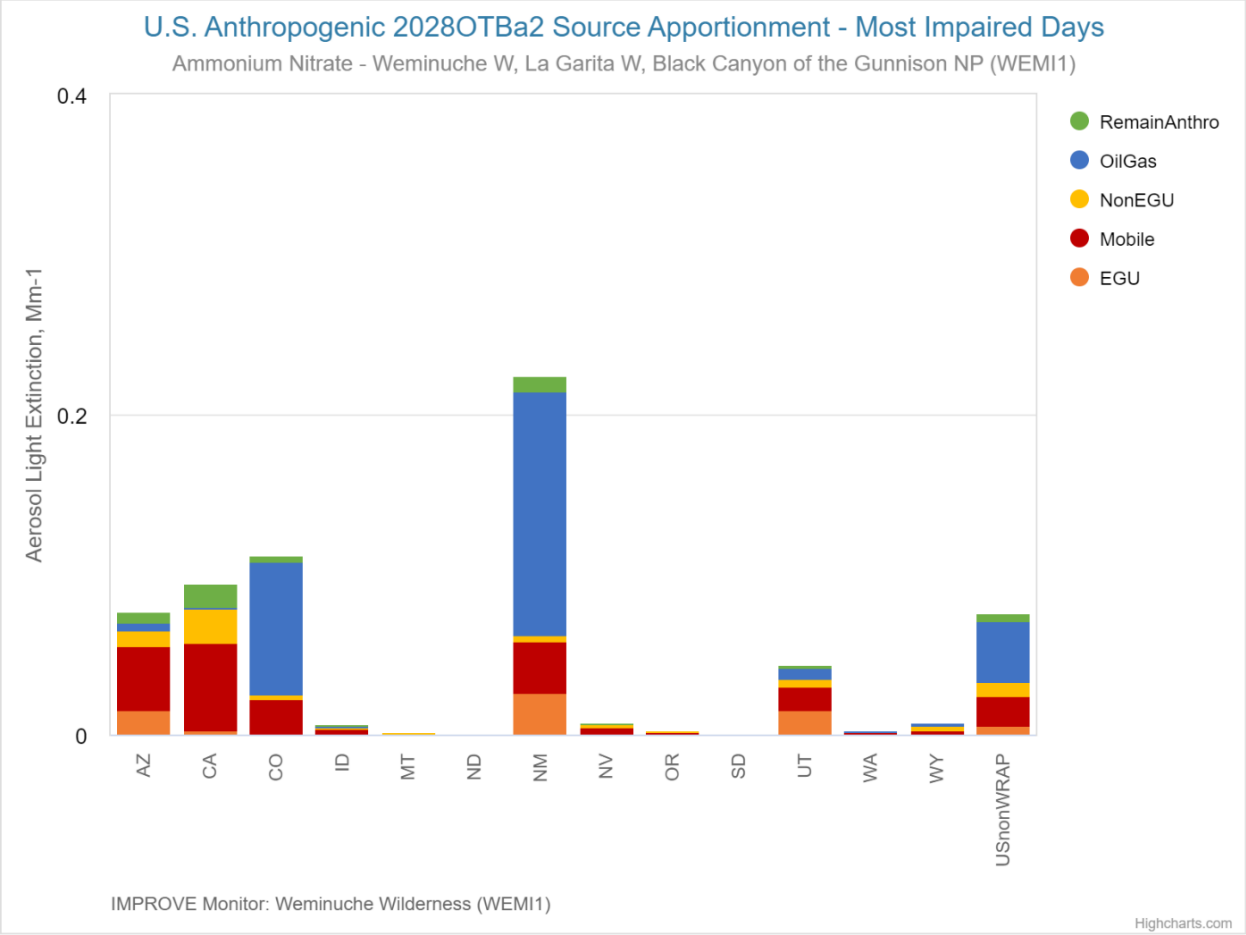
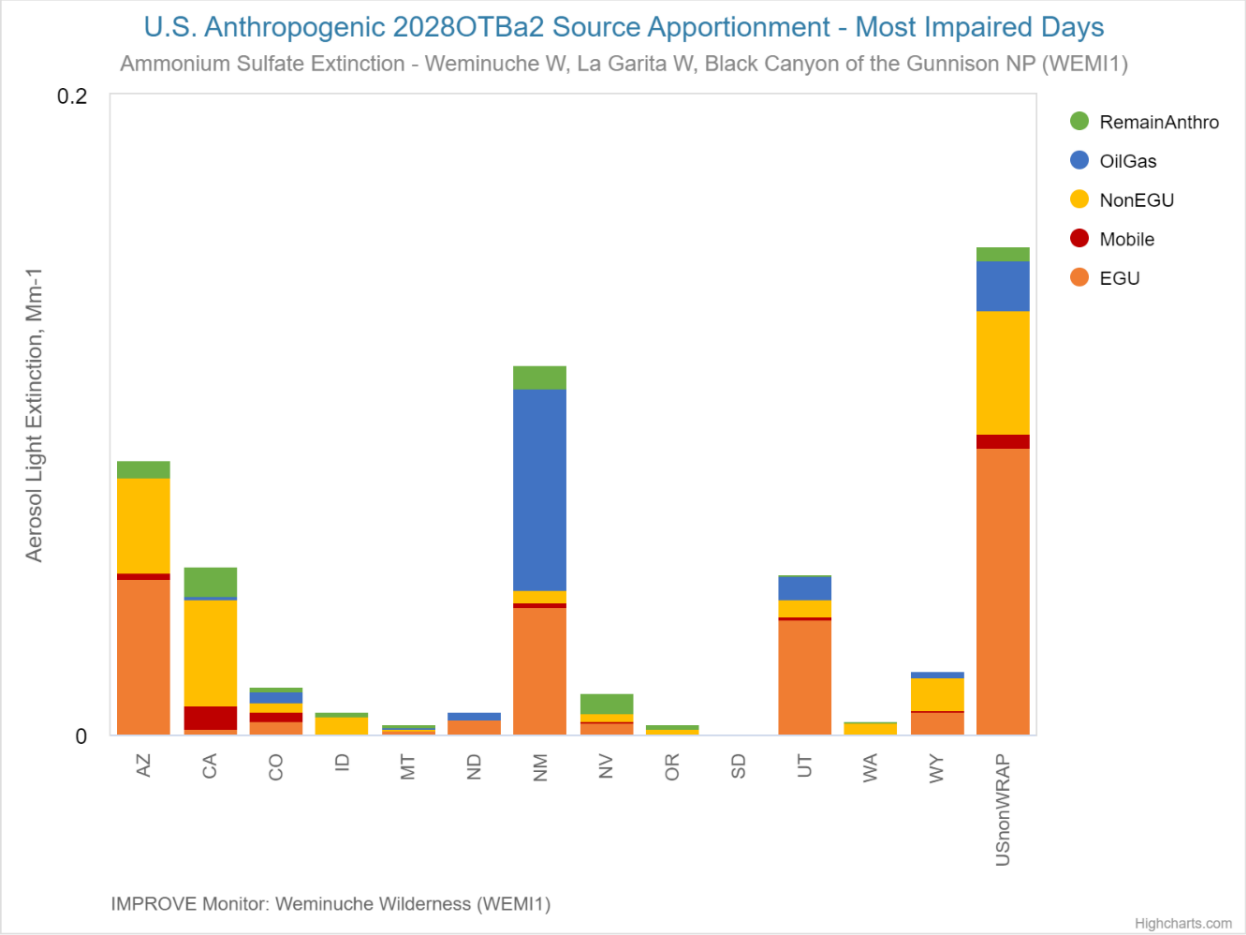


Figure (TSS State Source Group Contributions – U.S. Anthropogenic NH_4SO_4) shows individual state contributions, broken down by source sector, to the 2028OTBa2 modeled anthropogenic visibility impairment attributed to NH_4SO_4 at WEMI1 on the most impaired days. New Mexico contributes approximately 22% of anthropogenic NH_4SO_4. The largest source-sector contributions of NH_4SO_4 are EGU (45%), non-EGU (21%), and Oil and Gas (18%).

Figure 4-32: State and source sector contributions to 2028 modeled anthropogenic visibility impairment attributed to NH_4SO_4 at WEMI1 on the most impaired days.



Geographic Areas of Greatest Emissions Influence

Figure (EWRT) show that air mass masses reaching WEMI1 on the most impaired days with the highest relative NH_4NO_3 contributions spend a large amount of time in the Four Corners states including New Mexico. The air mass contribution from Bernalillo County is very low in comparison to the contribution from the Four Corners region, particularly Southwestern Colorado.

Figure 4-33: WEMI1 – NH_4NO_3 Extinction Weighted Residence Times.

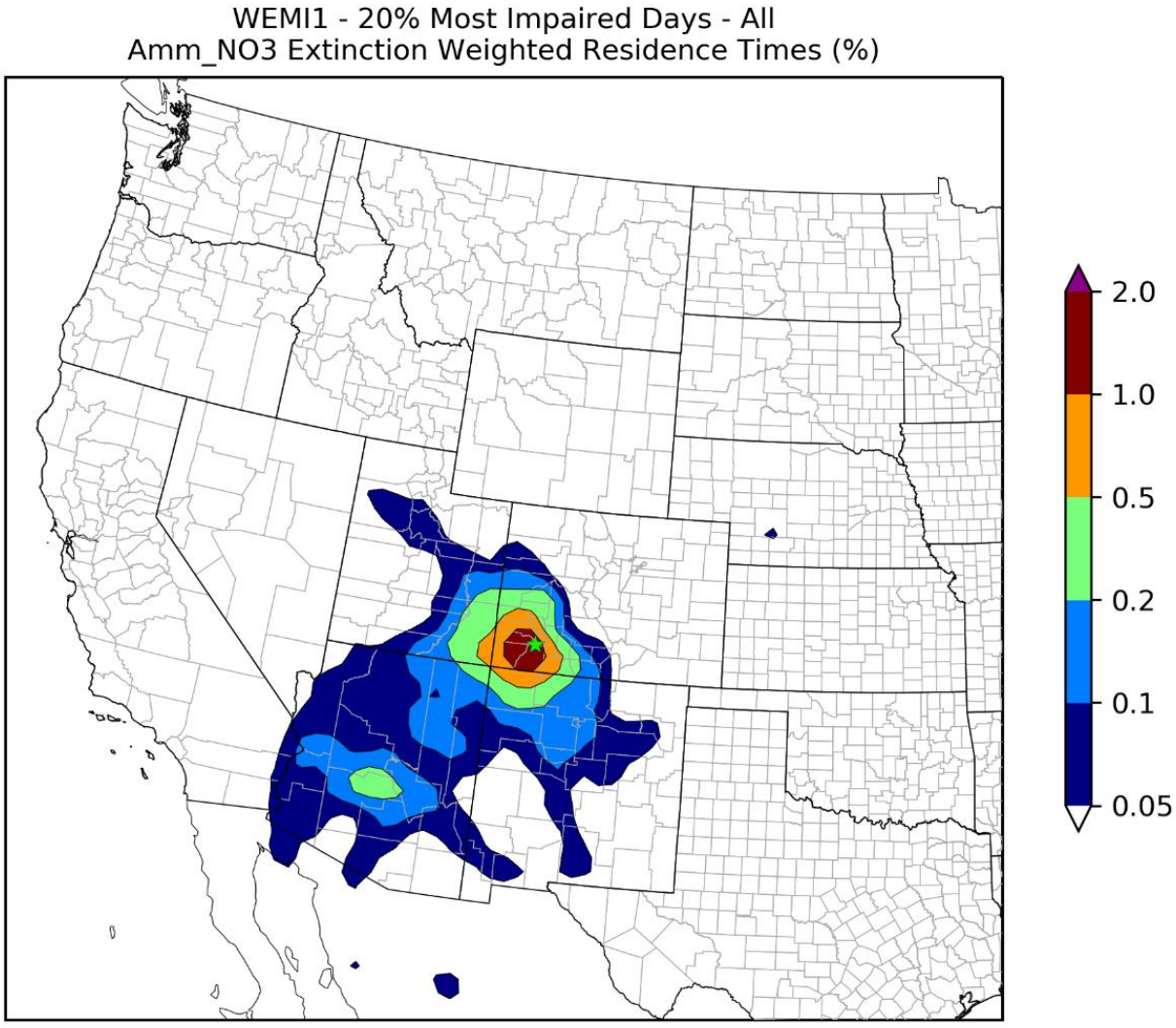


Figure , *Figure* 4-35, *Figure* , and *Figure* (WEP ALL/WEP O&G/WEP EGU/WEP Non-EGU) show the WEP for NO_x for all anthropogenic emissions, Oil and Gas emissions, EGU emissions, and non-EGU point source emissions, respectively. The WEP figures show that there are substantial anthropogenic NO_X emission affecting WEMI1. Oil and Gas sources impacting visibility at WEMI1 are predominantly in the San Juan Basin in New Mexico. The WEPs for EGU point sources and non-EGU point sources show that there are small impacts on visibility from New Mexico sources of NO_x on WEMI1. Bernalillo County is just within the contour line with an extinction weighted residence time of greater than 0.1%.

Figure 4-34: WEMI1 – NO_x Weighted Emissions Potential for All Anthropogenic Sources.

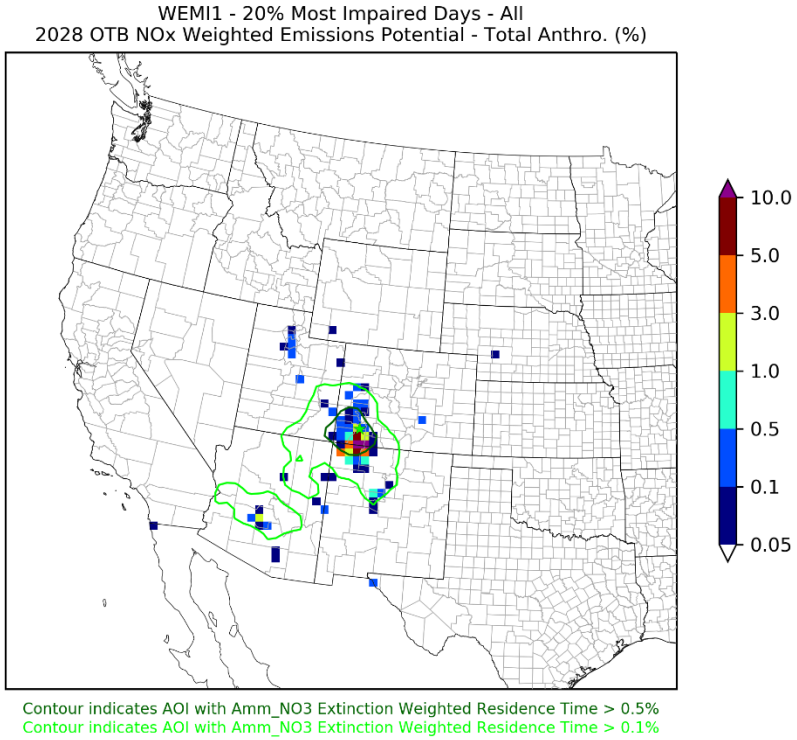


Figure 4-35: WEMI1 – NO_x Weighted Emissions Potential for Oil and Gas Sources.

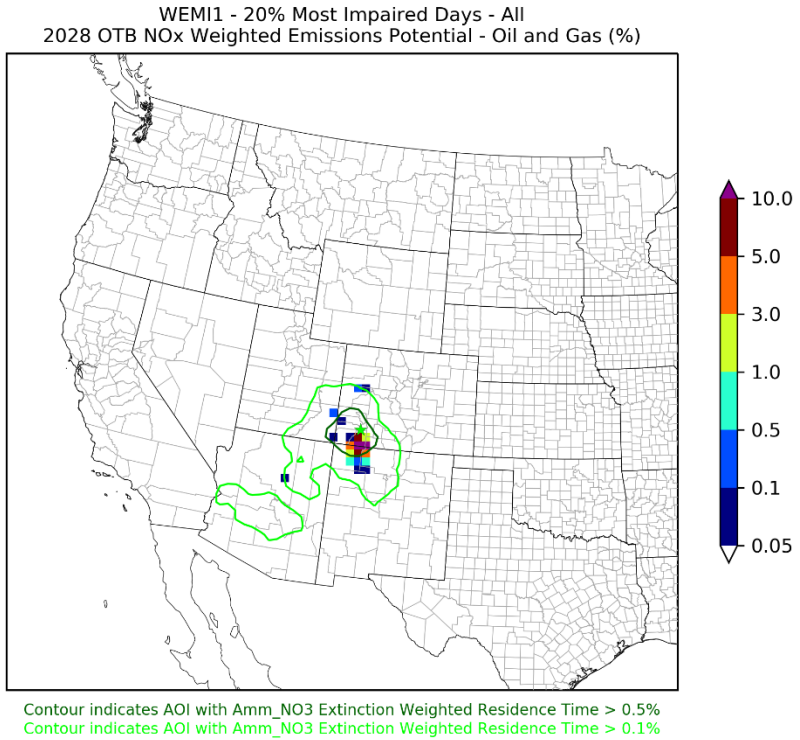


Figure 4-36: WEMI1 – NO_x Weighted Emissions Potential for EGU Point Sources.

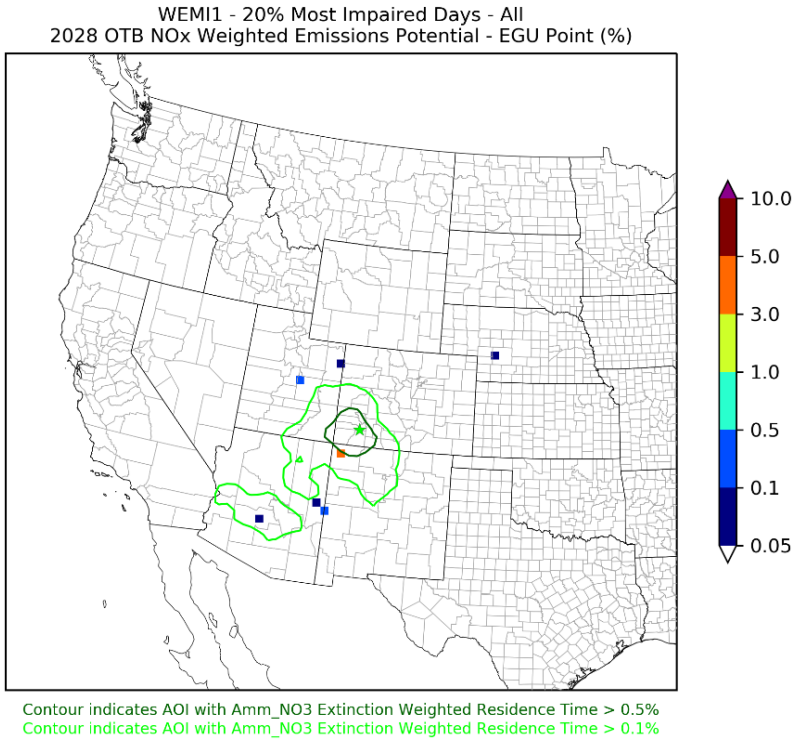


Figure 4-37: WEMI1 – NO_x Weighted Emission Potential for Non-EGU Point Sources.

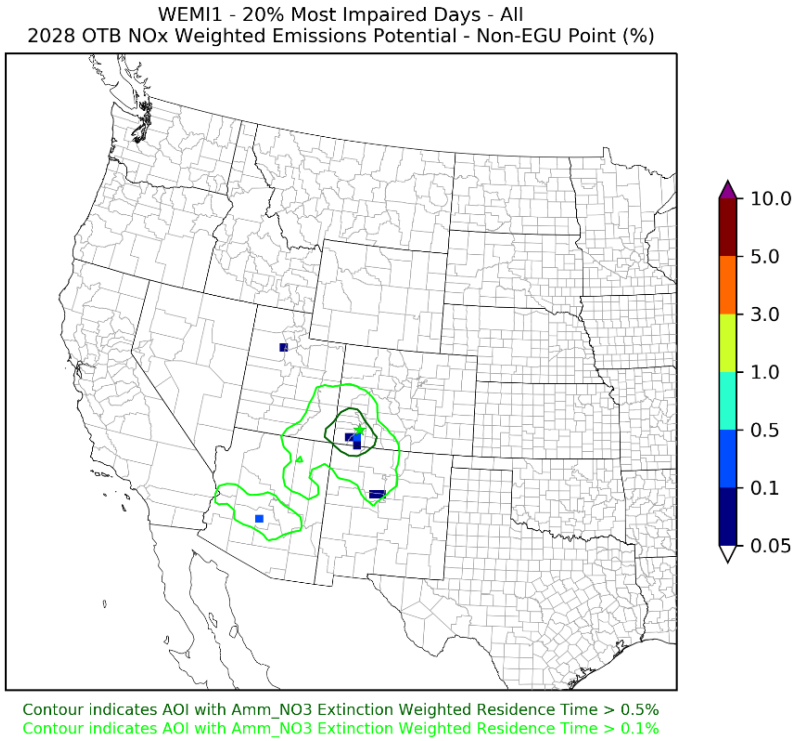


Figure *4-38* (EWRT) shows that air masses reaching WEMI1 on the most impaired days with the highest relative NH_4SO_4 contributions spend most of their time in Utah and Arizona, but also time in northwestern New Mexico. The amount of time spent in Bernalillo County is low in comparison.

Figure 4-38: WEMI1 – NH_4SO_4 Extinction Weighted Residence Times.

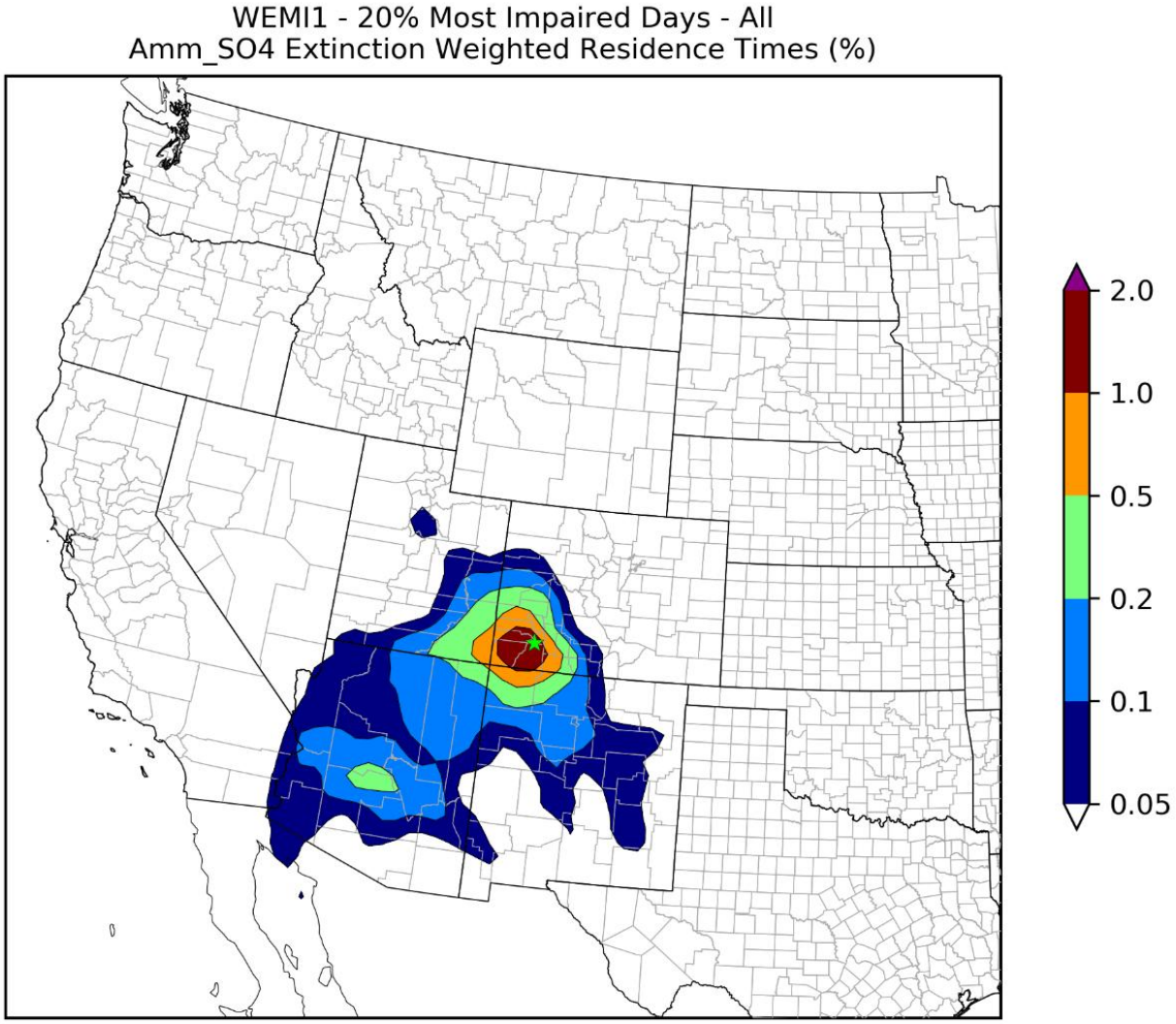


Figure 4-39, Figure 4-40, Figure 4-41, and Figure 4-42 (WEP ALL/WEP O&G/WEP EGU/WEP Non-EGU) show the WEP for SO_x for all anthropogenic emissions, Oil and Gas emissions, EGU emissions and non-EGU point source emissions, respectively. The WEP figures show that New Mexico has SO_x emissions affecting visibility at WEMI1. Oil and Gas sources impacting visibility at WEMI1 from New Mexico are in the San Juan and Permian basins. A grid cell in northwest New Mexico contains EGU sources of SO_x affecting WEMI1. The WEP for non-EGU point sources shows that there are small impacts from New Mexico non-EGU point sources at WEMI1. Bernalillo County is just within the contour line with an extinction weighted residence time of greater than 0.1%.

Figure 4-39: WEMI1 – SO_x Weighted Emissions Potential for All Anthropogenic Sources.

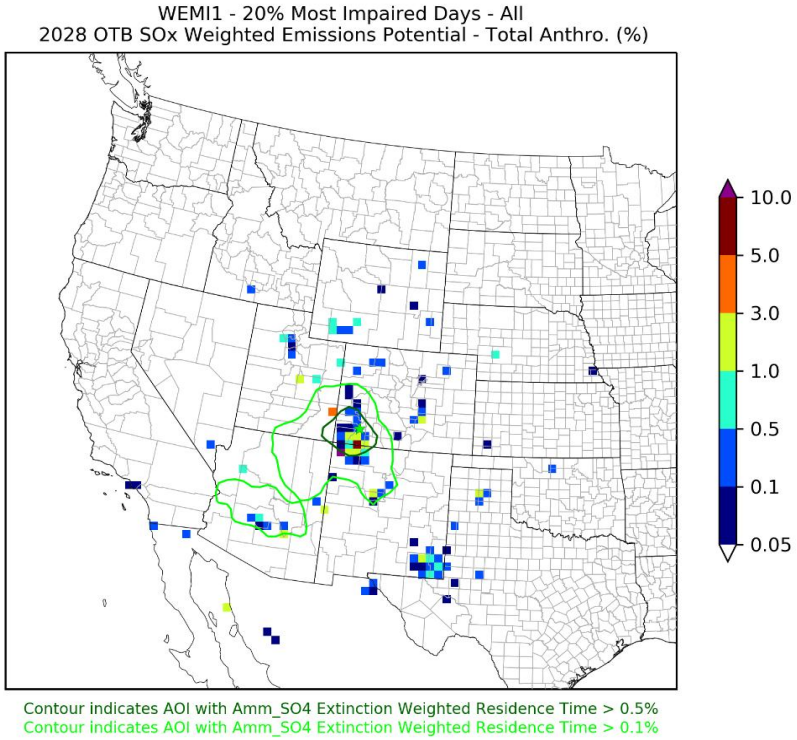


Figure 4-40: WEMI1 – SO_x Weighted Emissions Potential for Oil and Gas Sources.

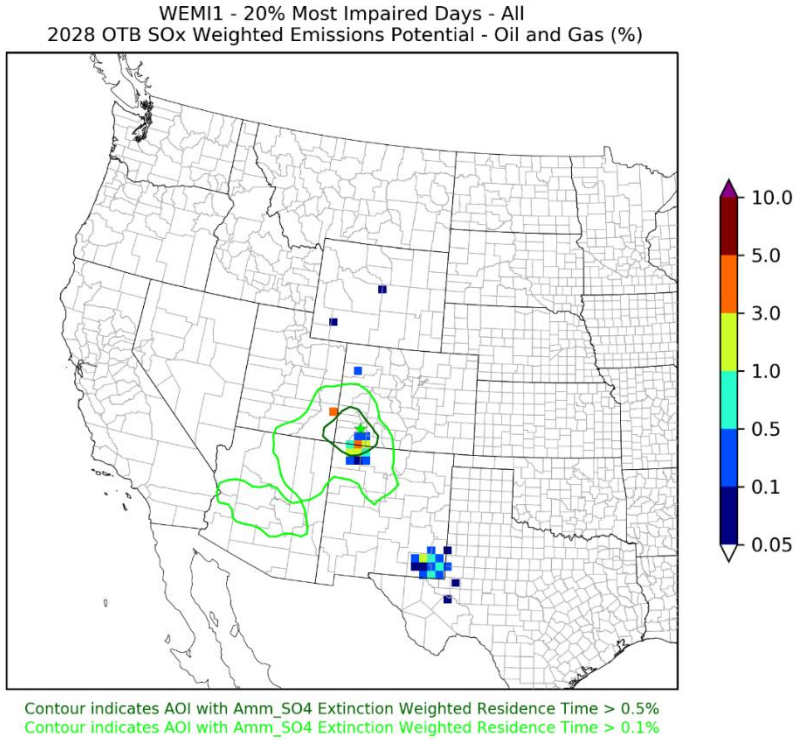


Figure 4-41: WEMI1 – SO_x Weighted Emissions Potential for EGU Point Sources.

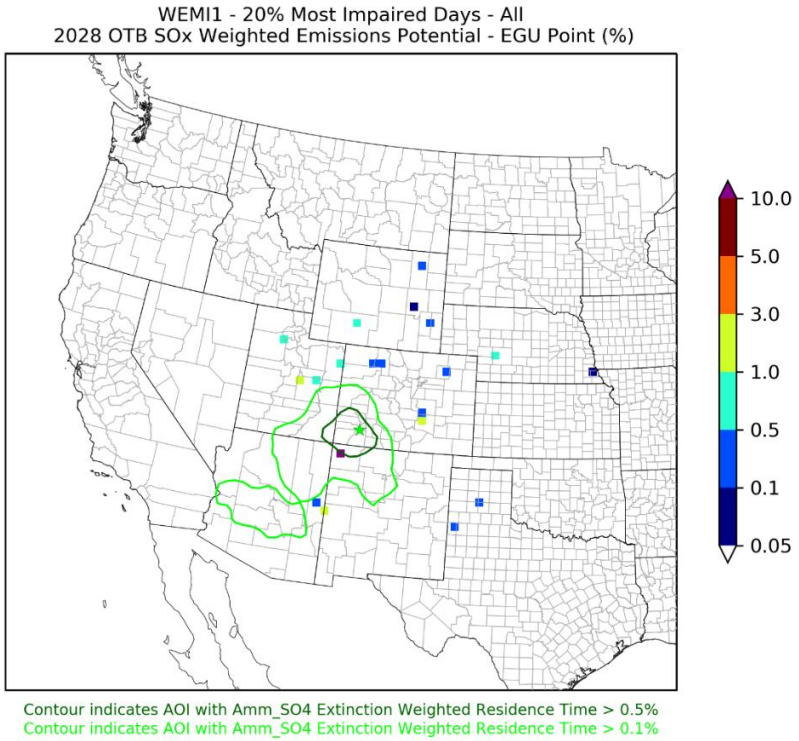
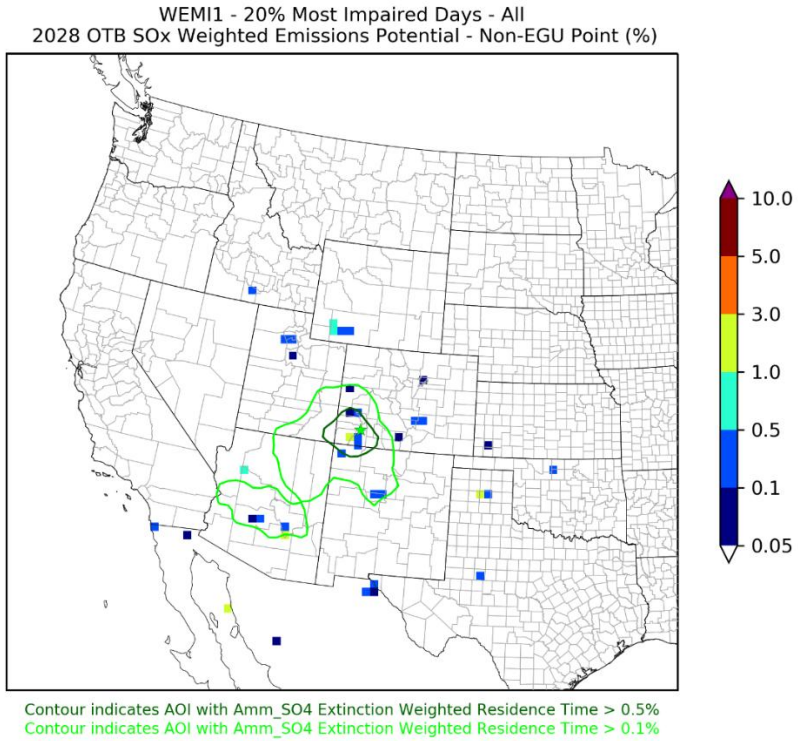


Figure 4-42: WEMI1 – SO_x Weighted Emission Potential for Non-EGU Point Sources.



Summary

Monitoring and modeling data show that a substantial portion of visibility impairment at WEMI1 is due to anthropogenic sources of NO_x and SO_2. Nitrates and sulfates are both significant contributors to visibility impairment. Source sector apportionment results, EWRT and WEP show that anthropogenic emissions significant to WEMI1 originate mostly in Colorado and New Mexico, particularly areas outside of Bernalillo County. EGU and non-EGU point sources impacting visibility are distributed throughout Colorado, Utah and New Mexico, using a 0.5% threshold to assess WEP contribution, the rank point data (TSS Rank Point Results – CO) show the point source facilities that have a relative impact on WEMI1.

4.4 Impacts to Arizona, Utah, Texas, and Oklahoma

Bernalillo County was not within an area of influence contour line for any of the Class 1 Areas in Arizona, Utah, Texas, or Oklahoma. See the State of New Mexico SIP for an analysis of impacts from outside Bernalillo County but within New Mexico on those areas. Since Bernalillo County was not within any area of influence contour lines for Class 1 areas in the above states, and thus any impact from the county being extremely minimal, WRAP TSS images from those areas are not included in this SIP element.

EHD also communicated with NMED and neighboring states outside of New Mexico, both during the WRAP collaborative process and once a SIP draft was prepared. This is discussed more in Chapter 11. EHD did not receive any request from those states to select more sources or require the installation of controls at sources regulated by EHD to address impacts to those states.

4.5 Conclusions

Based on the weighted emission potential analysis from the images above for this planning period, the available WRAP TSS data does not support a finding of substantial visibility impact from Bernalillo County for NO_x and SO_2 on Class 1 Areas in states outside of New Mexico.

Chapter 5: Embedded Progress Report and Assessment of Visibility Conditions

The Regional Haze Rule requires that this Regional Haze SIPr for the second planning period (2019-2028) provide a progress report on implementation of the first planning period SIP during the five years following the required submittal of a mid-period progress report in 2013[63]. This Chapter provides the required progress report, covering the second half of the first planning period (i.e. 2014-2018).

The Albuquerque-Bernalillo County Regional Haze SIP for the first planning period (2008-2018) was adopted under a different section of the Regional Haze Rule than this second planning period SIP. The first planning period SIP was adopted in accordance with 40 CFR § 51.309, *Requirements Related to The Grand Canyon Visibility Transport Commission* ("Section 309"), whereas this second planning period SIP is proposed for adoption in accordance with 40 CFR § 51.308, *Regional Haze Program Requirements* ("Section 308").

The progress report in this Chapter satisfies Section 308 requirements and provides a progress report regarding implementation of Section 309 requirements for 2014-2018. For simplicity, this Chapter will refer to the first planning period SIP for Albuquerque-Bernalillo County, adopted under Section 309, as the "First Period SIP." This Chapter will refer to the SIP for the current (i.e. second) planning period, proposed for adoption under Section 308, as the Regional Haze SIPr Round 2 (2019-2028). The first two Sections of this Chapter will cover, first, the Section 308 requirements that the progress report in this Chapter must satisfy and, second, the background of Albuquerque-Bernalillo County's decision to adopt the First Period SIP under Section 309. That background will be useful in understanding the progress report, which is covered in the last five Sections of this Chapter.

5.1 Regulatory Requirements

The specific regulatory requirements for the embedded progress report in this Regional Haze SIPr Round 2 (2019-2028) are listed below. This progress report must address the period since the most recent progress report, which was 2009-2013.[64] Therefore, this progress report addresses the next period-2014-2018.

As specified in 40 CFR § 51.308(f)(5), this progress report must provide the information specified in 40 CFR § 51.308(g)(1) to (8), as described below:

1. A description of the status of implementation of all measures included in the implementation plan for achieving reasonable progress goals for mandatory Class I Federal Areas both within and outside the State.[65]
2. A summary of the emissions reductions achieved throughout the State through implementation of the measures described in [40 CFR § 51.308(g)(1)].[66]

[63] 40 CFR § 51.308(f)(5).
[64] 40 CFR § 51.308(f)(5); 40 CFR § 51.309(d)(10).
[65] 40 CFR § 51.308(g)(1).
[66] 40 CFR § 51.308(g)(2).

3. 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, least impaired and/or clearest days as applicable expressed in terms of 5-year averages of these annual values. The period for calculating current visibility conditions is the most recent 5-year period preceding the required date of the progress report for which data are available as of a date 6 months preceding the required date of the progress report. These include:
    - The current visibility conditions for the most impaired and least impaired days.[67]
    - The difference between current visibility conditions for the most impaired and least impaired days and baseline visibility conditions.[68]
    - The change in visibility impairment for the most impaired and least impaired days over the period since the period addressed in the most recent plan required under paragraph (f) of this section.[69]
4. An analysis tracking the change over the period since the period addressed in the most recent plan required under [40 CFR § 51.308(f)] in emissions of pollutants contributing to visibility impairment from all sources and activities within the State.[70]
5. An assessment of any significant changes in anthropogenic emissions within or outside the State that have occurred since the period addressed in the most recent plan required under [40 CFR § 51.308(f)], including whether or not these changes in anthropogenic emissions were anticipated in that most recent plan and whether they have limited or impeded progress in reducing pollutant emissions and improving visibility.[71]
6. An assessment of whether the current implementation plan elements and strategies are sufficient to enable the State, or other States with mandatory Class I Federal Areas affected by emissions from the State, to meet all established reasonable progress goals for the period covered by the most recent plan required under [40 CFR § 51.308(f)]. [72]
7. For progress reports for the first implementation period only, a review of the State's visibility monitoring strategy and any modifications to the strategy as necessary.[73]
8. For a state with a long-term strategy that includes a smoke management program for prescribed fires on wildland that conducts a periodic program assessment, a summary of the most recent periodic assessment of the smoke management program including conclusions if any that were reached in the assessment as to whether the program is meeting its goals regarding improving ecosystem health and reducing the damaging effects of catastrophic wildfires.[74]

Following the 8-step framework outlined in the U.S. Environmental Protection Agency's (EPA) August 2019 *Guidance on Regional Haze State Implementation Plans for the Second Implementation Period,* this Chapter covers the progress report elements described in 40 CFR § 51.308(g)(1) to (8). Chapter 12 of this Regional Haze SIPr Round 2 (2019-2028) covers the progress report elements described in 40 CFR § 51.308(g)(6) and (7).

[67] 40 CFR § 51.308(g)(3)(i)(A).
[68] 40 CFR § 51.308(g)(3)(ii)(A).
[69] 40 CFR § 51.308(g)(3)(iii)(A).
[70] 40 CFR § 51.308(g)(4).
[71] 40 CFR § 51.308(g)(5).
[72] 40 CFR § 51.308(g)(6).
[73] 40 CFR § 51.308(g)(7).
[74] 40 CFR § 51.308(g)(8).

5.2 Background on Section 309 of the Regional Haze Rule

The CAA provides the EPA Administrator with the authority to establish a visibility transport region for any area of at least two states where the Administrator has reason to believe that the current or projected interstate transport of air pollutants from one or more states contributes significantly to visibility impairment in Class I Areas located in the affected states.[75] The CAA directs the EPA Administrator to also establish a visibility transport commission whenever the Administrator establishes a visibility transport region and provides specific direction on the composition of such a commission.[76] The CAA additionally specifies the duties of visibility transport commissions, which include: assessing scientific and technical data, studies, and other currently available information pertaining to adverse impacts on visibility from potential or projected growth in emissions from sources located in the visibility transport region; and, within four years of establishment, issuing a report to the EPA Administrator recommending what measures, if any, should be taken to remedy such adverse impacts.[77] Once such a report is issued, the CAA allows EPA 18 months to carry out its regulatory responsibility to promulgate a regional haze rule under 42 U.S.C. § 7491.[78] The CAA also expressly provides for the establishment of such a visibility transport commission - the Grand Canyon Visibility Transport Commission (GCVTC) - for the region affecting the visibility of Grand Canyon National Park.[79]

The EPA established the GCVTC in November 1991[80] for the Grand Canyon visibility transport region, which spans nine states (Arizona, California, Colorado, Idaho, Nevada, New Mexico, Oregon, Utah, and Wyoming) and 211 tribal lands on the Colorado Plateau. Members included the governors or their designees of each state in the region (with the exception of Idaho, which chose not to participate in the GCVTC); the leaders of the Navajo, Hopi, Hualapai, and Acoma Pueblo Indian tribes, or their designees; and *ex officio* members including EPA, federal land managers from the National Park Service, Bureau of Land Management, U.S. Fish and Wildlife Service, and U.S. Forest Service, and the Columbia River Inter-Tribal Fish Commission.[81] The GCVTC, following the instructions in 42 U.S.C. § 7492, issued a final report in June 1996 recommending long range strategies for addressing regional haze that impairs visibility in Class I Areas on the Colorado Plateau.[82]

As required by the CAA, the EPA promulgated the original Regional Haze Rule in July 1999. The Regional Haze Rule provided two paths for states to address regional haze. The first path, Section 308, required states to perform individual point source Best Available Retrofit Technology (BART) determinations and evaluate the need for other control strategies. The other path, Section 309, allowed the nine states in the Grand Canyon visibility transport region - and the 211 tribes within those states - to implement the GCVTC's recommendations from its June 1996 report to address visibility impairment in the 16 Class I Areas on the Colorado Plateau. Five states - Arizona, New Mexico, Oregon, Utah, and Wyoming - as well as Albuquerque - Bernalillo County submitted their First Period SIPs under Section 309 by the December

[75] 42 U.S.C. § 7492(c)(1).
[76] 42 U.S.C. § 7492(c)(2).
[77] 42 U.S.C. § 7492(d).
[78] 42 U.S.C. § 7492(e)(1).
[79] 42 U.S.C. § 7492(f).
[80] The Grand Canyon Visibility Transport Commission, Recommendations for Improving Western Vistas (June 10, 1996), "GCVTC Report", pp. 1-91.
[81] GCVTC Report, p. 3.
[82] Id.

31, 2003 deadline. Oregon ceased participating in the program in 2006, followed by Arizona in 2010.[83,84] While tribes are not subject to the deadline and can still opt into the Section 309 program at any time, none have done so.

The EPA revised the Regional Haze Rule on July 6, 2005 and again on October 13, 2006 in response to two legal challenges.[85,86] The October 13, 2006 revisions modified Section 309 to provide a methodology consistent with the Court's decision for evaluating the equivalence of alternatives to BART, such as the alternative Section 309 strategy based on the GCVTC recommendations.

The Regional Haze Rule was revised again on January 10, 2017, requiring all states - including Section 309 states - to comply with Section 308 requirements in their periodic implementation plan revisions.[87] In the preamble to the January 10, 2017 final rule, EPA clarified that all measures and obligations contained in a state's First Period SIP submitted under Section 309 must continue to be implemented unless the SIP itself provides for that measure or obligation to sunset; that the revised provisions of Section 309 will apply to any SIP revision that would revise a First Period SIP provision that was part of the basis of EPA initially approving the First Period SIP as meeting the requirements of Section 309 of the original Regional Haze Rule; and that future periodic comprehensive SIP revisions and progress reports from the Section 309 states - including this Regional Haze SIPr Round 2 (2019-2028) - will be subject to the requirements of Section 308.[88]

5.3 Implementation Status of All Control Measures in First Period SIP

The progress report must provide "A description of the status of implementation of all measures included in the implementation plan for achieving reasonable progress goals for mandatory Class I Federal areas both within and outside the State."[89]

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[83] "In 2003, Oregon did submit a Section 309 Regional Haze Plan, to primarily address the contribution of Oregon emissions to visibility impacts in the Colorado Plateau. This plan, along with 4 other state plans submitted under Section 309, were disapproved by EPA due to a lawsuit regarding the BART requirements in Section 309. [For more information see *Center for Energy and Economic Development v. EPA*, no. 03-1222, (D.C. Cir. Feb. 18, 2005)("CEED v. EPA")]. The four states chose to resubmit their 309 plans. The Department decided not to resubmit the plan, due to the optional nature of Section 309, the fact that Oregon is only a minor contributor to visibility impacts in the Colorado Plateau, and that a Section 308 plan is required in 2008 regardless under the Regional Haze Rule." Oregon Regional Haze Plan, December 2009, p. 9.

[84] "Originally, Arizona was to submit a SIP addressing both Section 309(d)(4) and Section 309(g); however, it was determined in 2010 that EPA did not approve of the revisions to the milestone program. To avoid a FIP, EPA requested that Arizona submit a plan under Section 308. Arizona agreed but with the understanding that all the work done on the previously submitted plans would be recognized and that the important long-term strategies would be incorporated into the 308 SIP as would have been the case under Section 309(g) except now for all 12 of Arizona's national parks and wilderness areas." Final Arizona Regional Haze SIP – 308, January 2011, p. 9.

[85] 70 Fed. Reg. 39104 (July 6, 2005) (Regional Haze Regulations and Guidelines for Best Available Retrofit Technology (BART) Determinations).

[86] 71 Fed. Reg. 60612 (October 13, 2006) (Regional Haze Regulations; Revisions to Provisions Governing Alternative to Source-Specific Best Available Retrofit Technology (BART) Determinations).

[87] 82 Fed. Reg. 3078 (January 10, 2017) (Protection of Visibility: Amendments to Requirements for State Plans.)

[88] Id.

[89] 40 CFR § 51.308(g)(1).

This Section describes control measures in the Albuquerque-Bernalillo County First Period SIP that were adopted for the first Regional Haze planning period to regulate anthropogenic sources of haze-causing pollutants in the county. For each control measure, this Section describes the pollutant being controlled, the method of control and how it affects visibility, the type of source affected, and the extent to which any applicable compliance date for sources has come into effect.

5.3.2 SO_2 Milestone and Backstop Trading Program

The Regional Haze Rule requires Section 309 states to develop an emissions reduction program for stationary sources of sulfur dioxide (SO_2).[90] To meet this requirement, the First Period SIPs for Albuquerque-Bernalillo County and the other Section 309 jurisdictions (New Mexico, Utah, and Wyoming) provided an SO_2 Milestone and Backstop Trading program that:

- tracks SO_2 emissions from major stationary sources reporting 100 tons per year or more of SO_2 emissions;
- requires that total emissions from the SO_2 sources tracked remain at or below specific annual milestones; and
- in the event an annual milestone is exceeded, requires implementation of a regional SO_2 emissions trading system among the three Section 309 states.

Albuquerque-Bernalillo County has two major sources of SO_2 within its borders, which was also the case during the first planning period. One is the GCC Rio Grande facility in Tijeras, NM, which manufactures Portland limestone cement. The other is the Southside Water Reclamation Facility, operated by the Albuquerque-Bernalillo County Water Utility Authority.

Under its First Period SIP, EHD coordinated with its Western Regional Air Partnership (WRAP) partners (including the State of New Mexico) to maintain an inventory of regional SO_2 emissions across the Section 309 states. Annual regional emissions must not exceed specific milestones for each year, which have gradually decreased over time.

If an annual regional milestone is exceeded, then a regional backstop trading program (Western Backstop SO_2 Trading Program) will be triggered to bring emissions below the milestone. Once triggered, the trading program would require New Mexico to allocate "allowances" to each source for specific maximum permissible amounts of SO_2 emissions. Sources would be allowed to trade allowances in order to comply with source-specific emissions targets. A tracking system would be used to manage emissions monitoring, allowances allocation, and allowances trading. This backstop SO_2 trading program has been adopted in the currently effective rule, 20.11.46 NMAC, *Sulfur Dioxide Emissions Inventory Requirements; Western Backstop Sulfur Dioxide Trading Program*. By design, the program would not be implemented unless the annual regional SO_2 milestones are exceeded. Only at that time would applicable compliance dates for specific regulatory provisions under 20.11.46 NMAC become effective. Albuquerque-Bernalillo County is prepared to implement the SO_2 backstop trading program if it becomes necessary in the future.

20.11.46 NMAC, *Sulfur Dioxide Emissions Inventory Requirements; Western Backstop Sulfur Dioxide Trading Program*, requires all stationary sources with actual emissions of 100 tons per year or more of

[90] 40 CFR § 51.309(d)(4).

SO_2 to submit an annual inventory of SO_2 emissions to measure compliance with the regional SO_2 milestones. If the backstop trading program is triggered, then these requirements will eventually be replaced by more rigorous monitoring requirements in 20.11.46 NMAC.

Table 5-1 presents the adjusted actual regional SO_2 emissions for 2014 - 2022 in tabular form. Figure presents the adjusted actual regional SO_2 emissions for 2003-2021 in graphical form. Each year, adjusted actual SO_2 emissions were well below the regional milestone. Consequently, the backstop trading program was not triggered.

Table 5-1: 2014 - 2022 Regional SO_2 Milestones and Emission Trends in Section 309 States.[91]

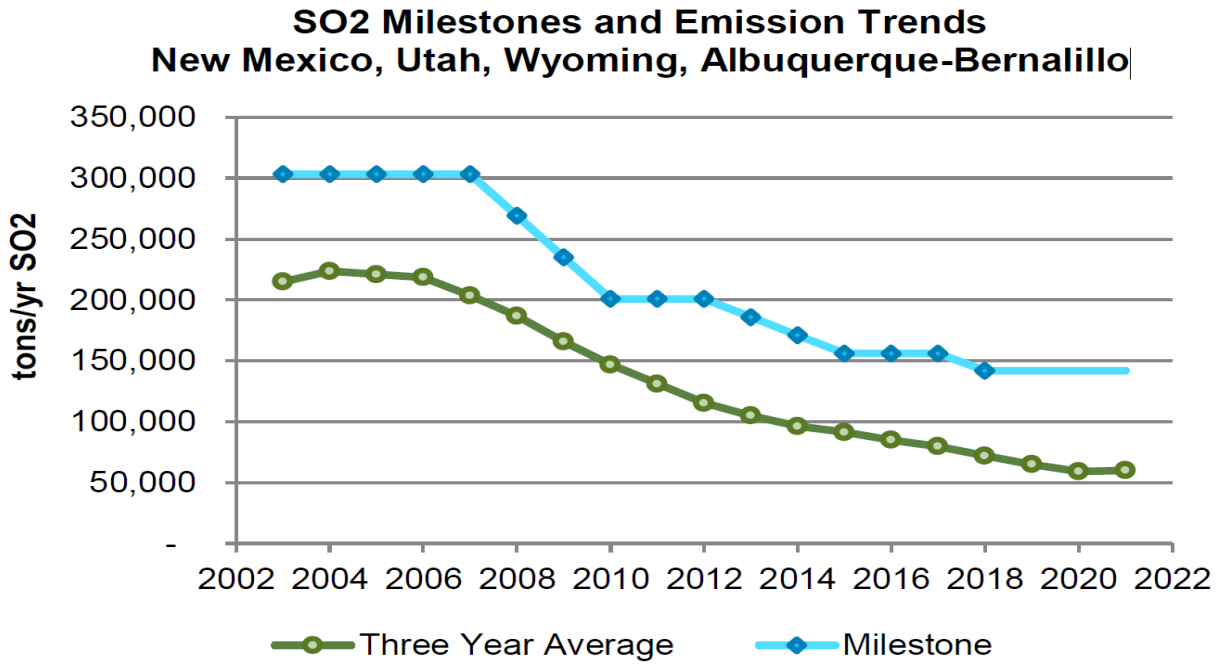
Year	SO_2 Milestone (tons)	Adjusted Actual SO_2 Emissions (tons)[92]	3-Yr Avg. Adjusted SO_2 Emissions (tons)	Difference between Milestone and 3-Yr Avg. Adjusted SO_2 Emissions[93]	3-Yr Avg. Adjusted SO_2 Emissions as a Percent of Milestone	Adjusted Actual SO_2 Emissions as a Percent of Milestone
2014	170,868	92,553	96,392	<74,476>	56%	NA
2015	155,940	81,454	91,310	<64,630>	59%	NA
2016	155,940	98,035	90,591	<65,349>	58%	NA
2017	155,940	76,504	79,709	<76,231>	51%	NA
2018	141,849	71,994	NA	<69,854>	NA	51%
2019	141,849	65,001	NA	<76,847>	NA	46%
2020	141,849	59,352	NA	<82,496>	NA	42%
2021	141,849	60,011	NA	<81,837>	NA	42%
2022	141,849	59,364	NA	<82,485>	NA	42%

[91] The full content of the SO_2 Emissions and Milestone Reports for the years 2013 to 2021 are available from WRAP at https://www.wrapair2.org/reghaze.aspx.

[92] The First Period SIPs require states to adjust reported emissions to account for changes in monitoring, calculation methods, and enforcement actions.

[93] From 2003 to 2017 states compared the milestone to a three-year average of adjusted region-wide SO_2 emissions as required by the First Period SIPs. The First Period SIPs require states to compare the final 2018 regional milestone to 2018 emissions rather than the three-year average. Negative Value = Emissions < Milestone

Figure 5-1: 2003 - 2022 SO_2 Milestones and Emission Trends.



5.3.3 Mobile Sources

Section 309 of the Regional Haze Rule required the First Period SIP to perform projections demonstrating a continuous decline in mobile source emissions[94] from 2003 to 2018.[95] If projected emissions did not demonstrate a continuous decline forecast to occur over that period, then the plan submission must provide for an implementation plan revision by no later than December 31, 2008 containing any necessary long term strategies to achieve a continuous decline in total mobile source emissions of the pollutant(s), to the extent practicable, considering economic and technological reasonableness and federal preemption of vehicle standards and fuel standards under title II of the CAA..[96]

Such consideration was not necessary because the First Period SIP did demonstrate a projected continuous decline in mobile source emissions for the period 2003 to 2018. Section 309 also required an interim report to EPA and the public in the year 2018 on the status of regional and local control strategies for mobile sources.[97] The progress report in this Chapter addresses that requirement (see

[94] For the Regional Haze Rule definition of the term "continuous decline in mobile source emissions," *see* 40 CFR § 309(b)(6). The "continuous decline" is a decline in "the projected level of emissions" from mobile sources, forecast to occur in the future, after submittal of the First Period SIP.
[95] 40 CFR § 51.309(d)(5)(i).
[96] 40 CFR § 51.309(d)(5)(i)(A).
[97] 40 CFR § 51.309(d)(5)(ii). This regulatory provision requires a report on implementation status of mobile source control strategies recommended by the predecessor organization to WRAP, the GCVTC. For purposes of the progress report presented in this Chapter, the relevant control strategy being discussed here is the projection made in the First Period SIP of a continuous decline in mobile source emissions for the years 2003 to 2018.

Section 5.4.5 – ***Mobile Sources***). For more on regulatory efforts in Bernalillo County and the State of New Mexico to address mobile emissions, see Chapter 8.

5.3.4 Fire/Smoke Management

Section 309 of the Regional Haze Rule required the First Period SIP to include programs for managing visibility-impairing emissions caused by prescribed fire sources.[98] The first period SIP contains all elements required by Section 309. It provides for fire and smoke management programs under 20.11.21 NMAC, *Open Burning*, to help control prescribed fire-related emissions of volatile organic compounds ("VOC's"), nitrogen oxides ("NOx"), elemental carbon, organic carbon, and particulate matter 2.5 micrometers or smaller in diameter ("PM 2.5")[99].

The requirements for prescribed fire under 20.11.21 NMAC include notification, registration, weather monitoring for appropriate conditions, public notice, visual monitoring, use of emission reduction techniques, and other requirements. Section 20.11.21.19 NMAC described in detail some of the emission reduction techniques for prescribed fires. Those techniques include:

Generally, prescribed fire is a proactive approach to reducing wildfire risk on national forest land and is encouraged. Extreme weather events due to climate change, such as lower humidity, can pose challenges to many prescribed burn efforts.

Prescribed burning is a very important part of reducing the risk of wildfires, which is why the rule allows an adjustment to the glidepath for wildland prescribed fire. In 2021, EPA prepared a report that did a comparative assessment on the impacts of prescribed fire in the Western United States[100]. In that assessment, there was a discussion about the ecosystem and economic impacts of wildfire, as well as the air quality impacts. The report mentions that higher intensity fires (e.g. long flame lengths) result in more consumption and charring of surface fuel, increased exposure of soil and alteration of soil properties, greater smoke production, and more damage to trees and other vegetation[101]. Thus, prescribed burns play an important role in reducing the amount of fuel for a wildfire, and are an important planning tool for air managers as a way of allowing some emissions from prescribed fire for the sake of reducing the chances of very high emission events and high visibility degradation from wildfires.

The EPA report further mentioned two case studies in the west, which showed PM 2.5 levels (based on photochemical modeling projections and surface level measurements) were at most 546 tons in the prescribed fires and ranged from 1,869 to 85,638 tons during the wildfires[102]. Total fuel consumption was at most 26,992 tons in the prescribed fires and ranged from 213,454 to 3,254,638 tons in the wildfires[103].

NMAC 20.11.21 requires that most open burning in Albuquerque-Bernalillo County be conducted under a permit from EHD subject to specific requirements, including: reporting of emissions for use in emission

[98] 40 CFR § 309(d)(6).
[99] First Period SIP, pp. 60 to 69.
[100] https://assessments.epa.gov/risk/document/&deid=352824
[101] Id., pp. 67
[102] Id., pp. 226
[103] Id., pp. 226

inventories; consideration of alternatives to burning; use of enhanced smoke management techniques recommended by the WRAP; and use of specific emission reduction techniques.[104] EHD implemented this regulation throughout the period since the most recent progress report and continues to rely on this regulation to achieve its fire and smoke management goals. The SMP is applicable to Bernalillo County, with the rest of the state having their own SMP that meets the requirements of the Regional Haze Rule as well. Tribal lands are not included. EHD is not proposing amendments to this regulation at this time as there has been no indication the current smoke management program has not been effective.

Additionally, in Bernalillo County, numerous efforts currently aim to reduce fire risk along the Bosque near the Rio Grande. For instance, the City of Albuquerque recently hired a contractor to manage a herd of goats to help clear out much of the brush that could increase fuel for fire spread along the Bosque riparian area near the Rio Grande[105]. Volunteer groups through City of Albuquerque Parks and Recreation Department have also worked hard to clear out non-native, invasive plant species and reduce heavy fuel loads to decrease fire risk and protect the health of the ecosystem[106]. These community efforts compliment the goals of NMAC 20.11.21 to further reduce risk.

5.3.5 Fugitive and Unpaved Road Dust

Section 309 of the Regional Haze Rule required the First Period SIP to include an assessment of the impact on visibility conditions in the 16 Class I Areas on the Colorado Plateau of regional-scale dust emissions by WRAP states from paved and unpaved roads.[107] If such dust emissions are determined to be a significant contributor to visibility impairment in these Class I Areas, then a SIP must implement emissions management strategies to address the impact as necessary and appropriate. The First Period SIP conducted the required assessment and determined, based on WRAP data, that regional-scale dust emissions for the purpose of the Regional Haze Rule were not a significant contributor to visibility impairment within the 16 Colorado Plateau Class I Areas.[108]

Nevertheless, the First Period SIP proactively provided for control of particulate matter 10 micrometers or smaller in diameter (PM10) and PM2.5 emissions from unpaved roads and stationary fugitive dust sources through 20.11.20 NMAC, *Fugitive Dust Control*.[109]

EHD recently developed a *High Wind Fugitive Dust Mitigation Plan for Bernalillo County*, which was confirmed complete by EPA on July 16, 2024. The impetus for these actions was the finalization by EPA of revisions to its 2007 Exceptional Events Rule, on September 16, 2016.[110] The Exceptional Events Rule, codified in 40 CFR Parts 50 and 51, provides air quality agencies regulatory relief in situations when exceptional events cause an exceedance of a NAAQS. Exceptional events can be caused by human activity unlikely to recur, or by natural events. In New Mexico, natural events, such as windstorms and wildfires, cause exceedances of the particulate matter standards.

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[104] NMAC 20.11.21

[105] https://www.koat.com/article/goat-grazing-a-unique-and-natural-approach-to-fire-prevention-in-albuquerques-bosque/46571130

[106] https://www.cabq.gov/parksandrecreation/news/winter-work-in-bosque-begins

[107] 40 CFR § 309(d)(7).

[108] First Period SIP, pp. 69 to 71.

[109] *Id.*

[110] 81 Fed. Reg. 68216(October 3, 2016) (Treatment of Data Influenced by Exceptional Events).

Other exceptional events such as tornadoes, firework displays, and chemical spills may occur. The revised rule includes requirements for states to prepare mitigation plans (40 CFR 51.930, *Mitigation of Exceptional Events*) for areas with recurring events (i.e. three similar events of the same type and pollutant in a three-year period).

20.11.20 NMAC, *Fugitive Dust Control*, applies to certain sources of fugitive dust that are not required to obtain a construction permit from EHD. Sources of fugitive dust subject to the rule include disturbed surface areas and inactive disturbed surface areas equal to or greater than one acre and any commercial or industrial bulk material processing, handling, transport or storage operations.

The rule requires that all sources of fugitive dust use reasonably available control measures to prevent fugitive dust from leaving the site on which it is produced and work to reduce the amount of those emissions. It also requires sources of fugitive and unpaved road dust to obtain permits and pay related fees, and it limits the construction of new unpaved roads more than ¼ mile in length. EHD has an active enforcement program in place to implement these and other provisions of this regulation, including detailed requirements for specific control measures. EHD implemented this regulation throughout the period since the most recent progress report and continues rely on this regulation to achieve its fugitive dust management goals.

5.3.6 Pollution Prevention - Renewable Energy Goals

Section 309 of the Regional Haze Rule required that the First Period SIP describe programs that EHD and NMED would rely upon for the state's contribution toward renewable energy goals set forth by the GCVTC for states in the Grand Canyon visibility transport region.[111] Those goals provided that ". . . [renewable energy] will comprise 10% of [the power needs in transport region states] by 2005 and 20% by 2015."[112] Consistent with the GCVTC goals and the intent of the programs described, available information on renewable energy's role in meeting New Mexico's power needs indicates increasing reliance on such energy over time. The U.S. Energy Information Administration estimates that in 2018 wind power accounted for almost 19% of New Mexico's electricity generation, utility scale solar photovoltaic accounted for 4%, and small scale, customer-sited solar photovoltaic accounted for about 1%.[113]

[111] 40 CFR § 51.309(d)(8)(vi). Section 309 did not require numerical quantification (for example, as a percentage) of New Mexico's "contribution" toward the GCVTC regional renewable energy goals. Accordingly, the First Period SIPs for New Mexico and Albuquerque - Bernalillo County described the state's contribution in terms of numerous renewable energy programs whose implementation would be consistent with the regional renewable energy goals. Section 309 also required the First Period SIP to describe or provide for several other pollution prevention programs. 40 CFR § 51.309(d)(8)(i) to (v). EPA found that the First Period SIP met these requirements. 77 Fed. Reg. 70693 (November 27, 2012) (Approval and Promulgation of State Implementation Plans; State of New Mexico; Regional Haze Rule Requirements for Mandatory Class I Areas).

[112] GCVTC, Recommendations for Improving Western Vistas (June 1996), p. 35. Section 309 did not define "renewable energy". It did define "eligible renewable energy resource" as "electricity generated by non-nuclear and non-fossil low or no air emission technologies." 40 CFR § 51.309(b)(13). The latter term does not appear in the Regional Haze Rule.

[113] U.S. Energy Information Administration, New Mexico State Profile and Energy Estimates (last updated February 20, 2020), available at https://www.eia.gov/state/analysis.php?sid=NM, accessed August 14, 2020.

In addition, the New Mexico Renewable Energy Act, as amended, requires that New Mexico's publicly owned electric utilities obtain 15% of their total retail sales from renewable energy by 2015 and 20% by 2020, with smaller, additional requirements for percentages of retail electricity sales applicable to rural electric cooperatives for these years.[114]

New Mexico's governor signed amendments to this state law in 2019 requiring publicly owned electric utilities to account for 40% of retail electricity sales from renewables by 2025, 50% by 2030, 80% by 2040, and 100% by 2045, with smaller, additional requirements for percentages of retail sales by rural electric cooperatives during the same time span.[115]

This control measure was limited to the period of time through 2018 and will not be further addressed in this Regional Haze SIPr Round 2 (2019-2028) or in subsequent progress reports. Due to the nature of the renewable energy goals being implemented at a state level, this section is looked at in the context of New Mexico as a whole and not just Bernalillo County.

5.3.7 Implementation of Additional GCVTC Recommendations

Section 309 of the Regional Haze Rule required that the First Period SIP provide for implementation of all other recommendations in the GCVTC's report that can be practicably included as enforceable emission limits, schedules of compliance, or other enforceable measures (including economic incentives) to make reasonable progress toward remedying existing and preventing future regional haze in the 16 Class I Areas on the Colorado Plateau.[116] Section 309 states must provide a report to EPA and the public in 2018 on the progress toward developing and implementing policy or strategy options recommended in the GCVTC's report.

The First Period SIP evaluated the GCVTC's 1996 report, *Recommendations for Improving Western Vistas*, to first determine which recommendations were not already incorporated into 40 CFR § 51.309, and then to determine whether any of those additional recommendations could be practicably included in the First Period SIP. After this evaluation, none of the GCVTC's additional recommendations that were not already incorporated into 40 CFR § 51.309 were included in the First Period SIP, which noted a lack of supporting modeling or technical guidance from WRAP necessary to evaluate the additional recommendations.

This situation has not changed as of the submittal of this Regional Haze SIPr Rd2 (2019-2028). Further, Albuquerque-Bernalillo County is proposing that this Regional Haze SIPr Round 2 (2019-2028) be adopted under Section 308, with an accordingly different process for assessing potential new control measures necessary to make reasonable progress at Class I Areas potentially affected by Albuquerque-

[114] These requirements are codified in NMSA 1978 § 62-15-34 (setting renewable energy portfolio requirements for rural electric cooperatives); NMSA 1978 § 62-16-4 (setting renewable energy portfolio requirements for publicly owned utilities). Although the state legislature has amended these statutes several times during the first and second Regional Haze planning periods, these amendments did not change the obligation of publicly owned electric utilities and rural electric cooperatives to meet the retail electricity sale requirements for 2015 and 2020 noted above.

[115] *Id*.

[116] 40 CFR § 51.309(d)(9).

Bernalillo County emissions.[117] Therefore, this Regional Haze SIPr Round 2 (2019-2028) will not further evaluate the additional recommendations of the GCVTC.

This control measure was limited to the first planning period and will not be further addressed in this Regional Haze SIPr Round 2 (2019-2028) or in subsequent progress reports.

5.4 Summary of Emission Reductions Achieved by Control Measure Implementation

The progress report must provide: *"A summary of the emissions reductions achieved throughout the State through implementation of the measures described in [40 CFR § 51.308(g)(1)."*[118]

To analyze emission reductions achieved through the first planning period, EHD looked at WRAP TSS data from 2002 to 2018, including the 2002-2016 dynamic model evaluation emissions as well as the 2014-2018 representative base (rep base)[119], relying primarily on the 2014-2018 rep base.

This Section relies on the WRAP data presented in Section 5.5 to provide a summary of the emissions reductions achieved throughout Albuquerque - Bernalillo County by implementing the control measures described in Section 0.

5.4.1 SO_2 Milestone and Backstop Trading Program

Emission reductions attributable to this control measure were addressed in Section 5.3.1 – ***SO_2 Milestone and Backstop Trading Program***.

5.4.2 Mobile Sources

As discussed in Section 5.3.5 – ***Mobile Sources***, Section 309 required an interim report in the year 2018 on the status of regional and local control strategies for mobile sources. This Section presents data from WRAP consistent with a decline in mobile source emissions over the period 2003 to 2018.

Table 5-3 presents data from WRAP on emissions of sulfur dioxide, nitrogen oxides, volatile organic compounds, fine particulate matter, primary organic aerosols, and elemental carbon over the period 2000 to 2013 for the combined source categories of on-road mobile and off-road mobile. Table 5-4 presents data from WRAP on emissions of SO2, NOx, VOCs, and $PM_{2.5}$ over the period 2014 to 2018 for the combined source categories of on-road mobile and non-road mobile. The differences in WRAP's emission inventory methodology for these periods are explained in Section 5.5, Assessment of Visibility Conditions.

[117] As noted earlier, in the preamble to the January 10, 2017 Regional Haze Rule, EPA clarified that future periodic comprehensive SIP revisions and progress reports from the Section 309 states will be subject to the requirements of Section 308.
[118] 40 CFR § 51.308(g)(2).
[119] https://views.cira.colostate.edu/tssv2/Docs/WRAP_TSS_modeling_reference_final_20210930.pdf

Table 5-3 Albuquerque - Bernalillo County mobile source emissions (On-Road Mobile and Off-Road Mobile) from 2000 through 2013

Year	SO_2 (TPY)	NOx (TPY)	VOCs (TPY)	Fine Particulate Matter (TPY)	Primary Organic Aerosols (TPY)	Elemental Carbon (TPY)
2002	668	19,245	13,260	0	248	341
2008	158	14,540	8,314	55	361	545
2011	59	10,948	6,433	43	353	288

Table 5-4 Albuquerque - Bernalillo County mobile source emissions (On-Road Mobile, Marine Shipping, Rail, and Non-Road Mobile) from 2014 through 2018

Year	SO_2 (TPY)	NOx (TPY)	VOCs (TPY)	$PM_{2.5}$ (TPY)
2014-2018	52.1	11,555.1	6,226.9	518.5

The data above demonstrate a general trend of decreasing mobile source emissions for the above contaminants since 2000. The Inspection and Maintenance (I/M) Program for Albuquerque-Bernalillo County, which began in 1983, likely contributed to this overall reduction along with more efficient fuel combustion and educational outreach.

As indicated by these emission trends, more work remains in order to further reduce pollution from mobile sources. Because two major interstate highways cross through Bernalillo County, it can be difficult to pinpoint the amount of mobile source emissions originating in Bernalillo County. Additionally, as described later in this SIPr, both Albuquerque-Bernalillo County and the rest of the state adopted the latest Advanced Clean Vehicle standards pursuant to Section 177 of the CAA, which is expected to further reduce emissions from mobile sources into the future.

5.4.3 Fire/Smoke Management

Emission reductions and strategies attributable to this control measure were addressed in Section 5.3.6 –***Fire/Smoke Management***.

5.4.4 Fugitive and Unpaved Road Dust

As discussed in Section 5.3.7 - Fugitive and Unpaved Road Dust, regional-scale dust emissions for the purpose of the Regional Haze Rule were determined to not be a significant contributor to visibility impairment within the 16 Colorado Plateau Class I Areas. The following information is presented for context.

Table 5- presents data from the WRAP on emissions of coarse particulate matter, fine particulate matter, primary organic aerosols, and elemental carbon over the period of years 2000 through 2013 for the combined source categories of On-Road Mobile and Off-Road Mobile. *Table 5-6* presents data from the WRAP on emissions of PM_{10} and $PM_{2.5}$ over the period of years 2014 through 2018 for the combined source categories of On-Road Mobile and Non-Road Mobile.

Table 5-5 Albuquerque - Bernalillo County mobile source emissions (On-Road Mobile and Off-Road Mobile) from 2000 through 2013

Year	Coarse Particulate Matter (TPY)	Fine Particulate Matter (TPY)	Primary Organic Aerosols (TPY)	Elemental Carbon (TPY)
2002	97	0	248	341
2008	478	55	361	545
2011	139	43	353	288

Table 5-6 Albuquerque - Bernalillo County mobile source emissions (On-Road Mobile and Non-Road Mobile) from 2014 through 2018

Year	PM_{10} (TPY)	$PM_{2.5}$ (TPY)
2014-2018	808.7	518.5

5.4.5 Pollution Prevention - Renewable Energy Goals

As discussed in Section 5.2 - ***Pollution Prevention - Renewable Energy Goals***, the State of New Mexico and Albuquerque - Bernalillo County have dramatically expanded their use of renewable energy. This section presents data from the WRAP on Albuquerque - Bernalillo County's emissions of sulfur dioxide and nitrogen oxides from point sources over the period of years 2000 through 2018 to provide context for the ongoing transition to renewable energy sources.

Table 5-7 presents data from WRAP on emissions of sulfur dioxide and nitrogen oxides over the period of 2000 through 2013 for the Point source category. *Table* presents data from the WRAP on emissions of sulfur dioxide and nitrogen oxides over the period of 2014 through 2018 for the EGU Point, Oil & Gas Point, and Remaining Non-EGU Point source categories.

As shown below, downward trends in NOx and SO2 point source emissions suggest a possible decreasing reliance on fossil fuel powered electricity over time. Increased energy efficiency measures could also have played a role in these trends.

Table 5-7 Albuquerque - Bernalillo County point source emissions over the period of years 2000 through 2013

Year	SO_2 (TPY)	NOx (TPY)
2002	1,167	2,282
2008	107	1,651
2011	761	1,492

Table 5-8 Albuquerque - Bernalillo County point source emissions (EGU Point, Oil & Gas Point, and Remaining Non-EGU Point) over the period of years 2014 through 2018

Year	SO_2 (TPY)	NOx (TPY)
2014-2018	460.2	2320.4

More broadly statewide, in 2022 wind energy accounted for 35% of New Mexico's total in-state electricity generation, surpassing coal for the first time. At the beginning of 2023, the state ranked ninth in the nation in wind capacity with approximately 4,400 megawatts installed.[120] In 2022, renewable resources accounted for the largest share – about 42% - of New Mexico's in-state electricity generation from utility-scale (1 megawatt or larger) and small-scale (less than 1 megawatt) facilities combined.[121]

In Bernalillo County, electricity usage from renewable energy in the years 2017-2024 consisted of 635,540,146.20 kWh and solar production itself 48,866,260 kWh[122]. EHD is currently processing a

[120] U.S. Energy Information Administration, New Mexico State Profile and Energy Estimates (last updated May 18, 2023), available at https://www.eia.gov/state/analysis.php?sid=NM, accessed September 28, 2023.
[121] Id.
[122] City of Albuquerque BRAIN real time data; PNM Accounts

permit for Maxeon, a solar panel manufacturing facility. Overall, the county is seeing more momentum toward renewable energy each year.

Due to the nature of the renewable energy goals requirement being implemented at a state level, this section is presented in the context of New Mexico as a whole, and not just Bernalillo County.

5.5 Assessment of Visibility Conditions

The progress report requirement is as follows: *"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, least impaired and/or clearest days as applicable expressed in terms of 5-year averages of these annual values. The period for calculating current visibility conditions is the most recent 5-year period preceding the required date of the progress report for which data are available as of a date 6 months preceding the required date of the progress report."*[123]

The visibility conditions and changes to be assessed depend when the progress report is due; progress reports due before January 31, 2025 must assess "The current visibility conditions for the most impaired and least impaired days,"[124]; "[t]he difference between current visibility conditions for the most impaired and least impaired days and baseline visibility conditions,"[125]; and "[t]he change in visibility impairment for the most impaired and least impaired days over the period since the period addressed in the most recent plan required under [40 CFR § 51.308(f)],"[126].

The material presented in Chapter 3 of this Regional Haze SIPr Rd 2 (2019-2028) addresses these progress report requirements. Table 5-9 provides a comparison of these requirements and the sections and tables of Chapter 3 that address them.

Table 5-9: Embedded Progress Report Requirement to Chapter 3 Crosswalk

Embedded Progress Report Requirement	Chapter 3 Section and Matching Requirement	Chapter 3 Table
40 CFR § 51.308(g)(3)(i) The current visibility conditions for the most impaired and least impaired days	3.2 Trends in Visibility Conditions: Current (2014-2018) visibility for the most impaired and clearest days (40 CFR § 51.308(f)(1)(iii))	Table 3-2: Visibility Conditions by Time Period, 20% Most Impaired Days (in dv) and Table 3-3: Visibility Changes by Time Period, 20% Clearest Days (in dv) - Current Period Visibility (2014-2018 avg.)
40 CFR § 51.308(g)(3)(ii) The difference between current visibility conditions for the most impaired and	3.2 Trends in Visibility Conditions: Progress to date for the most impaired and	Table 3-2 and Table 3-3 - Change from Baseline Period to Current Period

[123] 40 CFR § 51.308(g)(3).
[124] 40 CFR § 51.308(g)(3)(i)(A).
[125] 40 CFR § 51.308(g)(3)(ii)(A).
[126] 40 CFR § 51.308(g)(3)(iii)(A).

Embedded Progress Report Requirement	Chapter 3 Section and Matching Requirement	Chapter 3 Table
least impaired days and baseline visibility conditions.	clearest days (40 CFR § 51.308(f)(1)(iv))	
40 CFR § 51.308(g)(3)(iii) The change in visibility impairment for the most impaired and least impaired days over the period since the period addressed in the most recent plan required under [40 CFR § 51.308(f)].	3.2 Trends in Visibility Conditions: Progress to date for the most impaired and clearest days (40 CFR § 51.308(f)(1)(iv))	Table 3-2 and Table 3-3 - Change from Interim Period to Current Period

5.6 Analysis Tracking the Change in Emissions Contributing to Visibility Impairment from all Sources and Activities within the State over Time

The progress report must provide: "An analysis tracking the change over the period since the period addressed in the most recent plan required under [40 CRF § 51.308(f)] 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. With respect to all sources and activities, the analysis must extend at least through the most recent year for which the state has submitted emission inventory information to the Administrator in compliance with the triennial reporting requirements of Subpart A of [40 CFR Part 51] as of a date six months preceding the required date of the progress report.

With respect to sources that report directly to a centralized emissions data system operated by the Administrator, the analysis must extend through the most recent year for which the Administrator has provided a State-level summary of such reported data or an internet-based tool by which the State may obtain such a summary as of a date six months preceding the required date of the progress report. The State is not required to backcast previously reported emissions to be consistent with more recent emissions estimation procedures, and may draw attention to actual or possible inconsistencies created by changes in estimation procedures."[127]

This Section presents an analysis of emissions of haze causing pollutants in Albuquerque-Bernalillo County over time, by type of source or activity, using data provided by the WRAP. EPA's April 2013 *General Principles for the 5-Year Regional Haze Progress Reports for the Initial Regional Haze State Implementation Plans* states that the reports should, ideally, present the most recent available data for emissions inventories performed five years apart, or as approximate as practicable given the methodology and availability of emissions inventories.[128]

This Regional Haze SIPr Round 2 (2019-2028) uses WRAP 2002 data to represent the 2000-2004 baseline period meteorological and emissions data, WRAP 2008 data to represent the 2005-2009 progress period meteorological and emissions data, WRAP 2011 data to represent the 2010-2013 progress period meteorological and emissions data, and WRAP 2014 data to represent the 2014-2018 progress period

[127] 40 CFR § 51.308(g)(4).

[128] EPA, General Principles for the 5-Year Regional Haze Progress Reports for the Initial Regional Haze State Implementation Plans, April 2013 ("EPA 2013 Guidance"), pp. 11-12.

meteorological and emissions data.[129] Collectively, then, this Section will present WRAP data that is the most recent available and that covers the most recent period of approximately five years for which data is available in practical terms (2014 to 2018).

The WRAP data for 2002, 2008, and 2011 describe emissions inventories for the following pollutants: sulfur dioxide, nitrogen oxides, ammonia, volatile organic compounds, coarse particulate matter,[130] fine particulate matter,[131] primary organic aerosols,[132] and elemental carbon.[133] The WRAP data for 2014 describes emissions inventories for the following pollutants: sulfur dioxide, oxides of nitrogen, ammonia gas,[134] volatile organic compounds, PM_{10}, and $PM_{2.5}$. Changes in estimation procedures for the 2014 WRAP data mean that the pollutants coarse particulate matter, fine particulate matter, primary organic aerosols, and elemental carbon were not individually included.

Instead, emissions inventories were included for PM_{10} and $PM_{2.5}$. Additionally, changes in estimation procedures for the 2014 WRAP data mean that the other pollutants - sulfur dioxide, nitrogen oxides, ammonia, and volatile organic compounds - are also not comparable to WRAP data for earlier periods. This Regional Haze SIPr Rd 2 (2019-2028) will not backcast previously reported emissions to be consistent with more recent emissions estimation procedures, nor will it speciate PM_{10}, and $PM_{2.5}$ into coarse particulate matter, fine particulate matter, primary organic aerosols, and elemental carbon.

Table 5-10 through Table 5-23, below, present the 2002, 2008, 2011, and 2014 WRAP data for the pollutants sulfur dioxide, nitrogen oxides, ammonia gas, volatile organic compounds, coarse particulate matter, PM_{10}, fine particulate matter, primary organic aerosols, elemental carbon, and $PM_{2.5}$ for all anthropogenic source categories. Collectively, this data covers the years 2000 through 2018. All values

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[129] On the methodology for WRAP emissions inventories, see, for example, Zac Adelman and B.H. Baek, Three-State Air Quality Modeling Study Emissions Modeling Report: Simulation Years 2008 and 2011 (University of North Carolina at Chapel Hill, Institute for the Environment and ENVIRON Corporation), available by contacting the WRAP, http://wrapair2.org/; Cyndi Loomis, Zac Adelman, and Ralph Morris, Technical Memorandum No. 1: Point Source Emissions (March 15, 2013) (addressing the subject of "Point Source Emissions, including Electricity Generating Units (EGUs) and non EGUs, for the WestJumpAQMS 2008 Photochemical Modeling"), available at http://www.wrapair2.org/pdf/Memo1_PointSources_Mar15_2013final.pdf; Mobile Source Emissions (June 2011) (addressing the mobile source inventory scope and methodology) available at http://vista.cira.colostate.edu/docs/wrap/emissions/TSS%20Mobile%20Emissions%20June%202011.doc; Run Specification Sheet: Representative Baseline and 2028 On-The-Books CAMx Simulations (February 27, 2020) (addressing the inputs for developing domains that are representative of the 2014-2018 period) available at https://views.cira.colostate.edu/docs/iwdw/platformdocs/WAQS_2014/Run_Spec_WRAP_2014_Task2.3-RepBase_Task%204.4-2028_CAMx_v3.pdf.

[130] 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 coarse mass. WRAP 2013 Summary Report, p. 6-223.

[131] Fine soil is reported here as the crustal or soil components of $PM_{2.5}$. WRAP 2013 Summary Report, p. 6-223.

[132] Primary organic aerosols represent organic aerosols that are emitted directly as particles, as opposed to gases. Wildfires in the west generally dominate primary organic aerosol emissions, and large wildfire events are generally sporadic and highly variable from year-to-year. WRAP 2013 Summary Report, p. 6-223.

[133] Large elemental carbon events are often associated with large particulate organic matter events during wildfires. Other sources include both on- and off-road diesel engines. WRAP 2013 Summary Report, p. 6-223.

[134] Despite a change in nomenclature from "ammonia" in the 2002, 2008, and 2011 WRAP emissions inventories to "ammonia gas" in the 2014 WRAP emission inventory, all of the emissions inventories are reporting on the pollutant "ammonia gas", with a chemical composition of NH_3.

in the below tables are rounded to the nearest whole number, meaning that some results may show an emissions amount of zero.

Sulfur dioxide emissions 2000 - 2018

Table 5-10 Albuquerque - Bernalillo County sulfur dioxide emissions 2000 - 2013

Source Category	Sulfur Dioxide Emissions (tons/year)[135]		
	2002 (Plan02d)	2008 (WestJump08c)	2011 (IWDW-2011)
Point	1,167	107	761
Area	2,937	26	430
On-Road Mobile	396	105	52
Off-Road Mobile	272	53	7
Area Oil and Gas	0	0	0
Fugitive and Road Dust	0	0	0
Anthropogenic Fire	0	0	0
Total Anthropogenic	**4,772**	**291**	**1,250**

Table 5-11 Albuquerque - Bernalillo County sulfur dioxide emissions 2014 - 2018

Source Category	Sulfur Dioxide Emissions (tons/year) 2014 (RepBase2)[136]
Fugitive Dust	0.00
Agriculture	0.00
Agricultural Fire	0.02
Commercial Marine C1, C2, C3	0.00
Remaining Nonpoint	378.42
Nonroad Mobile	4.9
Oil and Gas Nonpoint	0.00
Onroad Mobile	47.2
Oil and Gas Point	0.00
EGU Point	1.6
Industrial Point	458.6
Rail	0.00
Residential Wood Combustion	4.2
Wildland Prescribed Fire	7.8
Total Anthropogenic	**872.72**

[135] For 2002, 2008, and 2011 Sulfur Dioxide Emissions, WRAP Technical Support System ("TSS") (ARCHIVED), http://vista.cira.colostate.edu/TSS/Results/HazePlanning.aspx (click on the picture below "Emissions and Source Apportionment," then click on "Emissions Review Tool," then select "Sulfur Dioxide" in the Parameter field, the appropriate emissions scenario in the Emissions Scenario field, the appropriate source category in the Source Category field, "NM - New Mexico" in the State/Region field, and "Bernalillo" in the County/Subregion field, then select "+ Show Data" under the resulting figure).

[136] WRAP TSS

Nitrogen oxides emissions 2000 - 2018

Table 5-12 Albuquerque - Bernalillo County nitrogen oxides emissions 2000 - 2013

Source Category	Nitrogen Oxides Emissions (tons/year)[137]		
	2002 (Plan02d)	2008 (WestJump08c)	2011 (IWDW-2011)
Point	2,282	1,651	1,492
Area	12,118	768	2,325
On-Road Mobile	16,212	11,842	8,662
Off-Road Mobile	3,033	2,698	2,286
Area Oil and Gas	14	0	0
Fugitive and Road Dust	2	0	7
Anthropogenic Fire	0	1	0
Total Anthropogenic	**33,661**	**16,960**	**14,772**

Table 5-13 Albuquerque - Bernalillo County nitrogen oxides emissions 2014 - 2018

Source Category	Nitrogen Oxides Emissions (tons/year) 2014-2018 (RepBase2)[138]
Fugitive Dust	0.00
Agriculture	0.00
Agricultural Fire	0.09
Commercial Marine C1, C2, C3	0.00
Remaining Nonpoint	4,737.1
Nonroad Mobile	1,991
Oil and Gas Nonpoint	0.00
Onroad Mobile	9,564.1
Oil and Gas Point	0.00
EGU Point	337.7
Industrial Point	1982.7
Rail	0.00
Residential Wood Combustion	29.4
Wildland Prescribed Fire	7.4
Total Anthropogenic	**18,648,7**

[137] For 2002, 2008, and 2011 Nitrogen Oxides Emissions, WRAP TSS (ARCHIVED), http://vista.cira.colostate.edu/TSS/Results/HazePlanning.aspx (click on the picture below "Emissions and Source Apportionment," then click on "Emissions Review Tool," then select "Nitrogen Oxides (gas and particulate)" in the Parameter field, the appropriate emissions scenario in the Emissions Scenario field, the appropriate source category in the Source Category field, "NM - New Mexico" in the State/Region field, and "Bernalillo" in the County/Subregion field, then select "+ Show Data" under the resulting figure).

[138] For 2014 Nitrogen Oxides Emissions, WRAP TSSv2, https://views.cira.colostate.edu/tssv2/Express/EmissionsTools.aspx (in the "Emissions Data Analysis - Tables" section, Row 2: "County-level summary table," select the filters "New Mexico" for the State, "Bernalillo" for the County, and "NOx" for the Parameter, then select the action "Submit" to open the results in a new tab. Review the results in the "RepBase2" column for each source category).

Ammonia gas emissions 2000 - 2018

Table 5-14 Albuquerque - Bernalillo County ammonia gas emissions 2000 - 2013

Source Category	Ammonia Gas Emissions (tons/year)[139]		
	2002 (Plan02d)	2008 (WestJump08c)	2011 (IWDW-2011)
Point	24	2	2
Area	846	626	470
On-Road Mobile	527	224	207
Off-Road Mobile	3	3	3
Area Oil and Gas	0	0	0
Fugitive and Road Dust	0	0	0
Anthropogenic Fire	0	1	0
Total Anthropogenic	**1,400**	**856**	**682**

Table 5-15 Albuquerque - Bernalillo County ammonia gas emissions 2014 - 2018

Source Category	Ammonia Gas Emissions (tons/year) 2014-2018 (RepBase2)[140]
Fugitive Dust	0.00
Agriculture	98
Agricultural Fire	0.3
Commercial Marine C1, C2, C3	0.00
Remaining Nonpoint	244.1
Nonroad Mobile	4.1
Oil and Gas Nonpoint	0.00
Onroad Mobile	172.9
Oil and Gas Point	0.00
EGU Point	4.5
Industrial Point	7
Rail	0.00
Residential Wood Combustion	12.6
Wildland Prescribed Fire	17.5
Total Anthropogenic	**561.00**

[139] For 2002, 2008, and 2011 Ammonia Gas Emissions, WRAP TSS (ARCHIVED), http://vista.cira.colostate.edu/TSS/Results/HazePlanning.aspx (click on the picture below "Emissions and Source Apportionment," then click on "Emissions Review Tool," then select "Ammonia" in the Parameter field, the appropriate emissions scenario in the Emissions Scenario field, the appropriate source category in the Source Category field, "NM - New Mexico" in the State/Region field, and "Bernalillo" in the County/Subregion field, then select "+ Show Data" under the resulting figure).

[140] For 2014 Ammonia Gas Emissions, WRAP TSSv2, https://views.cira.colostate.edu/tssv2/Express/EmissionsTools.aspx (in the "Emissions Data Analysis - Tables" section, Row 2: "County-level summary table," select the filters "New Mexico" for the State, "Bernalillo" for the County, and "NH3" for the Parameter, then select the action "Submit" to open the results in a new tab. Review the results in the "RepBase2" column for each source category).

Volatile organic compound emissions 2000 - 2018

Table 5-16 Albuquerque - Bernalillo County volatile organic compound emissions 2000 - 2013

Source Category	Volatile Organic Compound Emissions (tons/year)[141]		
	2002 (Plan02d)	2008 (WestJump08c)	2011 (IWDW-2011)
Point	297	491	496
Area	11,904	10,332	7,645
On-Road Mobile	9,871	5,625	4,019
Off-Road Mobile	3,389	2,689	2,414
Area Oil and Gas	112	0	0
Fugitive and Road Dust	0	0	0
Anthropogenic Fire	0	2	0
Total Anthropogenic	**25,573**	**19,139**	**14,574**

Table 5-17 Albuquerque - Bernalillo County volatile organic compound emissions 2014 - 2018

Source Category	Volatile Organic Compound Emissions (tons/year) 2014-2018 (RepBase2)[142]
Fugitive Dust	0.00
Agriculture	10.5
Agricultural Fire	0.2
Commercial Marine C1, C2, C3	0.00
Remaining Nonpoint	9,274.2
Nonroad Mobile	1,625.5
Oil and Gas Nonpoint	0.00
Onroad Mobile	4,601.4
Oil and Gas Point	0.00
EGU Point	4.8
Industrial Point	591.2
Rail	0.00
Residential Wood Combustion	267.2
Wildland Prescribed Fire	353.8
Total Anthropogenic	**16,739.5**

[141] For 2002, 2008, and 2011 Volatile Organic Compound Emissions, WRAP TSS (ARCHIVED), http://vista.cira.colostate.edu/TSS/Results/HazePlanning.aspx (click on the picture below "Emissions and Source Apportionment," then click on "Emissions Review Tool," then select "Volatile Organic Compounds" in the Parameter field, the appropriate emissions scenario in the Emissions Scenario field, the appropriate source category in the Source Category field, "NM - New Mexico" in the State/Region field, and "Bernalillo" in the County/Subregion field, then select "+ Show Data" under the resulting figure).

[142] For 2014 Volatile Organic Compound Emissions, WRAP TSSv2, https://views.cira.colostate.edu/tssv2/Express/EmissionsTools.aspx (in the "Emissions Data Analysis - Tables" section, Row 2: "County-level summary table," select the filters "New Mexico" for the State, "Bernalillo" for the County, and "VOC" for the Parameter, then select the action "Submit" to open the results in a new tab. Review the results in the "RepBase2" column for each source category).

Coarse particulate matter emissions 2000 - 2013

Table 5-18 Albuquerque - Bernalillo County coarse particulate matter emissions 2000 - 2013

Source Category	Coarse Particulate Matter Emissions (tons/year)[143]		
	2002 (Plan02d)	2008 (WestJump08c)	2011 (IWDW-2011)
Point	332	992	77
Area	162	19	195
On-Road Mobile	97	466	127
Off-Road Mobile	0	12	12
Area Oil and Gas	0	0	0
Fugitive and Road Dust	16,095	35,493	56,244
Anthropogenic Fire	0	0	0
Total Anthropogenic	**16,686**	**36,982**	**56,655**

PM_{10} emissions 2014 - 2018

Table 5-19 Albuquerque - Bernalillo County PM_{10} emissions 2014 - 2018

Source Category	PM_{10} Emissions (tons/year) 2014-2018 (RepBase2)[144]
Fugitive Dust	22,805.6
Agriculture	0.00
Agricultural Fire	0.7
Commercial Marine C1, C2, C3	0.00
Remaining Nonpoint	1,071.8
Nonroad Mobile	248.5
Oil and Gas Nonpoint	0.00
Onroad Mobile	560.2
Oil and Gas Point	0.00
EGU Point	9.1
Industrial Point	394.9
Rail	0.00
Residential Wood Combustion	240
Wildland Prescribed Fire	120
Total Anthropogenic	**25,450.8**

[143] For 2002, 2008, and 2011 Coarse Particulate Matter Emissions, WRAP TSS (ARCHIVED), http://vista.cira.colostate.edu/TSS/Results/HazePlanning.aspx (click on the picture below "Emissions and Source Apportionment," then click on "Emissions Review Tool," then select "Coarse Particulate Matter" in the Parameter field, the appropriate emissions scenario in the Emissions Scenario field, the appropriate source category in the Source Category field, "NM - New Mexico" in the State/Region field, and "Bernalillo" in the County/Subregion field, then select "+ Show Data" under the resulting figure).

[144] For 2014 PM_{10} Emissions, WRAP TSSv2, https://views.cira.colostate.edu/tssv2/Express/EmissionsTools.aspx (in the "Emissions Data Analysis - Tables" section, Row 2: "County-level summary table," select the filters "New Mexico" for the State, "Bernalillo" for the County, and "PM10" for the Parameter, then select the action "Submit" to open the results in a new tab. Review the results in the "RepBase2" column for each source category).

Fine particulate matter emissions 2000 - 2013

Table 5-20 Albuquerque - Bernalillo County fine particulate matter emissions 2000 - 2013

Source Category	Fine Particulate Matter Emissions (tons/year)[145]		
	2002 (Plan02d)	2008 (WestJump08c)	2011 (IWDW-2011)
Point	20	1	65
Area	503	268	42
On-Road Mobile	0	48	43
Off-Road Mobile	0	7	0
Area Oil and Gas	0	0	0
Fugitive and Road Dust	1,706	3,787	5,627
Anthropogenic Fire	0	1	0
Total Anthropogenic	**2,229**	**4,112**	**5,777**

Primary organic aerosol emissions 2000 - 2013

Table 5-21 Albuquerque - Bernalillo County primary organic aerosol emissions 2000 - 2013

Source Category	Primary Organic Aerosol Emissions (tons/year)[146]		
	2002 (Plan02d)	2008 (WestJump08c)	2011 (IWDW-2011)
Point	10	1	30
Area	507	647	1,453
On-Road Mobile	156	255	163
Off-Road Mobile	92	106	190
Area Oil and Gas	0	0	0
Fugitive and Road Dust	104	263	762
Anthropogenic Fire	0	2	0
Total Anthropogenic	**869**	**1,274**	**2,598**

Elemental carbon emissions 2000 - 2013

Table 5-22 Albuquerque - Bernalillo County elemental carbon emissions 2000 - 2013

Source Category	Elemental Carbon Emissions (tons/year)[147]

[145] For 2002, 2008, and 2011 Fine Particulate Matter Emissions, WRAP TSS (ARCHIVED), http://vista.cira.colostate.edu/TSS/Results/HazePlanning.aspx (click on the picture below "Emissions and Source Apportionment," then click on "Emissions Review Tool," then select "Fine Particulate Matter" in the Parameter field, the appropriate emissions scenario in the Emissions Scenario field, the appropriate source category in the Source Category field, "NM - New Mexico" in the State/Region field, and "Bernalillo" in the County/Subregion field, then select "+ Show Data" under the resulting figure).

[146] For 2002, 2008, and 2011 Primary Organic Aerosol Emissions, WRAP TSS (ARCHIVED), http://vista.cira.colostate.edu/TSS/Results/HazePlanning.aspx (click on the picture below "Emissions and Source Apportionment," then click on "Emissions Review Tool," then select "Primary Organic Aerosol" in the Parameter field, the appropriate emissions scenario in the Emissions Scenario field, the appropriate source category in the Source Category field, "NM - New Mexico" in the State/Region field, and "Bernalillo" in the County/Subregion field, then select "+ Show Data" under the resulting figure).

[147] For 2002, 2008, and 2011 Elemental Carbon Emissions, WRAP TSS (ARCHIVED), http://vista.cira.colostate.edu/TSS/Results/HazePlanning.aspx (click on the picture below "Emissions and Source

	2002 (Plan02d)	2008 (WestJump08c)	2011 (IWDW-2011)
Point	0	1	20
Area	57	62	80
On-Road Mobile	170	407	164
Off-Road Mobile	171	138	124
Area Oil and Gas	0	0	0
Fugitive and Road Dust	7	5	8
Anthropogenic Fire	0	0	0
Total Anthropogenic	**405**	**613**	**396**

$PM_{2.5}$ emissions 2014 - 2018

Table 5-23 Albuquerque - Bernalillo County $PM_{2.5}$ emissions 2014 - 2018

Source Category	$PM_{2.5}$ Emissions (tons/year) 2014-2018 (RepBase2)[148]
Fugitive Dust	2,478.7
Agriculture	0.00
Agricultural Fire	0.5
Commercial Marine C1, C2, C3	0.00
Remaining Nonpoint	801.8
Nonroad Mobile	236.4
Oil and Gas Nonpoint	0.00
Onroad Mobile	282.1
Oil and Gas Point	0.00
EGU Point	9.1
Industrial Point	166.8
Rail	0.00
Residential Wood Combustion	239.6
Wildland Prescribed Fire	106.1
Total Anthropogenic	**4,321.1**

5.7 Assessment of Significant Changes in Anthropogenic Emissions from Within or Outside the State

The progress report must provide: *"An assessment of any significant changes in anthropogenic emissions within or outside the State that have occurred since the period addressed in the most recent plan required under [40 CFR § 51.308(f)] including whether or not these changes in anthropogenic emissions*

Apportionment," then click on "Emissions Review Tool," then select "Elemental Carbon" in the Parameter field, the appropriate emissions scenario in the Emissions Scenario field, the appropriate source category in the Source Category field, "NM - New Mexico" in the State/Region field, and "Bernalillo" in the County/Subregion field, then select "+ Show Data" under the resulting figure).

[148] For 2014 $PM_{2.5}$ Emissions, WRAP TSSv2, https://views.cira.colostate.edu/tssv2/Express/EmissionsTools.aspx (in the "Emissions Data Analysis - Tables" section, Row 2: "County-level summary table," select the filters "New Mexico" for the State, "Bernalillo" for the County, and "PM25" for the Parameter, then select the action "Submit" to open the results in a new tab. Review the results in the "RepBase2" column for each source category).

were anticipated in that most recent plan and whether they have limited or impeded progress in reducing pollutant emissions and improving visibility."[149]

Changes in emission trends as shown by the 2002-2016 dynamic eval modeling data and the 2014-2018 RepBase2 data are generally consistent with what was anticipated in the previous plan, which predicted SO_2 from major sources to decline in accordance with the milestone program, and the trends in NOx and PM to show a decline. While there has been some rise in NOx emissions from the 2014-2018 RepBase2 data (which can be explained by the changes in methodologies), the patterns generally have trended as predicted. Emissions from SO_2 in particular have continued to trend downward over the RepBase2 period (2014-2018).

Given that visibility data from IMPROVE monitors continue to stay below the glidepath, particularly for those areas with any noticeable impact from Albuquerque-Bernalillo County emissions, there is not enough information at this time to suggest that changes in emission patterns have "limited or impeded" visibility progress.

5.7.1 Significant emissions reductions

SO_2 Milestone and Backstop Trading Program

Figure 5-1: 2003 - 2021 SO_2 Milestones and Emission Trends, shows that the regional SO_2 emissions have always met the milestone since the inception of the SO_2 Milestone and Backstop Trading Program. *Table 5-1: 2014 - 2022 Regional SO_2 Milestones and Emission Trends in Section 309 States.*, further shows that participating states have held emissions below 60% of the milestone every year since 2014. Regional SO_2 emissions decreased from 92,553 tons in 2014 to 71,994 tons in 2018. Regional emissions subsequently decreased by an additional 11,983 tons to 60,011 tons in 2021.

Mobile Sources

Section 309 of the Regional Haze Rule required the First Period SIP to perform projections demonstrating a continuous decline in mobile source emissions[150] from 2003 to 2018. The data shown in Section 5.4.5 – ***Mobile Sources***, confirmed this overall decline.

Pollution Prevention - Renewable Energy Goals

Albuquerque-Bernalillo County and New Mexico Point Source emissions over the period of Years 2000-2013, and also from 2014-2018 have continued to decrease due, in part, to less reliance on fossil-fuel electricity generation over time.

5.7.2 Visibility trends from baseline period to 2018.

Chapter 3: Ambient Data Analysis, details all of the Regional Haze Rule requirements for visibility reporting at each of New Mexico's Class I Areas. From the 2000-2004 baseline period to the 2014-2018

[149] 40 CFR § 51.308(g)(5).

[150] For the Regional Haze Rule definition of the term "continuous decline in mobile source emissions," *see* 40 CFR § 309(b)(6). The "continuous decline" is a decline in "the projected level of emissions" from mobile sources, forecast to occur in the future, after submittal of the First Period SIP.

current period addressed in this progress report, most network sites showed improving visibility and progress toward the Regional Haze Rule goals of reducing impacts on the most impaired days while not backtracking during the clearest days.

A progress report due before January 31, 2025, will further assess "[t]he current visibility conditions for the most impaired and least impaired days."[151]

[151] 40 CFR § 51.308(g)(3)(i)(A).

Chapter 6: Selection of Sources for Control Measures Analysis

The Regional Haze Rule requires that each state select emission sources for an analysis for potential new emission reduction measures that may be cost-effective to implement at the source.[152] The City of Albuquerque Environmental Health Department (EHD) conducted a two-tiered source selection process in coordination with the New Mexico Environment Department (NMED) on a statewide basis, excluding Tribal jurisdictions. The two-tiered source selection was based on guidance from the U.S. Environmental Protection Agency (EPA) and the Western Regional Air Partnership (WRAP). This chapter describes the methods and results which identified 24 facilities (tier one), and at least 133 individual pieces of equipment or emission release points at those 24 facilities with the potential to emit sulfur dioxide (SO_2) and/or nitrogen oxides (NO_X) in quantities above EHD and NMED's threshold for requiring an analysis of potential new emission reduction measures (tier two).

6.1 Regional Haze Rule Regulatory Requirements

- A Regional Haze State Implementation Plan (SIP) must "evaluate and determine the emission reduction measures that are necessary to make reasonable progress" at Class I Areas.[153]
- The SIP's evaluation of emission reduction measures "should consider evaluating major and minor stationary sources or groups of sources, mobile sources, and area sources."[154]
- The SIP must include "a description of the criteria it used to determine which sources or groups of sources it evaluated" that would be subject to analysis for potential new control measures.[155]

6.2 Tier One Q/d Assessment for Selecting New Mexico Facilities for Control Measures Analysis

For tier one of the source selection process, EHD and NMED utilized the Q/D method, based on recommendations from the WRAP. This method sums up the quantity of aerosol precursor pollutants emitted by the facility (NO_X plus SO_2) and divides it by the distance from the facility to the nearest Class I Area. This provides a screening-level estimate of the potential for pollutants from the facility to impact the Class I Area. The WRAP recommendations (hereinafter, the "WRAP Source Selection Protocol") were completed in February 2019 and subsequently approved by consensus by WRAP's Regional Haze Planning Work Group.[156] A contractor (Ramboll) then developed a database application for facilitating regionally-consistent western U.S. Regional Haze source screening to assist in determining which emission sources might potentially require Reasonable Progress controls.

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[152] 40 CFR § 51.308(f)(2)(i).
[153] Id.
[154] Id.
[155] Id.
[156] WRAP Regional Haze Planning Workgroup - Control Measures Subcommittee, WRAP Reasonable Progress Source Identification and Analysis Protocol for Second 10-Year Regional Haze State Implementation Plans, February 27, 2019. WRAP Regional Haze Planning Work Group consensus is documented at https://www.wrapair2.org/TSC_Docket.aspx.

NMED and EHD agreed upon a single, statewide procedure for tier one of the source selection process, based on the WRAP Source Selection Protocol. The procedure involved calculating Q/d scores for all New Mexico Title V facilities[157] and comparing them to a threshold value to identify facilities requiring an analysis of potential new emission reduction measures. NMED and EHD followed these steps to complete the tier one screening:

1. EHD and NMED calculated "Q" in the Q/d equation as the sum of annual reported NO_X and SO_2 emissions by Title V facilities for 2016.

    A. EHD and NMED chose NO_X and SO_2 as the targeted pollutants because monitoring data indicates that aerosol species related to emissions of these two precursor pollutants (i.e., ammonium nitrate and ammonium sulfate) are the key drivers of anthropogenic visibility impairment at Class I Areas, as described in Chapter 3 of this Regional Haze SIPr Rd 2 (2019-2028). EHD and NMED chose not to include PM_{10} or other pollutants in the Q component of the Q/d calculation (which the WRAP Source Selection Protocol had identified as potential candidates for the calculation) because emissions of those pollutants from Title V facilities would have been a negligible contributor to the overall Q/d score, based on the information available to NMED. Additionally, much of the contribution of species other than nitrates and sulfates at Class 1 Areas are not directly tied to anthropogenic sources.

    B. EHD and NMED chose the emissions reported by Title V facilities in 2016 as the basis for "Q" in the Q/d equation based in part on consultation with the Federal Land Managers, who used 2016 reported emissions as the basis for their own independent assessments of the potential visibility impacts of facilities. Additionally, EPA used reported 2016 emissions data as the basis for its own Regional Haze modeling of emissions and their potential visibility impacts.[158]

    C. Finally, EHD and NMED determined that 2016 reported emissions were sufficiently representative of recent emissions of NO_X and SO_2 for Title V facilities in New Mexico for purposes of assessing the potential visibility impacts of emissions from those facilities and selecting which would be subject to further analysis for potential control measures to reduce visibility impairing pollutants.

2. EHD and NMED calculated "d" in the Q/d equation as the distance in kilometers from the centroid of each facility to the boundary of the nearest Class I Area.

3. Using these "Q" and "d" values, EHD and NMED calculated Q/d scores for every Title V facility in the state, including in Albuquerque - Bernalillo County. EHD and NMED then identified a Q/d threshold necessary to capture 80% of the total NO_X and SO_2 emissions from all New Mexico Title V facilities combined. EHD and NMED chose this 80% threshold based on guidance in the WRAP Source Selection Protocol. The Protocol noted draft guidance from EPA[159] recommending an 80% threshold applied to emissions from all stationary sources. However, the Protocol

[157] A Title V facility is a major source requiring a Title V operating permit pursuant to 20.11.42 NMAC.
[158] Technical documentation for EPA's modeling is available at https://www.epa.gov/visibility/technical-support-document-epas-updated-2028-regional-haze-modeling (last accessed September 29, 2023).
[159] EPA, Draft Guidance on Progress Tracking Metrics, Long-term Strategies, Reasonable Progress Goals and Other Requirements for Regional Haze State Implementation Plans for the Second Implementation Period, July 2016.

recognized that emissions information for some types of stationary sources and area sources might be lacking in particular jurisdictions. In view of the lack of such information for minor stationary sources and area sources in EHD and NMED's jurisdictions,[160] EHD and NMED decided to conduct a source selection process for major (i.e. Title V) sources only[161], applying an 80% threshold to the sum of emissions from these sources. EHD and NMED consulted with Federal Land Managers on this approach and received a response that commended the source selection process and the collaboration[162].

6.3 Tier One Q/d Assessment Results – Selected Sources

EHD and NMED performed the state-level Q/d assessment in June 2019. As described above, the goal of the assessment was to identity the Title V facilities responsible for 80% of the total NO_X and SO_2 emissions from all New Mexico Title V facilities combined (i.e. adding the sum of those two pollutants together for all such facilities in the state), including facilities in Albuquerque - Bernalillo County. The assessment indicated that a Q/d threshold of 5.6 would achieve this goal. In all, 24 facilities had an individual Q/d score of 5.6 or greater. Therefore, EHD and NMED determined that those 24 facilities would each be required to perform a four-factor analysis (see Chapter 7) to assess potential new emission reduction measures that may be cost-effective to implement.

Several facilities selected to perform a four-factor analysis based on the Q/d assessment were nearest or in close proximity to Class I Areas in neighboring states (Mesa Verde National Park, CO and Guadalupe Mountains National Park, TX).

Table 6-1 provides a list of the 24 Title V facilities and information related to the Q/D assessment for each, including facility name; the Q/d score; 2016 emissions information ("Q" term); distance to the nearest Class I Area ("d" term); the name of the nearest Class I Area; and the Federal Land Manager (FLM) responsible for each Class I Area. The table ranks the Q/d scores from highest to lowest. Only one facility listed in the table is located in Albuquerque - Bernalillo County and is under EHD's jurisdiction- the GCC Tijeras Portland cement plant.

[160] EHD and NMED lack detailed emissions inventory data for minor stationary sources and area sources for the current Regional Haze planning period. Sufficient statewide data was not available to adequately assess the potential visibility impact of such sources at Class I Areas. Therefore, EHD and NMED chose not to evaluate minor stationary sources or area sources for potential new control measures. Minor stationary sources and area sources may be addressed in future planning periods or addressed through other rule makings.

[161] EPA has advised that States may assess some source types, but not others, for potential new control measures during any given planning period. The State may choose to leave some source types for control measures analysis in future planning periods. The Regional Haze Rule provides for "reasonable progress" in each planning period toward natural visibility conditions in 2064, thereby allowing an incremental, case-by-case approach to control measures analysis in each planning period, based on available information and circumstances particular to each state. *See* EPA Regional Haze Guidance, p. 9.

[162] See e-mail in Appendix D.

Table 6-1: Tier One Q/d Assessment Information for Facilities Selected to Perform a Four-Factor Analysis.[163]

Facility	Owner / Operator	Q/d score	2016 NO_X emissions (tons per year)	2016 SO_2 emissions (tons per year)	Q: combined 2016 NO_X + SO_2 emissions (tons per year)	d: distance to nearest Class I Area (kilometer)	Name of Nearest Class I Area	Land Management Agency
San Juan Generating Station	Public Service Co. of New Mexico	461.04	14,900.68	2923.10	17,823.78	38.66	Mesa Verde National Park (CO)	National Park Service
Bitter Lake Compressor Station	IACX Roswell, LLC	50.26	85.44	0	85.44	1.7	Salt Creek Wilderness Area (NM)	US Fish & Wildlife
Chaco Gas Plant	Enterprise Field Services	28.30	2258.9	11.80	2270.70	80.24	Mesa Verde National Park (CO)	National Park Service
Prewitt Escalante Generating Station	Tri State Generation and Transmission Association	26.11	2441.41	898.58	3339.99	127.91	San Pedro Parks Wilderness Area (NM)	US Forest Service
Washington Ranch Storage Facility	El Paso Natural Gas Co.	23.58	74.88	1.29	76.17	3.23	Carlsbad Caverns National Park (NM)	National Park Service
Jal No 3 Gas Plant	ETC Texas Pipeline Ltd.	20.54	345.97	1967.90	2313.87	112.67	Carlsbad Caverns National Park (NM)	National Park Service
Monument Gas Plant	Targa Midstream Services	20.40	299.37	1953.12	2252.49	110.39	Carlsbad Caverns National Park (NM)	National Park Service

[163] Q/d scores are based on 2016 emissions inventory data reported by the facilities to NMED and EHD, and distances to Class I Areas measured using GIS software.

Facility	Owner / Operator	Q/d score	2016 NO_X emissions (tons per year)	2016 SO_2 emissions (tons per year)	Q: combined 2016 NO_X + SO_2 emissions (tons per year)	d: distance to nearest Class I Area (kilometer)	Name of Nearest Class I Area	Land Management Agency
DCP Eunice Gas Processing Plant	DCP Operating Co. LCP	18.50	571.30	1433.50	2004.80	108.38	Carlsbad Caverns National Park (NM)	National Park Service
GCC Tijeras Portland Cement Plant[164]	GCC Rio Grande Inc.	16.03	1084.40	29.00	1113.40	69.46	Bandelier Wilderness Area (NM)	National Park Service
Pecos River Compressor Station	El Paso Natural Gas Co.	13.91	495.15	1.68	496.83	35.71	Carlsbad Caverns National Park (NM)	National Park Service
Targa Eunice Gas Processing Plant	Targa Midstream Services	13.09	1528.18	23.31	1551.49	118.55	Carlsbad Caverns National Park (NM)	National Park Service
Saunders Gas Plant	Targa Midstream Services	11.80	663.79	416.70	1080.49	91.60	Salt Creek Wilderness Area (NM)	US Fish & Wildlife
Kutz Canyon Processing Plant	Harvest Four Corners LLC	10.34	716.40	2.70	719.1	69.54	Mesa Verde National Park (CO)	National Park Service
OXY Indian Basin Gas Plant	OXY USA	9.48	234.86	51.29	286.15	30.17	Carlsbad Caverns National Park (NM)	National Park Service
Harvest Pipeline San Juan Gas Plant	Harvest Four Corners LLC	8.37	528.14	0.96	529.10	63.20	Mesa Verde National Park (NM)	National Park Service

[164] EHD Jurisdiction

Facility	Owner / Operator	Q/d score	2016 NO_X emissions (tons per year)	2016 SO_2 emissions (tons per year)	Q: combined 2016 NO_X + SO_2 emissions (tons per year)	d: distance to nearest Class I Area (kilometer)	Name of Nearest Class I Area	Land Management Agency
Blanco C & D Compressor Station	Enterprise Field Services	7.81	491.40	3.40	494.80	63.37	Mesa Verde National Park (NM)	National Park Service
Cunningham Station	Xcel Energy	7.73	859.37	4.30	863.67	111.79	Carlsbad Caverns National Park (NM)	National Park Service
Linam Ranch Gas Plant	DCP Midstream	7.68	572.64	322.18	894.82	116.46	Carlsbad Caverns National Park (NM)	National Park Service
Denton Gas Plant	Davis Gas Processing	7.68	22.72	951.66	974.38	126.89	Salt Creek Wilderness Area (NM)	US Fish & Wildlife
Roswell Compressor Station No 9	Transwestern Pipeline	7.68	74.40	0.03	74.43	9.75	Salt Creek Wilderness Area (NM)	US Fish & Wildlife
South Carlsbad Compressor Station	Enterprise Field Services	5.91	152.00	1.00	153.00	25.88	Carlsbad Caverns National Park (NM)	National Park Service
Mountainair No. 7 Compressor Station	Transwestern Pipeline	5.79	436.59	0.06	436.65	75.42	Bosque del Apache Wilderness Area (NM)	Fish and Wildlife Service
Artesia Gas Plant	DCP Midstream	5.71	340.78	24.96	365.74	64.09	Carlsbad Caverns National Park (NM)	National Park Service
Blanco Compressor Station A	El Paso Natural Gas Co.	5.63	356.53	0.12	356.65	63.35	Mesa Verde National Park (CO)	National Park Service

Figure 6-1 shows the locations of all 24 Title V facilities selected to perform a four-factor analysis in relationship to New Mexico's and neighboring states' Class I Areas.

Figure 6-1: Location of Facilities Selected to Perform a Four-Factor Analysis Based on EHD and NMED's Q/D Assessment.

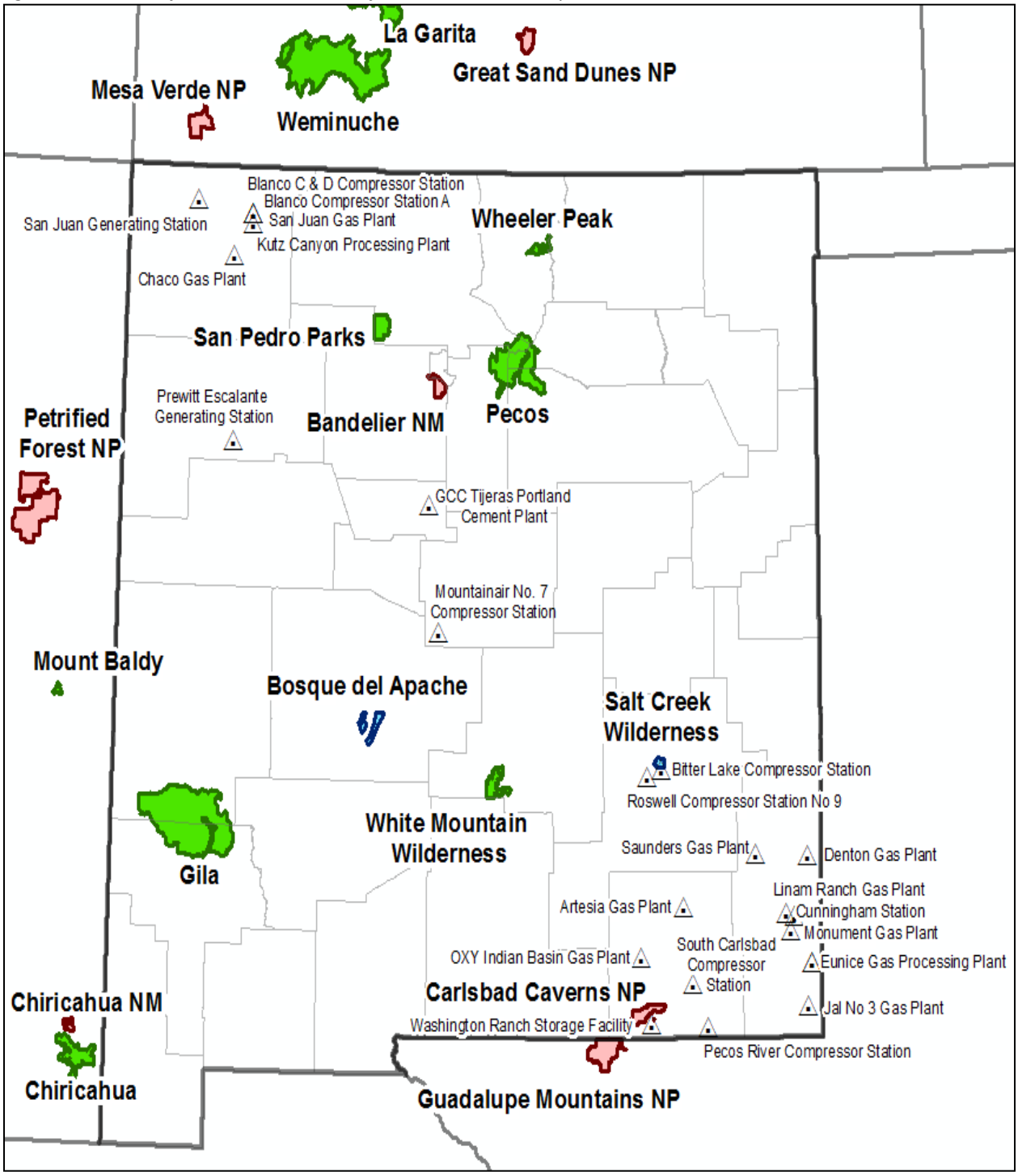


Table 6-2 shows the percentage of total statewide combined NO_X and SO_2 emissions from Title V facilities and the number of facilities responsible for that percentage of emissions at different Q/d thresholds. For example, a Q/d threshold of 10 or more would capture 13 Title V facilities responsible for 69.89% of the total NO_X and SO_2 emissions from all New Mexico Title V facilities combined. As noted

above, EHD and NMED decided to use a Q/d threshold of 5.6, which captures 24 Title V facilities responsible for 80.69% of the total NO_X and SO_2 emissions from all New Mexico Title V facilities combined in 2016.

Table 6-2: Statewide 2016 Title V Facility NO_X and SO_2 Emissions Captured by Various Q/d Thresholds.

Q/d Threshold	Number of Title V Sources Captured by Threshold	NO_X + SO_2 Emissions Captured by Threshold (tons per year)	% of Annual NO_X + SO_2 Emissions Captured by Threshold
10 or more	13	35,129	69.89%
9	14	35,415	70.46%
8	15	35,944	71.51%
7	20	39,246	78.08%
6	20	39,246	78.08%
5.7	23	40,201	79.98%
5.6	24	40,558	80.69%

6.4 Tier Two PTE Screen for Selecting Individual Equipment Requiring a Four-Factor Analysis

After selecting facilities to perform a four-factor analysis based on the Q/d assessment described above, EHD and NMED developed a secondary (tier two) screen to identify individual equipment for which an analysis of potential new control measures for NO_X and/or SO_2 would be required. Title V facilities are often complex and usually have numerous regulated sources of air pollutants. Each source typically has its own allowable emission limit, which is calculated using the maximum rated capacity of the source accounting for any federally enforceable physical or operational limits (e.g., restricted operating hours) the source is subject to. Such limits are also known as potential to emit (PTE) and are listed in Title V operating permits and other types of air quality permits (e.g., construction permits).

In order to focus on the most significant sources of NO_X and SO_2 at the selected facilities and expend their limited resources where they would have the greatest impact in terms of reducing anthropogenic visibility impairment at Class I Areas, EHD and NMED determined that a four-factor analysis would only be required on individual equipment with a PTE greater than ten pounds per hour of NO_X or SO_2 pursuant to the facility's latest Title V operating permit. EHD and NMED further determined that equipment exempt under 20.11.41 NMAC/20.2.72 NMAC – *Construction Permits* or insignificant under 20.11.42/20.2.70 NMAC – *Operating Permits*, as well as equipment that emits less than five tons per year of NO_X or SO_2, did not need to undergo an analysis.

EHD and NMED applied the tier two PTE screen to all 24 facilities selected to perform a four-factor analysis after completing their Q/d assessment in June 2019. For the one source in Bernalillo County, the screen identified two individual units of equipment, the kilns used to produce clinker.

6.5 Additional Evaluations of Interstate Emissions Impacts

In September 2020, Weighted Emissions Potential (WEP) and Area of Influence (AOI) products were made available for Regional Haze planning in the western U.S. by WRAP. The analysis was performed for the Most Impaired Days (MID) during each year of the 5-year period from 2014 through 2018 at 76 IMPROVE monitoring sites representing 116 Class I Areas in the 13 contiguous WESTAR-WRAP states and neighboring states. This information was discussed in Chapter 4 to help assess the potential interstate emissions impacts of sources on out-of-state Class I Areas. While this is also useful information in determining whether EHD and NMED's Q/d assessment captured point sources that had relative potential to impact Class I Areas in neighboring states, the information was not available to states in mid-2019 when the WRAP Regional Haze Planning Work Group Control Measures Subcommittee developed the source screening methodology discussed in section 0. Since this information was not available when WRAP states, including New Mexico, selected facilities to perform a four-factor analysis, it did not inform EHD and NMED's selection of facilities or individual equipment that would ultimately undergo a four-factor analysis for this Regional Haze SIPr Round 2 (2019-2028). The information presented in Chapter 4 and Appendix C, will be considered as additional weight of evidence considerations when determining proposed control measure determinations at the facility and equipment level.

6.6 Conclusion

Because the Q/d assessment described in this chapter identified the GCC Tijeras plant as having a potential impact on visibility at Class I Areas, GCC Tijeras was required to undergo a four-factor analysis for potential new control measures to reduce emissions of NOx and SO_2. Chapter 7 of this SIP describes that analysis.

Chapter 7: Four Factor Analysis and Control Measures

This chapter provides the Regional Haze Rule requirements for determining what control measures are necessary to make reasonable progress and describes how EHD developed the cost/ton threshold used to identify cost-effective controls and how EHD determined which cost-effective controls are necessary to make reasonable progress. This chapter also summarizes the results of EHD's four factor analyses and control measure determinations for the selected source.

7.1 Introduction

The Regional Haze Rule requires that this Regional Haze SIPr (2019-2028) contain an evaluation of the emission reduction measures that are necessary to make reasonable progress toward natural visibility conditions in Class 1 Areas in New Mexico as a result of emissions from Bernalillo County, as well as in Class 1 Areas outside New Mexico that may be affected by emissions from the county[165]. In determining which measures are necessary to make reasonable progress, states or local agencies are required to consider four statutory factors, including the "costs of compliance, the time necessary for compliance, the energy and non-air environmental impacts of compliance, and the remaining useful life of any potentially affected anthropogenic source of visibility impairment[166]. Hence, these evaluations are commonly referred to as four-factor analyses.

The Regional Haze Rule requires that Albuquerque-Bernalillo County and the State of New Mexico submit a long-term strategy (LTS) that addresses regional haze anthropogenic visibility impairment for each mandatory Class I Federal area (Class I Area) within New Mexico and for each mandatory Class I Area located outside New Mexico that may be affected by emissions from New Mexico. The LTS must include the enforceable emissions limitations, compliance schedules, and other measures necessary to make reasonable progress.[167] These measures are determined based on analysis of possible new control measures at the facilities identified in Chapter 6 of this Regional Haze State Implementation Plan (SIP) as subject to a four-factor analysis.

This chapter presents the results of the four-factor analysis for the GCC Rio Grande Portland cement facility in Tijeras, New Mexico (GCC Tijeras). As discussed in Chapter 6, GCC Tijeras is the only Albuquerque - Bernalillo County facility identified in a statewide selection process as being subject to a four-factor analysis during the second Regional Haze planning period.

Introduction to regulatory requirements

Once a source has been selected for a four-factor analysis, the Regional Haze Rule includes provisions governing how that analysis must be conducted and documented within the SIP. This chapter provides the following information about the processes by which EHD characterized the four statutory factors for GCC Tijeras and determined which emission control measures are necessary to make reasonable progress.

[165] 40 CFR 305(f)(2)(i).
[166] *Id.*
[167] 40 CFR §51.308(f)(2).

1) The four statutory factors. 40 CFR § 51.308(f)(2)(i).

2) The role of sources in providing technical information and data, potentially including modeling, monitoring, cost, engineering, and emissions information, and the role of EHD in reviewing that technical information and data. 40 CFR § 51.308(f)(2)(iii).

3) Characterizing the four statutory factors for control measures analysis at each applicable source and explaining which control measures were determined to be necessary to make reasonable progress in each Class I Area that a source impacts. 40 CFR § 51.308(f)(2)(iii).

General overview of four-factor analysis process

The Regional Haze Rule requires a SIP to identify facilities to be analyzed for possible new air pollution control measures, which is presented Chapter 6 in this SIP. For each facility identified, the SIP must document an analysis that looks for possible control measures that would be technically feasible and determines whether any would be cost-effective to install and operate. If the analysis does identify such measures, then the SIP generally will require the facility to implement them during the second Regional Haze planning period.

The SIPr must determine cost-effectiveness based on four specific factors identified in the Rule, which are based on nearly identical language in the CAA. One factor is the cost of implementing and complying with the control measure, which is factor 1 in the Rule. That cost can be affected by how long a measure would take to install and make operable, which is factor 2. Cost can also be affected by factor 3, which is how much energy is needed to operate the control measure (it may, for example, require a lot of electricity in order to go about reducing air pollution) and whether or not the measure might have negative environmental impacts unrelated to air pollution (for example, related to disposal of solid or liquid waste produced by the control equipment). Factor 4 is how long the facility expects to continue operating -- a longer expected operating life makes it easier for a facility to stretch out (or amortize) costs over time.

EHD executed this process for GCC Tijeras in cooperation with an experienced contractor. This chapter describes the process and its results (additional technical details of the process are available in the appendices). In sum, EHD determined that two new control measures would be both technically feasible and cost-effective at GCC Tijeras. One is called "selective non-catalytic reduction" (SNCR), which is a method of reducing NOx emissions. The other is "dry sorbent injection" (DSI), which is a method of reducing SO_2 emissions.

Installation of these two control measures at GCC Tijeras would reduce emissions known to impair visibility at nearby Class I Areas. Latter chapters of this SIP element describe how the measures will be implemented at the GCC Tijeras facility and the visibility conditions projected for the affected New Mexico Class I Areas in 2028.

7.2 The Four Statutory Factors

Four statutory factors

In establishing a reasonable progress goal for a Class I Area, the State must consider the four statutory factors and include a demonstration of how these factors were taken into consideration in selecting the goal. The four factors are:

1) Costs of compliance;

2) Time necessary for compliance;

3) Energy and non-air quality environmental impacts of compliance; and

4) Remaining useful life of any potentially affected sources.[168]

The U.S. EPA Regional Haze Guidance for the Second Implementation Period ("EPA Regional Haze Guidance") discusses the four statutory factors at length.[169] The following is a summary of the framework EHD used in its four-factor analysis.

Evaluation of the first and third factors: cost of compliance and energy/non-air environmental impacts of compliance

The first and third factors are evaluated using a four-step review of emission reduction options in a top-down fashion similar to the approach included in the EPA guidelines for conducting a best available retrofit technology ("BART") or best available control technology ("BACT") review. The steps to this top-down approach are identified and described below.

In the first step, all available control options for the emission unit and the pollutant under consideration are identified. This includes commercially available technologies used throughout the world or emission reductions attainable through the application of available control techniques, changes in process design, and/or operational limitations. Resources typically evaluated in identifying available control options and their precedence in application for each industry include the following:

- The RBLC;[170]
- EPA and state air quality permits and BACT or BART determinations;
- Various EPA and state resources;[171] and

[168] 40 CFR § 51.308(f)(2)(i).
[169] EPA 2019 Guidance, pp. 28-36.
[170] This is an abbreviation for the "EPA Reasonably Available Control Technology ("RACT")/BACT/Lowest Achievable Emission Rate ("LAER") Clearinghouse," which is available at https://cfpub.epa.gov/rblc/.
[171] Including, but not limited to, the California Air Resources Board BACT Clearinghouse (www.arb.ca.gov/bact), EPA's Compilation of Air Emissions Factors ("AP-42") (https://www.epa.gov/air-emissions-factors-and-

- Discussions with, and product literature available from, equipment manufacturers.

In general, techniques used to reduce emissions fall into two categories: those designed to minimize the formation of a pollutant at the point of generation ("pollution prevention"), and those designed to reduce the amount of air pollution emitted by capturing and/or destroying a portion of emissions generated ("add-on pollution control"). Low NOx burners ("LNB") and flue gas recirculation are examples of the first category, while selective catalytic reduction ("SCR") or SNCR is an example of the second. In the second step, the technical feasibility of the various control options is evaluated. If clear documentation and demonstration--based on physical, chemical, and engineering principles--shows that technical difficulties would preclude the successful use of the control option, then it is eliminated from further consideration.

In the third step, the remaining control options are ranked in order of control effectiveness, with the most effective option at the top. In this step, detailed information about the control efficiency, the expected emission rate, and/or the expected emission reduction of each control option is determined and presented.

In the fourth step, the economic impacts of the remaining control options are calculated and evaluated. Detailed evaluations of the less-effective control options are typically omitted if a facility proposes to use the most-effective control option.

Evaluation of the second factor: time necessary for compliance

The second factor includes reasonable progress analyses and accounts for the time anticipated to be required to implement the control option at the facility. While prior experience with the planning and installation of emission controls is a good way to estimate compliance timelines, source-specific considerations should be included to develop a more refined estimate. States have flexibility in characterizing the time necessary for compliance, but they should justify the time needed to install a control measure as being reasonable. While, unlike for BART, there is no requirement that control measures be installed as expeditiously as practicable or within five years of EPA's approval of this SIP revision, the SIP must identify measures that can be fully implemented within the second planning period and account for those measures in formulating reasonable progress goals.

Evaluation of the fourth factor: remaining useful life

The fourth factor accounts for the remaining useful life of any potentially affected source; a consideration that includes both how long the source is expected to remain in operation and the expected lifetime of potential air pollution control measures. A reasonable and appropriate evaluation of remaining useful life is integral to the four-factor analysis because of how the cost-effectiveness assessment of a potential control measure is weighted. The remaining useful life of the source is typically expected to exceed the life of the potential control, so the annualized compliance costs of the potential control are usually based on the control measure's expected useful life.

quantification/ap-42-compilation-air-emission-factors), and EPA's Clean Air Technology Center Air Pollution Control Fact Sheets and Cost Manual (https://www.epa.gov/catc/clean-air-technology-center-products).

Optional "fifth factor" of visibility benefits

The federal CAA, 42 U.S.C. § 7491(g)(1) lists the above four factors that must be taken into consideration in determining reasonable progress. The CAA does not list the visibility benefit of an emission reduction measure as a required factor, but it also does not prohibit States from considering visibility benefits when determining which emission control measures are required for a source to make reasonable progress at a Class I Area.[172] Both EHD and NMED did not consider the optional "fifth factor" of visibility benefits in their four-factor analyses of selected sources because it is not required by the Regional Haze Rule.

7.3 The role of sources in providing technical information and data and NMED's and EHD's review

GCC Tijeras Portland cement manufacturing facility

GCC Rio Grande, Inc. owns and operates GCC Tijeras, a Portland cement manufacturing facility in Tijeras, New Mexico, which is under EHD's jurisdiction. On August 13, 2019, EHD formally submitted its written request that GCC perform a four-factor analysis of control measures under the CAA Regional Haze Program. EHD requested that GCC perform the analysis for all potential new control measures for NOx and SO_2 on individual equipment that has a potential to emit (PTE) greater than 10 pounds per hour of NOx or SO_2.[173] Two pieces of equipment--both rotary, dry kilns with two-stage preheaters--have a PTE above the threshold of greater than 10 pounds per hour. Although there was no regulatory requirement that GCC perform and prepare such an analysis, GCC agreed to do so.

On December 23, 2019, EHD contracted with Eastern Research Group, Inc. (ERG) to review GCC's analysis.[174] ERG's task was to prepare a written report, with appropriate supporting data and rationale, opining whether or not GCC's analysis conforms to the technical requirements of the Regional Haze Rule, as interpreted by EPA guidance, and whether GCC's analysis considers all technically feasible control measures. Specifically, ERG's report would:

- Contain a detailed discussion of the data and methodology in GCC's analysis;
- Document the extent to which GCC's analysis for each identified control measure thoroughly analyzed each of the four statutory factors;
- Identify any additional control measures that are technically feasible for the source category, but which were not considered in GCC's analysis;
- Evaluate the four statutory factors for each of the additional control measures identified;

[172] EPA 2019 Guidance, p. 28.
[173] City of Albuquerque Environmental Health Department, Letter to GCC Rio Grande, Inc., (Notification of requirement to perform a four-factor analysis of control measures under the Clean Air Act Regional Haze program) (August 13, 2019).
[174] ERG is an environmental consulting firm headquartered in Lexington, Massachusetts. More information about ERG is available at the company's website, http://www.erg.com/.

- Recommend specific control measures that are cost-effective for GCC's facility and that the AQCB could adopt in this SIP;

- Quantify expected annual emissions reductions of visibility impairing pollutants for each control measure that ERG recommends as cost effective, once the control measure is implemented;

- Quantify expected annual emissions reductions and prepare them in the format requested by the WRAP for subsequent photochemical modeling of 2028 visibility improvements at Class I Areas; and

- Evaluate any additional information that GCC contends should be considered and provide ERG's opinion on whether the additional information is significant, technically reliable, and consistent with applicable EPA regulations and guidance.

GCC provided its Four-Factor Analysis results on May 11, 2020 (GCC Analysis).[175] ERG provided a draft review of the GCC Analysis on May 20, 2020. GCC provided supplementary information in response to the draft ERG review on June 22, 2020 (GCC Supplement).[176] ERG provided its final review of the GCC Analysis and GCC Supplement (ERG Review) on August 27, 2020.[177] All of these documents are available as appendices of this SIP element. These appendices show the evolution of dialogue between GCC's consultant and ERG, and were taken into consideration when setting a cost threshold and required controls.

7.4 Characterizing the four statutory factors for control measures analysis at GCC Portland cement manufacturing facility

This section provides an overview of the GCC Analysis, the ERG Review, and the GCC Supplement for NOx and SO_2.

Baseline emissions

In preparing the GCC analysis, GCC used the following baseline emissions for the period 2016 to 2018, based on stack test data for the facility.[178] The ERG Review found these emissions to be a satisfactory basis on which to analyze potential emission reductions from possible new control measures at the facility.[179]

[175] GCC Rio Grande, Inc., Regional Haze 2nd Implementation Period four-factor analysis (Prepared at EHD's Request for the Tijeras, NM Facility) (May 11, 2020). The GCC Analysis is available in Appendix E. GCC redacted certain portions of the GCC Analysis and GCC Supplement as confidential business information. EHD has reviewed GCC's request and agrees that the redactions are consistent with applicable law.
[176] Sarah Vance, Environmental Manager, GCC Rio Grande Inc., to Dario Rocha, Control Strategies Manager, Air Quality Program, City of Albuquerque Environmental Health Department, June 22, 2020. The June 22 GCC letter is available in Appendix F.
[177] Eastern Research Group, Inc., Review of Regional Haze 2nd Implementation Period four-factor analysis for GCC Rio Grande, Inc., Tijeras, New Mexico, May 29, 2020. The ERG Review is available in Appendix G.
[178] GCC Analysis, pp. 12 to 15.
[179] ERG Review, pp. 2-13 and 3-5.

Table 7-1: 2016-2018 GCC baseline emissions (tons per year)[180]

Pollutant	2016	2017	2018	2016 - 2018 average
NOx	1,212	1,194	1,213	1,206
SO_2	359	354	359	357

Additionally, ERG looked at stack test data from 2019-2021 in a more recent review. Upon further discussion, it was determined that the installation of a Continuous Emissions Monitoring System (CEMS) would provide more accurate data as which to determine the effectiveness of any cost-effective controls and estimate emission reductions.

For purposes of this analysis, the baseline emissions evaluated are sufficient to satisfy requirements of the Regional Haze Rule.

Four-factor analysis: NOx

Cement production creates both thermal and fuel NOx. Thermal NOx is the dominant mechanism for NOx formation in cement manufacturing and is created when the nitrogen in the combustion air is oxidized in the high temperatures required for clinker[181] production. Fuel NOx is produced when nitrogen compounds in the fuel oxidize in the high temperatures required for clinker production. NOx emissions can be reduced by applying combustion controls or post-combustion controls. Combustion controls reduce the peak flame temperature and excess air in the kiln burner, which minimizes NOx formation. Post-combustion controls, such as SCR and SNCR, convert NOx in the flue gas to molecular nitrogen and water. Both thermal and fuel NOx were assessed in the GCC Analysis and ERG Review.

Factor 1: Costs of compliance

Step 1: The following potential NOx control options were compiled in the GCC Analysis[182] and addressed in the ERG Review. [183]

- **Good combustion practices (GCP)** (combustion control);
- **Low NOx Burner** (**LNB)** (combustion control);

[180] The GCC 2016 emissions shown in Chapter 6 differ from those used in this chapter. GCC used an updated emissions estimation method to obtain the emissions estimates shown in Chapter 7 of this SIP, which was different than the method used to obtain the emissions estimate used in Chapter 6. GCC's update of its emissions estimation method took place after the Q/d assessment described in Chapter 6. In both cases, GCC used accepted methods to estimate its emissions. The emissions estimates used here in Chapter 7 for the four-factor analysis of the GCC facility are more conservative (i.e. they show higher GCC emissions) than in Chapter 6. The emissions estimates used for both the Q/d assessment and the subsequent four-factor analysis are sufficient to satisfy requirements of the Regional Haze Rule.

[181] "Clinker" is an intermediate product made in the manufacturing of Portland cement. It consists of tiny lumps or nodules of raw material that the manufacturing facility will eventually turn into finished Portland cement.

[182] GCC Analysis, pp. 26 to 30.

[183] ERG Review, pp. 2-4 to 2-8.

- **Selective Non-Catalytic Reduction** (**SNCR)** (post-combustion control);
- **Tire derived fuel (TDF) as alternative fuel** (combustion control);
- **Selective Catalytic Reduction** (**SCR)** (post-combustion control); and
- **Ceramic catalytic filters (CCF)** (post-combustion control).

Step 2: Each potential NOx control options was evaluated in the GCC Analysis for technical feasibility. The ERG Review concluded the following:

- **GCP**: ERG agreed with GCC's determination that GCP were already part of the current system design--known as the baseline or base case in four-factor analyses--and thus should not be evaluated further.[184,185]
- **LNB**: GCC and ERG determined that LNB were technically feasible for both kilns and thus should be evaluated further.[186,187]
- **SNCR**: GCC determined that SNCR at 50% control efficiency was technically infeasible, but that SNCR with a lower control efficiency may be technically feasible and thus should be evaluated further at a control efficiency of 25%.[188] ERG disagreed with GCC's determination that SNCR would not achieve typical reduction efficiencies, asserting that it was not well supported. ERG determined that SNCR was technically feasible for both kilns and thus should be evaluated further, using a control efficiency of 30%.[189]
- **TDF**: GCC determined that TDF was not technically feasible due to the low initial supply of tires near the facility and the unreliable and costly option of importing tires into New Mexico, meaning that the use of TDF in secondary combustion is not readily available. For completeness and at the request of EHD, GCC agreed to further evaluate TDF.[190] ERG disagreed with GCC's determination of that TDF was not technically feasible, concluding that the combustion of TDF was technically feasible for both kilns and thus should be evaluated further.[191]
- **SCR**: GCC determined that SCR was not widely available for use with cement kilns--in large part because the site-specificity limits the commercial availability of systems--and thus that it was not technically feasible.[192,193] ERG agreed with GCC's determination that SCR was not technically

[184] GCC Analysis, p. 27.
[185] ERG Review, pp. 2-8 to 2-9.
[186] GCC Analysis, p. 32.
[187] ERG Review, pp. 2-9 to 2-10.
[188] GCC Analysis, pp. 34 to 37.
[189] ERG Review, pp. 2-10 to 2-11, 2-13.
[190] GCC Analysis, pp. 30 to 32.
[191] ERG Review, p. 2-11.
[192] GCC Analysis, pp. 32 to 34.
[193] Despite this determination, the GCC Analysis continued to evaluate SCR. GCC's evaluation of SCR is presented in the following pages for completeness.

feasible for either kiln because GCC had not conducted pilot scale testing for application of SCR at their facility.[194] ERG determined that SCR should not be evaluated further.

- **CCF**: GCC determined that CCF was not technically feasible because they were not aware of any successful implementations of CCF on cement kilns in the United States at the time of their analysis. GCC determined that CCF should not be evaluated further.[195] ERG disagreed, noting that CCF has been successfully utilized in several other industries with exhaust characteristics like that of a Portland cement kiln and that one vendor (Tri-Mer Corporation) had completed technical feasibility evaluations of CCF for cement kilns and concluded that the technology was feasible and appropriate. ERG determined that CCF should be evaluated further.[196]

Step 3: The remaining potential NOx control options were ranked by effectiveness in the GCC Analysis. As discussed in Step 2 above, the ERG Review disagreed with some elements of the GCC Analysis. The following table summarizes these differences.

Table 7-2 Ranking the technically feasible NOx control options

Control Option	GCC Expected Control Efficiency (%)[197]	ERG Expected Control Efficiency (%)[198]
CCF	N/A	90%
SCR	90%	N/A
SNCR	25%	30%
LNB	15%	15%
TDF (12% substitution)	15%	15%
TDF (8% substitution)	10%	10%

Step 4: The economic impacts of the remaining potential NOx control options were calculated and evaluated in the GCC Analysis.[199] The ERG Review noted that, while EPA has not officially established an acceptable cost-effectiveness threshold for reasonable progress with regional haze, many air pollution control agencies use the estimate of $5,000 per ton of pollutant removed.[200] ERG further noted--without agreeing--that the GCC Analysis asserted that a $2,000 per ton threshold was a more appropriate threshold for their facility. As discussed in Steps 2 and 3, above, the ERG Review disagreed with some elements of the GCC Analysis; the following table summarizes these differences.[201]

[194] ERG Review, pp. 2-11 to 2-12.
[195] GCC Analysis, p. 36.
[196] ERG Review, p. 2-12.
[197] GCC Analysis, p. 37.
[198] ERG Review, p. 2-13.
[199] GCC Analysis, pp. 37 to 40.
[200] The New Mexico Environment Department, in its Regional Haze planning process, applied an approximate threshold of $10,000 per ton of pollutant removed as a general guide for assessing cost-effectiveness. Due to the differences in the type of facilities considered by NMED, EHD decided on a range of $5,000 to $7,000 per ton for this planning period pursuant to this Four Factor Analysis.
[201] ERG Review, pp. 2-13 to 2-17.

Table 7-3 Evaluating the economic impact of the remaining NOx control options

Control Option	Control Cost ($/year)	Baseline Emission Level (tons)	Expected Control Efficiency (%)	Emission Reduction (tons)	Cost Effectiveness ($/ton removed)*[202]
SNCR (ERG Estimate)	$710,585	1,206	30%	326	$3,313
SNCR (GCC Estimate)	$710,585	1,206	25%	271	$2,619
CCF (ERG Estimate)	$5,217,101	1,206	90%	977	$6,301[203]
SCR (GCC Estimate)	$6,708,694	1,206	90%	977	$6,868[204]
TDF (12% substitution)	$1,366,949	1,206	15%	179	$9,007
TDF (8% substitution)	$1,283,340	1,206	10%	119	$12,684
LNB	$1,981,719	1,206	15%	181	$12,929

Factor 2: Time necessary for compliance

The GCC Analysis estimated that GCC would require five years from the date of EPA's approval of this SIP to implement any of the remaining potential NOx reduction strategies.[205] The ERG Review indicated that five years might be conservative and it provided examples where shorter timeframes were achieved in relation to SNCR. ERG's examples indicated a potential time frame of between 18 months and five years after EPA SIP approval to begin operations of SNCR.[206]

Factor 3: Energy and non-air quality environmental impacts of compliance

The GCC Analysis included a qualitative description of what GCC depicted as the cost considerations of energy required to operate each remaining potential NOx control option. GCC did not separately evaluate each specific NOx control technology for non-air quality environmental impacts of compliance.

[202] ERG estimates adjusted to reflect 2023 costs based on the Consumer Price Index (CPI) inflation calculator in more recent review.

[203] ERG did not evaluate CCF past this point as explained in its report: "Note that the estimated cost-effectiveness calculation is incomplete. If CCF was to be employed, the existing baghouses – constructed in 2015 – would be replaced or retrofitted accordingly. A portion of the residual value of those baghouses - based on remaining useful life and total capital cost – must be factored into a final determination of cost-effectiveness. Doing so could significantly increase the cost-effectiveness of CCF, diminishing its economic feasibility in this particular application. Therefore, ERG provides the estimated cost-effectiveness of CCF for completeness and the technology is not evaluated further." ERG Review, pp. 2-17 to 2-18.

[204] GCC calculated possible costs of pollutant removal for SCR but concluded that the technology was not technically feasible due to lack of experience with implementation on Portland cement facilities in the United States. ERG agreed with this conclusion. Thus, EHD does not regard the SCR cost included in this table as a reliable indicator of the feasibility or cost of SCR at the Tijeras facility.

[205] GCC Analysis, p. 40.

[206] ERG Review, p. 2-17.

Instead, GCC asserted that all of the remaining control options would decrease overall plant efficiency and require increased electrical usage, thereby creating environmental impacts that directly counter the goals of the Regional Haze Program. Additionally, GCC asserted that the remaining control options that incorporate ammonia injection would lead to increased health risks to the local community from ammonia slip, as well as create safety concerns regarding ammonia transport and storage.[207] GCC did not support these assertions with quantitative analysis or evidence.

The ERG Review separately provided a qualitative evaluation of the energy and non-air quality environmental impacts of compliance for the remaining potential NOx control options and concluded the following.

- **LNB**: Additional equipment would have a minimal impact on plant fuel consumption or energy demand and, after the upgrade, the kilns would consume less energy.[208]

- **SNCR**: There could be an energy benefit or loss, depending on the concentration of ammonia or urea. ERG recommended an optimization study to establish the optimum ammonia injection rate to provide maximum NOx reductions and minimal ammonia slip environmental impacts.[209]

- **TDF**: Burning TDF in the kilns in lieu of coal would decrease truck traffic related to coal shipments, but would require constructing infrastructure to receive, handle, and process the tires.[210]

The ERG Review did not find any basis to support the assertions in the GCC Analysis regarding detrimental energy and non-air environmental impacts of the potential NOx control technologies.

Factor 4: Remaining useful life of any potentially affected sources

The GCC Analysis concluded that the remaining useful life of the kilns would not affect the annualized cost of the remaining potential NOx control options because their useful life was anticipated to be at least as long as the assumed 20-year capital cost recovery period specified in EPA guidelines for estimating the cost of potential new air pollution control measures.[211] The ERG Review agreed with GCC's assessment.[212]

Overall results

The GCC Analysis did not conclude with certainty that any of the potential NOx control options was technically feasible and cost-effective.[213] However, the GCC Analysis did present a dollar calculation of the cost-effectiveness of SNCR ($2,619 per ton of NOx reduced) consistent with a determination that

[207] GCC Analysis, p. 40.
[208] ERG Review, p. 2-17.
[209] ERG Review, pp. 2-17 to 2-18. The GCC Analysis discussed a similar optimization study at a GCC facility in Odessa, Texas. See Appendix G of the GCC Analysis (this appendix is part of the GCC Analysis and should not be confused with Appendices to this Regional Haze SIP, which have their own separate nomenclature).
[210] ERG Review, p. 2-18.
[211] GCC Analysis, p. 41.
[212] ERG Review, p. 2-18.
[213] GCC Analysis, pp. 41 to 43.

SNCR would be a cost-effective control measure. The ERG Review determined that SNCR was the only technically feasible and cost-effective control option for NOx emissions.[214]

Four-factor analysis: SO_2

SO_2 emissions are generated in cement kilns as the sulfur in the fuel and in the processed raw material is oxidized in the high temperatures required for clinker production. SO_2 emissions may be reduced through process modifications or through the installation of add-on control technologies.

Factor 1: Costs of compliance

Step 1: The following potential SO_2 control options were compiled in the GCC Analysis[215] and assessed in the ERG Review.[216]

- **Good combustion practices (GCP)** (process modification);
- **Inherent Dry Scrubbing** (process modification);
- **Alternative Low-Sulfur Fuels (specifically, natural gas, diesel, and TDF)** (process modification);
- **Dry sorbent injection (DSI)** (add-on control technology);
- **Wet Scrubbing** (add-on control technology); and
- **Semi-Wet/Dry Scrubbing** (add-on control technology).

Step 2: The GCC Analysis evaluated each of the above, potential SO_2 control options for technical feasibility. The ERG Review concluded the following:

- **GCP**: ERG agreed with GCC's determination that GCP were already part of the current system design--known as the baseline or base case in four-factor analyses--and thus should not be evaluated further.[217,218]
- **Inherent Dry Scrubbing**: ERG agreed with GCC's determination that inherent dry scrubbing was already part of the current system design--known as the baseline or base case in four-factor analyses--and thus should not be evaluated further.[219,220]
- **Alternative Low-Sulfur Fuels**: GCC and ERG determined that both natural gas and diesel fuel were technically feasible for both kilns and thus should be evaluated further. GCC and ERG

[214] ERG Review, pp. 2-18 to 2-19.
[215] GCC Analysis, pp. 16 to 18.
[216] ERG Review, pp. 3-1 to 3-3.
[217] GCC Analysis, p. 17.
[218] ERG Review, pp. 3-3 to 3-4.
[219] GCC Analysis, p. 17.
[220] ERG Review, p. 3-4.

determined that TDF was not technically feasible for either kiln and thus should not be evaluated further.[221,222]

- **DSI**: GCC and ERG determined that DSI was technically feasible for both kilns and thus should be evaluated further.[223,224]

- **Wet Scrubbing**: GCC and ERG determined that wet scrubbing was technically feasible for both kilns and thus should be evaluated further.[225,226]

- **Semi-Wet/Dry Scrubbing**: GCC and ERG determined that semi-wet/dry scrubbing was technically feasible for both kilns and thus should be evaluated further.[227,228]

Step 3: The remaining potential SO_2 control options were ranked by effectiveness in the GCC Analysis.[229] The ERG Review[230] agreed with GCC's ranking, which is presented in the below table:

Table 7-4 Ranking the technically feasible SO_2 control options

Control Option	Expected Control Efficiency (%)
Wet Scrubbing	95%
Semi-Wet/Dry Scrubbing	90%
DSI	50%
Alternative Low-Sulfur Fuel – All-Natural Gas	32%
Alternative Low-Sulfur Fuel - All Diesel	32%

Step 4: The economic impacts of the remaining potential SO_2 control options were calculated and evaluated in the GCC Analysis.[231]

Though EPA has not officially established an acceptable cost-effectiveness threshold for reasonable progress with regional haze, the ERG Review noted that many air pollution control agencies use the estimate of $5,000 per ton of pollutant removed. ERG further noted--without agreeing--that GCC asserted that a $2,000 per ton threshold was a more appropriate threshold for their facility. The ERG Review, adjusted to reflect 2023 costs based on the Consumer Price Index,[232] agreed with the GCC Analysis on the economic impacts of the remaining potential SO_2 control options, which is presented in the below table:

[221] GCC Analysis, pp. 18 to 19.
[222] ERG Review, pp. 3-4 to 3-5.
[223] GCC Analysis, p. 19.
[224] ERG Review, p. 3-5.
[225] GCC Analysis, p. 19.
[226] ERG Review, p. 3-5.
[227] GCC Analysis, p. 19.
[228] ERG Review, p. 3-5.
[229] GCC Analysis, pp. 20-21.
[230] ERG Review, pp. 3-5 to 3-6.
[231] GCC Analysis, pp. 21 to 23.
[232] ERG Review, pp. 3-6 to 3-8.

Table 7-5 Evaluating the economic impact of the remaining SO_2 control options

Control Option	Control Cost ($/year)	Baseline Emission Level (tons)	Expected Control Efficiency (%)	Emission Reduction (tons)	Cost Effectiveness ($/ton removed)[233]
DSI	$154,755	357	50%	161	$1,136
Semi-Wet/Dry Scrubbing	$4,613,620	357	90%	289	$18,827
Wet Scrubbing	$5,429,039	357	95%	305	$20,987
Alternative Low-Sulfur Fuel - All Natural Gas	$5,764,159	357	32%	113	$59,952
Alternative Low-Sulfur Fuel - All Diesel	$34,591,075	357	32%	113	$360,051

Factor 2: Time necessary for compliance

The GCC Analysis estimated that DSI could be implemented within three years from the date of determination and that wet scrubbing or semi-wet/dry scrubbing could be implemented within five years from the date of determination.[234] The ERG Review indicated that GCC's estimates might be conservative and that shorter implementation timeframes might be achieved. ERG noted that two years might be a more appropriate implementation timeline for DSI.

ERG noted that GCC's estimate for semi-wet and dry scrubbers was not supported by particular evidence and a shorter implementation time could likely be achieved. ERG noted that GCC did not provide an implementation time for alternative fuels. However, ERG estimated an implementation time of three years was likely feasible for this control measure.[235]

Factor 3: Energy and non-air quality environmental impacts of compliance

The GCC Analysis included a qualitative description of what GCC depicted as the cost considerations of energy required to operate each remaining potential SO_2 control option and concluded the following:

- All of the remaining control options would decrease overall plant efficiency and require increased electrical usage, thereby increasing secondary emissions from nearby power stations;
- Control options involving scrubbers (wet scrubbing or semi-wet/dry scrubbing) would result in increased energy demand and usage at the facility;

[233] Values adjusted to reflect 2023 dollars using the Consumer Price Index (CPI) inflation calculator
[234] GCC Analysis, pp. 23.
[235] ERG Review, pp. 3-8 to 3-9.

- Control options involving injecting lime (DSI, wet scrubbing, or semi-wet/dry scrubbing) pose significant energy impacts because the production and transportation of lime is energy-intensive; and

- These environmental impacts are substantial and are directly counter to the goals of the Regional Haze Program.[236]

The GCC Analysis also examined the non-air quality environmental impacts of the remaining potential SO_2 control options and concluded the following:

- A semi-wet/dry hydrated lime control system would require water to hydrate the lime and the sludge byproduct would require disposal;

- A wet scrubber would require significant quantities of water, the sludge byproduct would require disposal, and there would be visible plumes from the process; and

- Diesel fuel would require the construction of additional storage tanks at the facility, which also have the risk of accidental release into the surrounding environment.[237]

The ERG Review separately evaluated the energy and non-air quality environmental impacts of compliance for each remaining potential SO_2 control option and concluded the following:

- **Alternative Low-Sulfur Fuel - Natural Gas**: no adverse energy or non-air environmental impacts would be expected;

- **Alternative Low-Sulfur Fuel - Diesel**: Constructing plant infrastructure (e.g. storage tanks and fuel lines) to accommodate burning diesel in the kilns would require energy and materials. In addition, local roadways would need to be utilized to transport high volumes of diesel fuel to support kiln operations;

- **DSI**: While GCC described indirect impacts for DSI, EPA recommends that States focus their energy and non-air quality environmental impacts analysis on direct energy consumption at the facility, not on the indirect energy required to manufacture, transport, and handle the control equipment or inputs for that equipment (in this case, dry sorbent);

- **Wet Scrubbing**: Careful consideration should be made regarding using this water-intensive control option in an arid region with potential for restrictions on water consumption; and

- **Semi-Wet/Dry Scrubbing**: Careful consideration should be made regarding using this water-intensive control option in an arid region with potential for restrictions on water consumption.[238]

Factor 4: Remaining useful life of any potentially affected sources

[236] GCC Analysis, pp. 23 to 24.
[237] GCC Analysis, p. 24.
[238] ERG Review, pp. 3-9 to 3-10.

The GCC Analysis concluded that the remaining useful life of the kilns would not affect the annualized cost of the remaining potential SO_2 control options because their useful life was anticipated to be at least as long as the assumed 20-year capital cost recovery period specified in EPA guidelines for estimating the cost of potential new air pollution control measures.[239] The ERG Review agreed with GCC's assessment.[240]

Overall results

The GCC Analysis appears to present two inconsistent sets of results. First, the GCC Analysis concludes that there were no SO_2 emission reduction measures that were technically feasible, cost effective, and appropriate to implement for the two kilns at the Tijeras plant.[241] Later, GCC concludes that the injection of lime or other dry sorbents is a technically feasible and lowest cost option for SO_2 reduction at the GCC Tijeras facility, with a dollar calculation ($963 per ton of SO_2 reduced) consistent with a finding that DSI is cost-effective.[242] Further discussion with GCC in 2024 resulted in confirmation that DSI would not be a problem at the Tijeras facility. The ERG Review found that DSI was the only technically feasible and cost-effective control system available to reduce SO_2 emissions at the GCC Tijeras kilns.[243]

GCC Supplement of June 22, 2020

On June 22, 2020, GCC submitted what this chapter refers to as the "GCC Supplement" in response to a draft version of the ERG Review. The GCC Supplement is included in this SIP element in Appendix J. Of relevance here, the GCC Supplement asserts the following:

- **Technical infeasibility of SNCR.** GCC reiterated earlier assertions that temperature variations inside the cement kilns, along with the related need to stabilize temperatures in order to avoid particulate matter emissions due to ammonia slip, made use of SNCR technically infeasible. However, GCC went on to describe a 25% emission reduction rate as achievable for the GCC Tijeras facility once suitable modifications to the cement kilns were made. GCC later clarified that this 25% control efficiency took into account the possibility of ammonia slip, and a greater control efficiency could be feasible under the right circumstances.

- **Revision of cost calculations for SNCR.** GCC contended that its earlier calculation of a pollution removal cost of $2,619 per ton of NOx removed had been incorrect. GCC offered what it depicted as new information regarding costs associated with, first, modifying the cement kilns to maintain internal temperatures suitable for SNCR and, second, transporting ammonia for use with an SNCR system. GCC then revised the SNCR cost-effectiveness estimate to $4,164 per ton. GCC estimated that the annual cost of operating SNCR at the GCC Tijeras facility would be $1,129,839 per year. EHD inquired about any updated cost information from GCC in 2023. GCC did not have any new cost information in late 2023, other than mentioning the cost for ammonia needed to be adjusted for inflation.

[239] GCC Analysis, p. 24.
[240] ERG Review, p. 3-10.
[241] GCC Analysis, p. 25.
[242] GCC Analysis, p. 42.
[243] ERG Review, p. 3-10.

- **New information regarding appropriate cost-effectiveness threshold.** GCC presented new information that it said supported using a threshold of $2,000 per ton of pollutant removed as the level below which a control should be judged cost-effective to install and implement, rather than the $5,000 threshold typically used by air quality regulatory agencies in cost-effectiveness assessments such as a four-factor analysis for regional haze. The company had previously used the $2,000 threshold in the GCC analysis, submitted to EHD on May 11, 2020. In the GCC Supplement of June 22, 2020, the new information consisted of operating cost information from GCC facilities elsewhere in the United States, other than the facility in Tijeras, New Mexico. Based on this new information, the GCC Supplement asserted that its new SNCR cost assessment of $4,164 per ton of NOx removed should be compared to a cost-effectiveness threshold of $2,000, thereby concluding that SNCR is not cost-effective.

- **Energy and non-air environmental impacts of SNCR.** GCC reiterated earlier statements in the GCC Analysis that transport and storage of ammonia used in SNCR could present risks for the surrounding community. GCC presented no quantitative evidence or analysis in support of these assertions.

EHD staff discussed the GCC Supplement with ERG. These discussions concluded that nothing in the GCC Supplement altered the conclusion of the ERG Review that SNCR was both technically feasible and cost-effective for the GCC Tijeras facility. No evidence presented by GCC indicates that the facility would be unable to sustain an annual operating cost of $1,129,839 per year, or a cost adjusted for inflation. No evidence presented by GCC indicates that a $5,000-$7,000 cost threshold is inappropriate for comparison with SNCR pollution removal costs.

Follow up conversation with GCC in 2023 resulted in GCC affirming the likelihood that SNCR would be found to be cost effective, and mentioned the control is widely used at cement kilns across the country. Additional conversation in 2024 resulted in GCC mentioning the efficiency challenges of SNCR at the Tijeras facility, and a need for an optimization period similar to the optimization period conducted for their Odessa facility.

EHD determined that a range of $5,000-$7,000 was an appropriate cost effectiveness threshold in light of the details of the four-factor analysis and review, typical cost effectiveness thresholds in other western states, NMED's cost effectiveness threshold, the type of facility, the age of the facility, and projected visibility data for the planning period. Using a $5,000-$7000 threshold range, SNCR is cost-effective based on NOx removal costs as calculated by GCC ($2,619 in the GCC Analysis, $4,164 in the GCC Supplement) and by ERG ($3,313). CCF was not selected as cost-effective due to the need for baghouse retrofits to install that technology, as well as challenges with high temperatures in the kilns, greatly increasing its cost effectiveness.

EPA guidance on use of interest rates in a four-factor analysis

In July 2020, EPA staff notified WRAP members by email of their recommendation regarding the use of interest rates in a four-factor analysis.[244] EPA stated that a four-factor analysis should use the "bank

[244] Email from Dayana Medina, Regional Haze and SO_2 Section, EPA Region 6, July 16, 2020. EPA stated that its recommendation was consistent with the discussion in Chapter 2, Cost Estimation Concepts and Methodology, pages 15 to 17 of the EPA Control Cost Manual, 7th Edition, available at

prime rate" in effect at the time the analysis is prepared, as determined by information available from the Federal Reserve System. A four-factor analysis should document the bank prime rate in effect at the time the analysis is prepared.

The GCC Analysis used an interest rate 4.25%, based on the bank prime rate in effect at the time the Analysis was prepared. The ERG Review concluded that GCC's use of this interest rate in its cost calculations was reasonable, based on EPA regulations and guidance and ERG's prior experience in four-factor analyses. The guidance email from EPA on interest rate calculations stated that the bank prime rate in effect at the time of the EPA email was between 3.0 and 3.25%.

At EHD's request, ERG recalculated the cost estimates in the ERG review using an interest rate of 3.25%. ERG found that use of this rate did not change ERG's conclusion that SNCR for NO_x and DSI for SO_2 were cost-effective control measures.

7.5 EHD's determination of controls and emission limits

ERG and EHD evaluated NO_x and SO_2 controls and emission limits for GCC Tijeras. The evaluation resulted in the determination that SNCR and DSI are both technically feasible and cost effective at GCC's Tijeras facility.

While CCF was evaluated as a possible NOx control for GCC's Tijeras facility and has a cost effectiveness of $6,301 per ton based on 2023 dollars, the ERG analysis mentions the need for baghouse retrofit or replacement associated with the installation of CCF. This could significantly increase the per ton cost effectiveness value for CCF due to high capital costs, especially taking into consideration recent inflation when evaluating costs through the consumer price index. In addition, CCF is a novel approach to NO_x control that has not been commercially proven for cement kilns in the United States. GCC mentioned significant challenges associated with the control including exhaust temperatures and uncertainty regarding implementation. Raw materials as part of the fuel mix also vary. GCC uses natural gas for startup and shutdown at the Tijeras kilns, but generally relies on coal. GCC is exploring the possibility of a transition to natural gas but is in the preliminary stages of that assessment.

Specifically, the high temperature of the exhaust gas from the kilns poses a major challenge, and GCC's position is that CCF is technically infeasible at the Tijeras facility due to the high heat from the exhaust gas. Given the age of the Tijeras kilns and that the fact the control technology has not been proven as an effective and established control for cement kilns, as well as the technical challenges described above, CCF has been ruled out as a technically feasible and cost-effective control for the second planning period.

SNCR is an established method of NOx control for dry cement kilns that EHD has determined to be technically feasible and cost effective for GCC to install on both kilns at their Tijeras facility. GCC indicated an optimization period of no longer than 18 months, similar to the optimization period that took place at their Odessa facility, would be needed due to the makeup of the kilns, such as physical differences between them and challenges with the rotating nature of the kilns. EHD does not oppose an 18-month optimization period. EHD has chosen a legally enforceable emission limit of 4.1 lbs/ton of

https://www.epa.gov/sites/production/files/2017-12/documents/epaccmcostestimationmethodchapter_7thedition_2017.pdf.

clinker to put into this SIP, and allowing a reconsideration of that limit if compliance with it results in any violation of a local, state, or federal air quality standard as a result of too much ammonia slip. Additionally, if the optimization study shows that a limit of 3.8 lbs/ton of clinker or less is achievable, then EHD will revise the SIP to incorporate a lower limit based on the results of the optimization study.

An ammonia slip limit of 10ppm was also chosen consistent with accepted permitted levels in EPA SNCR literature in order to reduce plume formation and risks to human health[245].

Additionally, DSI has been determined to be a technically feasible and cost-effective control for SO_2. GCC already has already implemented a small version of DSI for hazardous air pollutants, and indicated no challenges with implementing it for SO_2. EHD has determined that DSI should be implemented with an emission limit of 0.88 lbs/ton of clinker based on a 12-month rolling average, with a reconsideration of the limit if three years of CEMS data show that a limit of 0.60 lbs/ton of clinker or less is achievable.

A continuous emissions monitoring system (CEMS) will be required for NO_x and SO_2 for this planning period. GCC is to install and have CEMS operating no later than January 1, 2026. GCC must operate the CEMS and collect data at all required intervals at all times the affected source is operating except for periods of monitoring system malfunctions, repairs associated with monitoring system malfunctions, and required monitoring system maintenance, quality assurance and quality control activities. These conditions will be reflected in a permit modification pursuant to requirements under this SIP element. Permit modification language specific to these requirements is located in Appendix OO of this SIP element. EHD is requesting that EPA adopt Section 2 (1), Regional Haze Rule Requirements, under GCC's Construction Permit #2197-M3, into this SIP revision, as well as Sections 1 (3, 4, 5, and 6), which were already in GCC's construction permit. Those sections include requirements pursuant to monitoring, recordkeeping, reporting, and compliance tests.

7.6 Conclusion

Based on information presented in the GCC Analysis, the ERG Review, and the GCC Supplement, EHD concludes the following in regard to new control measures at the GCC Tijeras facility that are necessary to make reasonable progress:

- SNCR is a technically feasible and cost-effective control measure for NO_x. The GCC Tijeras facility will implement this control measure to achieve a control efficiency of approximately 30%, with a legally enforceable emission limit of 4.1 lbs/ton of clinker on a 30-day rolling average, and a reconsideration of that limit if compliance with it results in any violation of a particulate matter NAAQS standard due to too much ammonia slip.

- The limit will be enforceable after an optimization period of no longer than 18 months and the installation of CEMS to get a more complete baseline level of emissions. If the optimization study shows that a limit of 3.8 lbs/ton of clinker or less can be achieved through SNCR at the Tijeras facility, EHD will commit to a revision of the SIP in the future to incorporate a new limit that is achievable based on the results of the optimization study.

[245] https://www3.epa.gov/ttncatc1/dir1/fsncr.pdf

- DSI a technically feasible and cost-effective control measure for SO_2. The GCC Tijeras facility will implement this control measure to achieve a legally enforceable emission limit of 0.88 lbs/ton of clinker on 30 day rolling average. If a limit of 0.60 lbs/ton of clinker or less is achievable based on 3 years of CEMS data including data from the operation of DSI, EHD will commit to a revision of the SIP in the future to incorporate a new limit that is achievable following the operation of the CEMS and DSI.

Chapter 8: Long-term Strategy for Second Planning Period

8.1 Regulatory Requirements

The Regional Haze Rule requires that this Regional Haze SIPr Round 2 (2019-2028) contain a long-term strategy[246] that addresses regional haze visibility impairment for each mandatory Class I Area within the State and for each mandatory Class I Area located outside the State that may be affected by emissions from the State. In the case of this SIP element the focus is on a particular county within the State of New Mexico. The long-term strategy must include the enforceable emissions limitations, compliance schedules, and other measures necessary to make reasonable progress, as determined pursuant to (f)(2)(i) through (iv).

8.2 Control Measures from Selected Sources - Four Factor Analysis

As described in the previous chapter, EHD has determined that the two technically feasible and cost-effective controls for NO_x and SO_2, respectively, are SNCR and DSI at GCC's Tijeras facility.

SNCR will be implemented (following an optimization period of no more than 18 months) at a legally enforceable emission limit of 4.1 lbs/ton of clinker on a 30-day rolling average, with a reconsideration allowed of that limit if compliance results in any violation of a local, state, or federal air standard.

DSI will be implemented (following an optimization period of no more than 12 months) with an emission limit of 0.88 lbs/ton of clinker (12 month rolling average).

These requirements will be made legally enforceable through a construction permit modification, and will go into effect prior to the final SIP package is submitted to EPA. The permit modification specific to regional haze conditions will include language that states those conditions cannot be modified, and will include standard monitoring, reporting, and recordkeeping requirements.

CEMS will be required to be installed for NOx and SO2 at the GCC Tijeras facility following final approval by EPA of this SIP element in order to obtain the most accurate emissions data going forward. GCC will have to have CEMS for NOx and SO2 operating by January 1, 2026.

8.3 Interstate Planning

EHD consulted early, in collaboration with NMED, with neighboring states to evaluate data provided by the WRAP to see what interstate impacts may exist for regional haze purposes. As mentioned in Chapter 4, WEP data made available from the WRAP showed there was minimal impact from Bernalillo County on Class 1 Areas in neighboring states. Bernalillo County also has the advantage of not sharing a border with states that are next to New Mexico, so most of the impacts from Bernalillo County are to Class 1 Areas within the State of New Mexico. EHD met weekly with NMED regarding regional haze strategy, and in some cases more often than once a week. Numerous parts of this SIP were developed in close cooperation with NMED, such as Chapter 6. Thus, a good planning framework between EHD and NMED is already in place.

[246] 40 CFR § 51.308(f)(2).

EHD also attended regional haze bi-monthly check ins with other WRAP states to discuss strategy for the second planning period, and to address numerous issues that other WRAP states came across.

No neighboring state to New Mexico asked EHD to implement any specific measures for the second planning period. A draft SIP will be provided to neighboring states.

8.4 Consideration of Additional Factors for the Long-term Strategy

The Regional Haze Rule requires EHD to consider the following additional factors in developing its long-term strategy[247]:

1) Emission reductions due to ongoing air pollution control programs, including measures to address reasonably attributable visibility impairment;

2) Measures to mitigate the impacts of construction activities;

3) Source retirement and replacement schedules;

4) Basic smoke management practices for prescribed fire used for agricultural and wildland vegetation management purposes and smoke management programs; and

5) The anticipated net effect on visibility due to projected changes in point, area, and mobile source emissions over the period addressed by the long-term strategy.

The entirety of the WRAP technical support document, *WRAP Technical Support System for Regional Haze Planning: Modeling Methods, Results, and References,* is included in this Regional Haze SIPr Round 2 (2019-2028) as Appendix B. This document provides information on the visibility monitoring, emissions, and air quality modeling analyses that support the 15 western states in developing regional haze state implementation plans (SIPs). The Modeling Methods, Results, and References document describe the WRAP modeling analyses and illustrates how the WRAP TSS products can be applied and interpreted to support the 2028 visibility progress demonstrations for western U.S. Class I Areas.

The anticipated net effect on visibility due to projected changes in point, area, and mobile source emissions

This SIP meets the requirement to consider visibility impacts of projected changes in certain categories of emissions in developing a LTS pursuant to 40 CFR 51.308(f)(2)(iv)(E). The WRAP emissions inventory scenarios and air quality modeling discussed in this section account for known 2028 visibility impacts of projected 2028 emissions for point, area, and mobile sources across the 13 WRAP states. When selecting a cost effectiveness threshold and control measures for the planning period, WEP data from Class 1 Areas provided by the WRAP were considered in determining what was reasonable to require for this planning period.
WRAP's modeling of the projected 2028 emissions was conducted prior to when EHD completed the four-factor analysis and selection of controls, and does not reflect emission reductions that could be achieved from implementation of those controls. Therefore, the projections as stated below are

[247] 40 CFR 51.308(f)(2)(iv).

conservative and likely overstate aerosol light extinction contribution from Bernalillo County. However, given that EHD only has one source for this plan, they are still generally representative of the expected future scenario.

Emission reductions due to ongoing air pollution control programs

The Regional Haze Rule requires consideration of emission reductions due to ongoing air pollution control programs as part of the LTS. Additional mobile source control measures are being implemented during the second planning period (2019-2028). On May 5, 2022, the AQCB in conjunction with the EIB adopted *New Motor Vehicle Emission Standards*, at 20.11.104 NMAC and 20.2.91 NMAC, respectively, both taking effect on July 1, 2022.

The goal of these rules, referred to collectively as the Clean Car Rule, is to adopt and implement California's Advanced Clean Cars I vehicle emission standards and requirements statewide pursuant to Section 177 of the federal Clean Air Act. The Clean Car Rule establishes low-emission and zero-emission standards for new cars and trucks offered for sale in New Mexico for model years 2026 and later to improve air quality, provide consumers more choices, save New Mexicans money, and protect the environment.

Pollution from transportation accounts for a large portion of New Mexico's greenhouse gas emissions and contributes to the state's growing ozone problem, affecting vulnerable groups. New vehicle standards can significantly improve air quality, including ground-level ozone, especially along heavily-traveled urban corridors where traditionally disadvantaged populations disproportionately live and work. The Clean Car Rule will reduce transportation sector emissions by making about 3,800 additional zero-emission passenger cars – such as battery electric vehicles – available in dealer showrooms in New Mexico each year. The Clean Car Rule is projected to eliminate about 130,000 tons of greenhouse gases and over 1,700 tons of harmful ozone-forming air pollution in New Mexico by 2050.

In July 2023, EHD and NMED proposed amending 20.11.104 NMAC and 20.2.91 NMAC to incorporate California's Advanced Clean Cars II and Advanced Clean Trucks vehicle emission standards and requirements. The proposed changes require automakers to deliver an increasing percentage of new zero-emission cars and light duty trucks to New Mexico each year, moving toward the requirement that 82% of all new vehicles delivered by the automakers for sale in New Mexico by 2032 are zero-emission vehicles.

The Advanced Clean Vehicle rules were adopted by the AQCB and the EIB on November 16, 2023. The rules will reduce nitrogen oxides by thousands of tons and particulate matter by hundreds of tons – especially along transportation corridors – and decrease carbon dioxide by millions of tons.

Along with these rules, Bernalillo County continues to have an inspection & maintenance emissions testing program in place for vehicles registered in the county. The program requires that all 1987 and newer vehicles under 10,001 pounds registered in Bernalillo County pass an emissions inspection in order to be eligible for registration with the New Mexico Motor Vehicle Division. The program captures most vehicles with tailpipe emissions, including gas-electric hybrid. Over 250,000 emissions tests are conducted annually at 130 air care stations throughout the Albuquerque metro area.

Measures to mitigate the impacts of construction activities

Numerous regulations as part of NSR for major sources are currently in place. NMAC 20.11.41, Construction Permits, is used to regulate new construction. NMAC 20.11.41 allows EHD to deny a permit application if the department determines that any construction activity will result in an exceedance of the NAAQS. Bernalillo County also has a fugitive dust program, codified as NMAC 20.11.20 and mentioned in Chapter 5. Some efforts to mitigate construction impacts associated with fugitive dust include wetting the ground at construction sites, limiting stockpile height, maintaining optimum moisture content in soil, silt fences, dust suppressants, clean up and removal of track out material, xeriscaping, reseeding using native grasses, monitoring of high wind days, and enforcement of violations.

NMAC 20.11.61, Prevention of Significant Deterioration, regulates major sources or major modifications in attainment areas. Increments are in place as part of this regulation to make sure there is no exceedance of the NAAQS. As part of NMAC 20.11.61, the owner or operator of a proposed major stationary source or major modification must do an analysis of visibility impacts. The department can require monitoring of visibility in a Class 1 Area if the department determines than an adverse impact on visibility may occur due primarily to the operations of the proposed new source or modification.

NMAC 20.11.60, Permitting in Nonattainment Areas, regulates major stationary sources or major modifications in a non-attainment area. The requirements in NMAC 20.11.60 are more stringent, including required emission reductions to offset increases. NMAC 20.11.60 contains a visibility component, including a required visibility analysis for any new major stationary source or major modification in a non-attainment area, as well as required consultation with federal land managers prior to department approval of any permit.

Fugitive and Unpaved Road Dust

The First Period SIP proactively provided for control of PM 10 and PM2.5 emissions from unpaved roads and stationary fugitive dust sources through 20.11.20 NMAC, *Fugitive Dust Control*.[248]

EHD is currently working on a *High Wind Fugitive Dust Mitigation Plan for Bernalillo County*, which is available for public comment as of March 2024. The impetus for these actions was the finalization by EPA of revisions to its 2007 Exceptional Events Rule, on September 16, 2016.[249] The Exceptional Events Rule, codified in 40 CFR Parts 50 and 51, provides air quality agencies regulatory relief in situations when exceptional events cause an exceedance of a NAAQS. Exceptional events can be caused by human activity unlikely to recur, or by natural events. In New Mexico, natural events, such as windstorms and wildfires, cause exceedances of the particulate matter standards every year.

Other exceptional events such as tornadoes, firework displays, and chemical spills may occur. The revised rule includes requirements for states to prepare mitigation plans (40 CFR 51.930, *Mitigation of Exceptional Events*) for areas with recurring events (i.e. three similar events of the same type and pollutant in a three-year period). Bernalillo County was identified as areas subject to the mitigation plan requirements due to PM_{10} exceedances from high winds. The mitigation plan was developed to mitigate PM_{10} and $PM_{2.5}$ emissions during high wind events in Bernalillo County.

[248] *Id.*

[249] 81 Fed. Reg. 68216(October 3, 2016) (Treatment of Data Influenced by Exceptional Events).

20.11.20 NMAC, *Fugitive Dust Control*, applies to certain sources of fugitive dust that are not required to obtain a construction permit from EHD. Sources of fugitive dust subject to the rule include disturbed surface areas and inactive disturbed surface areas equal to or greater than one acre and any commercial or industrial bulk material processing, handling, transport or storage operations.

The rule requires that all sources of fugitive dust use reasonably available control measures to prevent fugitive dust from leaving the site on which it is produced and work to reduce the amount of those emissions. It also requires sources of fugitive and unpaved road dust to obtain permits and pay related fees, and it limits the construction of new unpaved roads more than ¼ mile in length. EHD has an active enforcement program in place to implement these and other provisions of this regulation, including detailed requirements for specific control measures. EHD implemented this regulation throughout the period since the most recent progress report and continues rely on this regulation to achieve its fugitive dust management goals. EHD is not proposing amendments to this regulation at this time.

The draft Fugitive Dust Mitigation Plan encourages, but does not require, the use of best practices outlined by the United States Department of Agriculture Natural Resources Conservation Service (NRCS) to mitigate particulate matter emissions from agricultural land management, cropping operations, and livestock and poultry operations (e.g., maintaining soil surface cover; in-field pass reductions; soil conditioning and timing of operations modifications; wind barriers; equipment modifications; bulk material handling; unpaved roadway management; nutrition and feed management; animal confinement; manure management; land application; pasture and range management; and mortality management).

Source retirement and replacement schedules

This requirement does not apply to any of the sources subject to a four-factor analysis for Bernalillo County, and is not being considered as part of the Bernalillo County SIP element.

Smoke Management Plan

This requirement was addressed in Section 5.3.4. The current smoke management plan is codified in NMAC 20.11.21. It helps control fire-related emissions of VOC's, NOx, elemental carbon, organic carbon, and PM2.5. There are requirements for prescribed burning in the regulation, including timing limitations, consideration of meteorological factors, public notice, documentation, and emission reduction techniques such as burning before precipitation or use of an air curtain incinerator. EHD has no plans to change the current smoke management plan at this time, as there is no indication it is not achieving its desired effect or that smoke from Bernalillo County is a concern.

8.5 Continuation of 309 Control Measures

Pursuant to the first planning period SIP, EHD must contribute to the SO_2 milestone report compiled by the WRAP every year. EHD has been continuing to provide reported annual SO_2 emissions from GCC Tijeras, the one facility subject to the report, each year for WRAP to include in the report. The report is presented to the AQCB every year for approval after being published on EHD's website for a 30-day

public comment period[250], with notice also sent out to the Albuquerque Journal and EHD's Listserv. Once the report is approved, a final determination that the milestone has been met is sent to the EPA.

Since the time the milestone was first evaluated pursuant to the first planning period BART alternative option, the milestone has always been met, and the backstop trading program has not been triggered.

8.6 Conclusion

Numerous programs are in place to continue the momentum toward emission reductions for visibility impairing pollutants through the second planning period. The four-factor analysis and review, conducted at the one facility in the county, GCC Tijeras, resulted in a determination that two controls for NO_x and SO_2 were technically feasible and cost effective. Those controls will be established with a legally enforceable emission limit of 0.88 lbs/ton of clinker for SO_2 on a 12-month rolling average, and a legally enforceable emission limit of 4.1 lbs/ton of clinker for SNCR on a 30-day rolling average. GCC's current construction permit will be modified to reflect these limits, along with scenarios for optimization of SNCR. Estimated NO_x reductions from ERG's analysis are 326 tons per year and SO2 reductions of 161 tons per year. However, for NO_x, reductions will be better quantified following an optimization period and the installation of CEMS.

[250] https://www.cabq.gov/airquality/documents/draft-2022-so2-milestone-report.pdf

Chapter 9: Regional Scale Modeling of the LTS to Set RPG Goals for 2028

9.1 Regulatory Requirements

The 2017 Regional Haze Rule, 40CFR 51.308(f)(3)(i) requires that states establish reasonable progress goals that reflect visibility conditions projected to be achieved by the end of the planning period as a result of the long-term strategy. The long-term strategy and the reasonable progress goals must provide for an improvement in visibility for the most impaired days since the baseline period. Reasonable progress goals are shown for each New Mexico Class I Area in section 10.2.

The 2017 Regional Haze Rule, 40 CFR 51.308(f)(3)(ii)(A) requires that any state containing a Class I Area with a slower rate of improvement than the URP must provide a robust demonstration. This robust demonstration should include the criteria used to determine which sources were evaluated and how the four factors required by 40 CFR 51.308(f)(2)(i) were taken into consideration in selecting the measures to include in its long-term strategy. This obligation does not require that states demonstrate that the long-term strategy will be sufficient to be on the URP glidepath; rather, states should demonstrate that they have taken all reasonable measures to improve visibility at the Class I Areas.

The long-term strategy and reasonable progress goals must also ensure that there is no degradation in visibility for the clearest days since the baseline period. Demonstrations of no degradation in future years for each New Mexico Class I Area are shown in section 9.3.

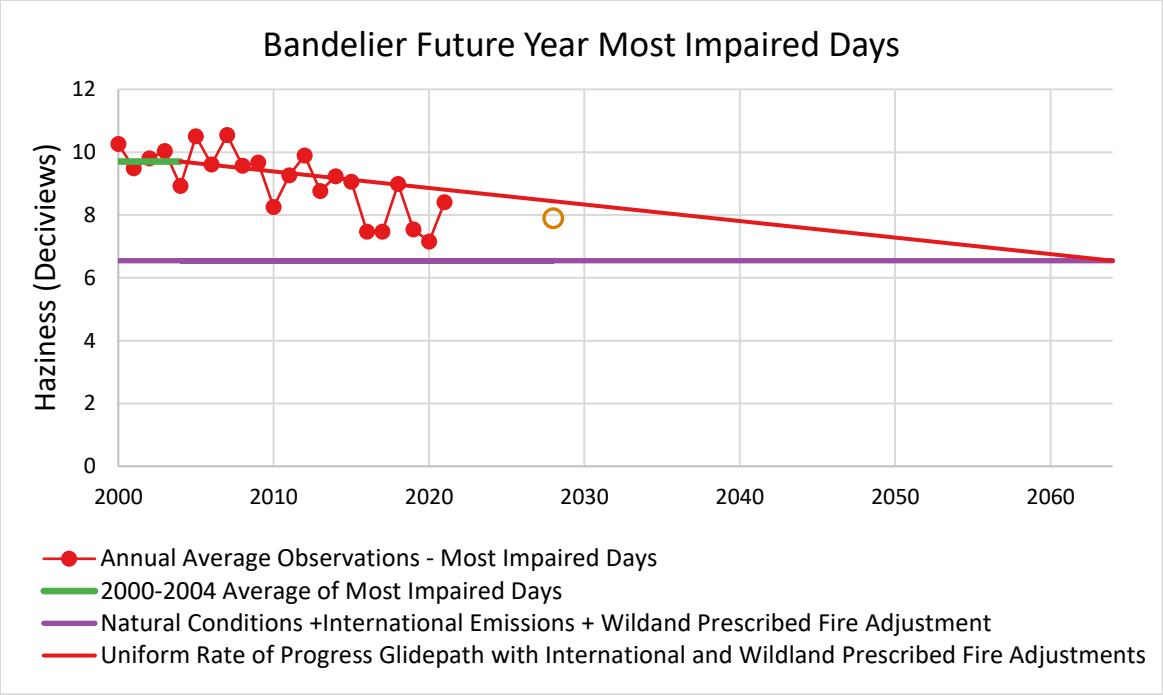
9.2 Modeled Future Year Most Impaired Days for New Mexico Class I Areas

Section 10.2 shows the reasonable progress goals as modeled future year most impaired days for each Class I Area in New Mexico. Modeled future year most impaired days are based on the WRAP 2028 'On the Books' modeling scenario (2028OTBa2)[251]. This modeling scenario includes regulations that were already adopted by regulatory agencies as of September 2020. The future year visibility on the MID at each Class I Area in New Mexico is projected to be below the URP glidepath adjusted for international emissions and wildland prescribed fire, with the exception of Salt Creek Wilderness area. Salt Creek Wilderness area is projected to be above the URP glidepath in the future year (2028). See the NMED regional haze SIP for the second planning period for the robust demonstration for Salt Creek Wilderness area.

9.2.1 Bandelier Wilderness Area

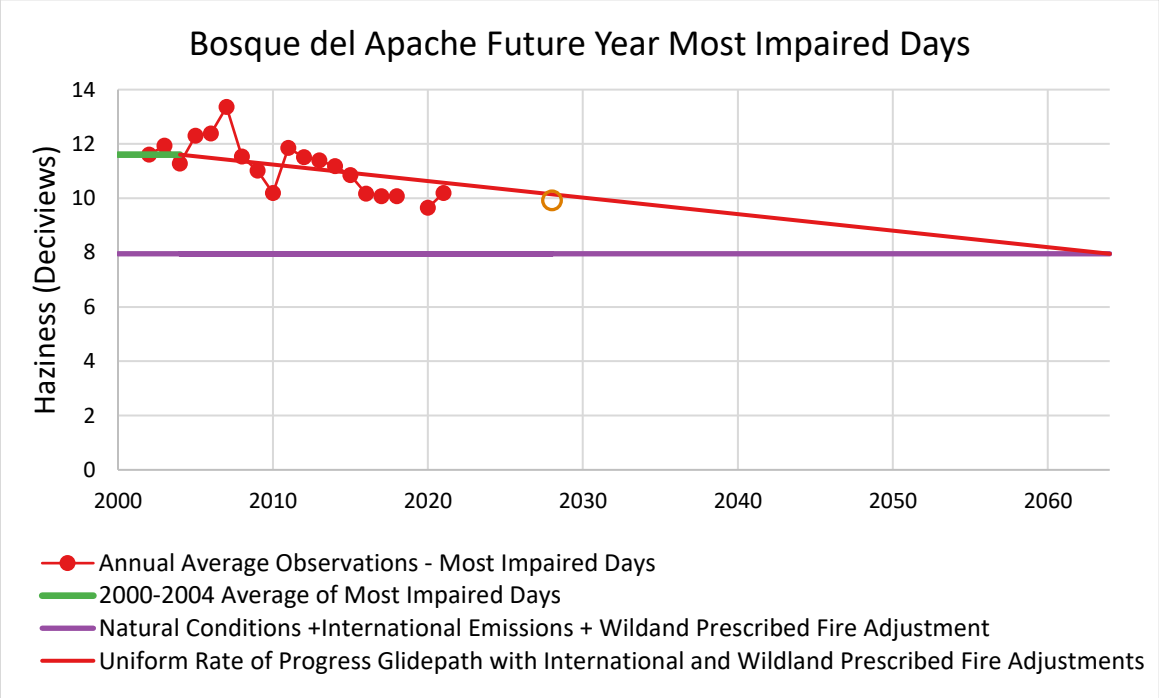
Figure 9-1 Reasonable Progress Goals for Bandelier Wilderness Area

[251] https://views.cira.colostate.edu/iwdw/docs/WAQS_and_WRAP_Regional_Haze_spec_sheets.aspx



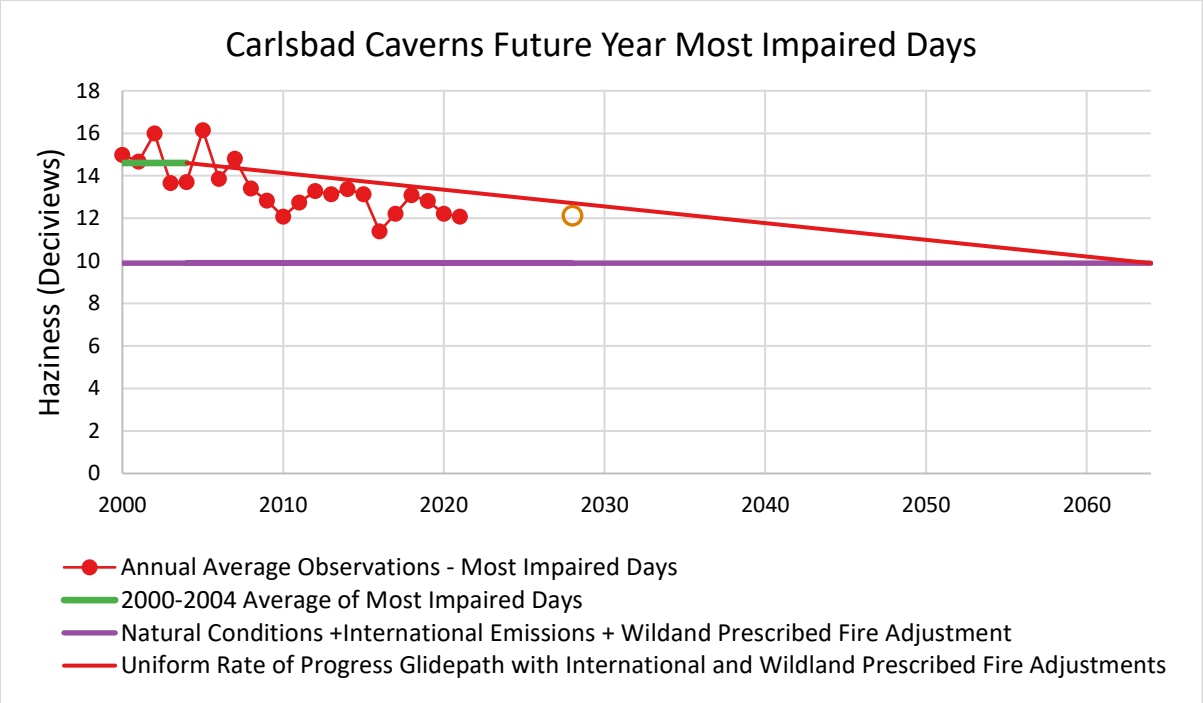
9.2.2 ***Bosque del Apache Wilderness Area***

Figure 9-2 Reasonable Progress Goals for Bosque del Apache Wilderness Area



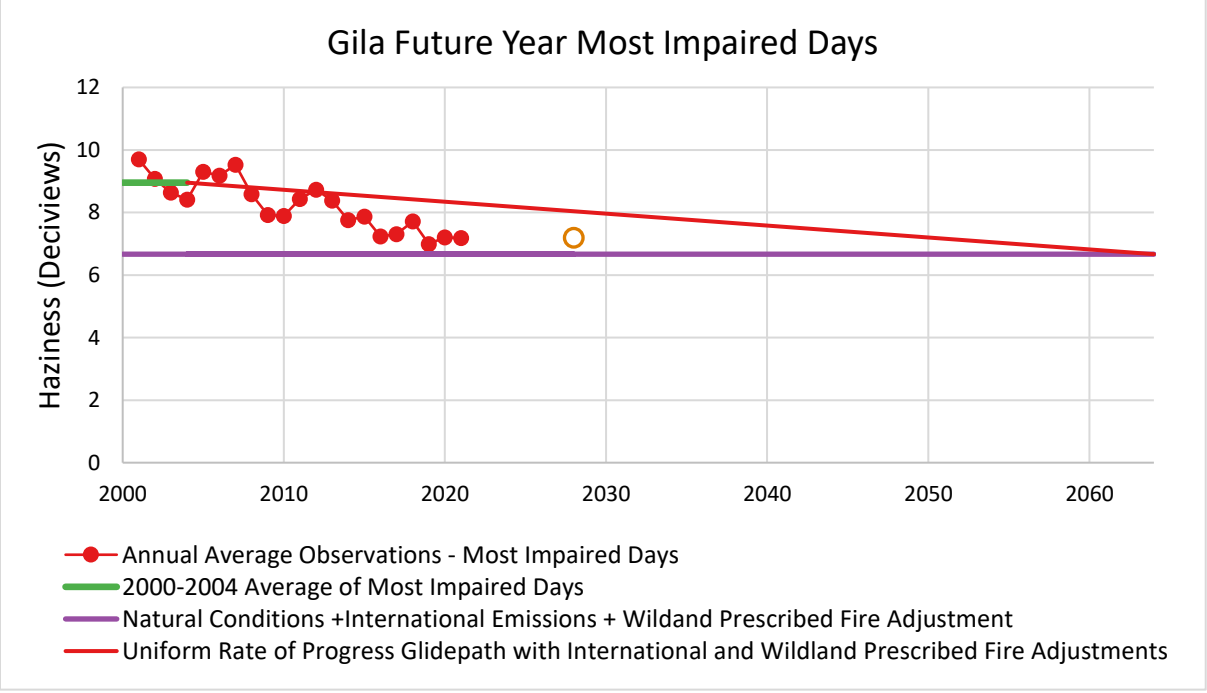
9.2.3 ***Carlsbad Caverns National Park***

Figure 9-3 Reasonable Progress Goals for Carlsbad Caverns National Park



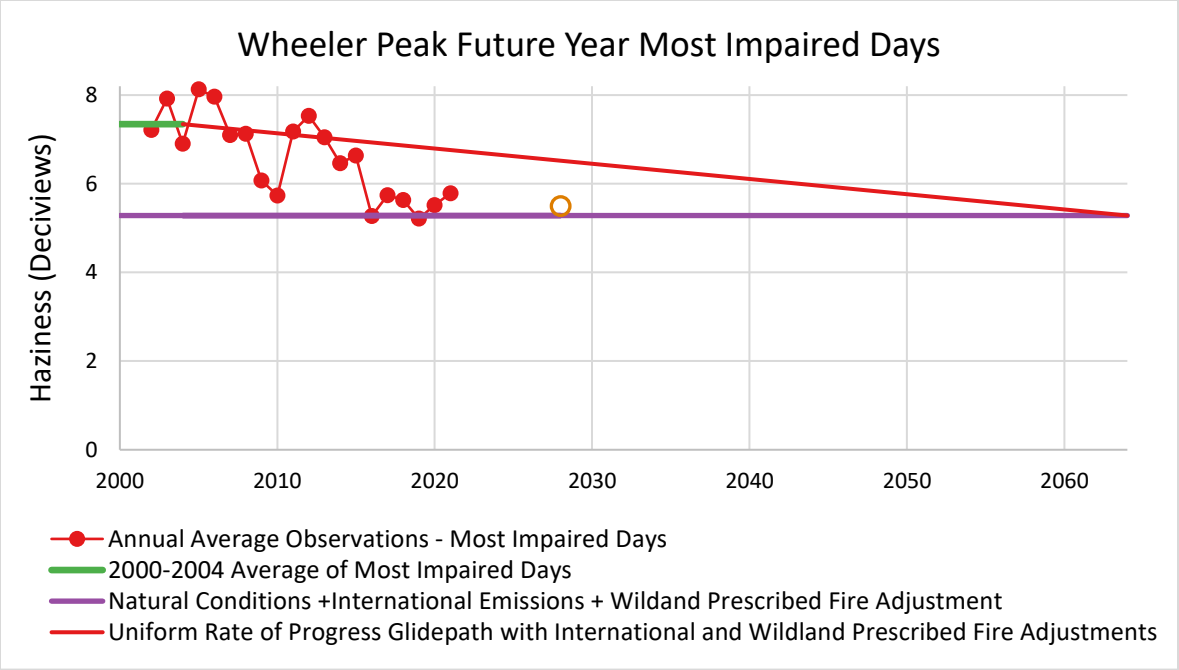
9.2.4 Gila Wilderness Area

Figure 9-4 Reasonable Progress Goals for Gila Wilderness Area



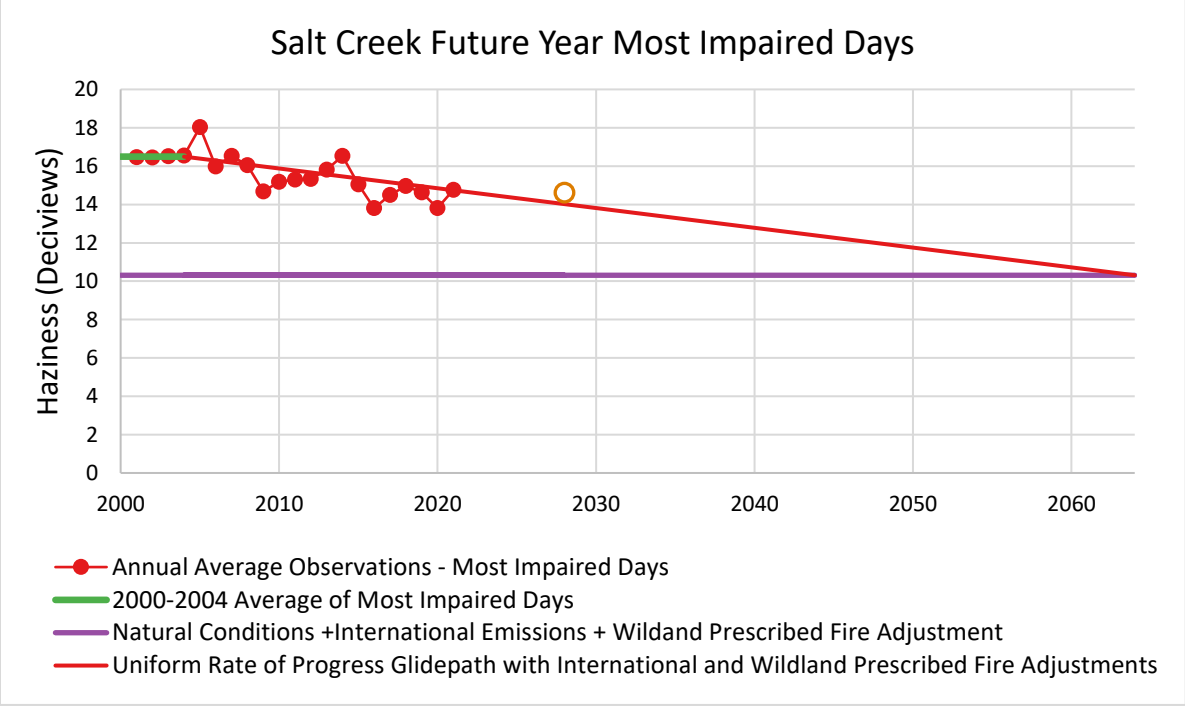
9.2.5 Pecos Wilderness Area & Wheeler Peak Wilderness Area

Figure 9-5 Reasonable Progress Goals for Wheeler Peak Wilderness Area



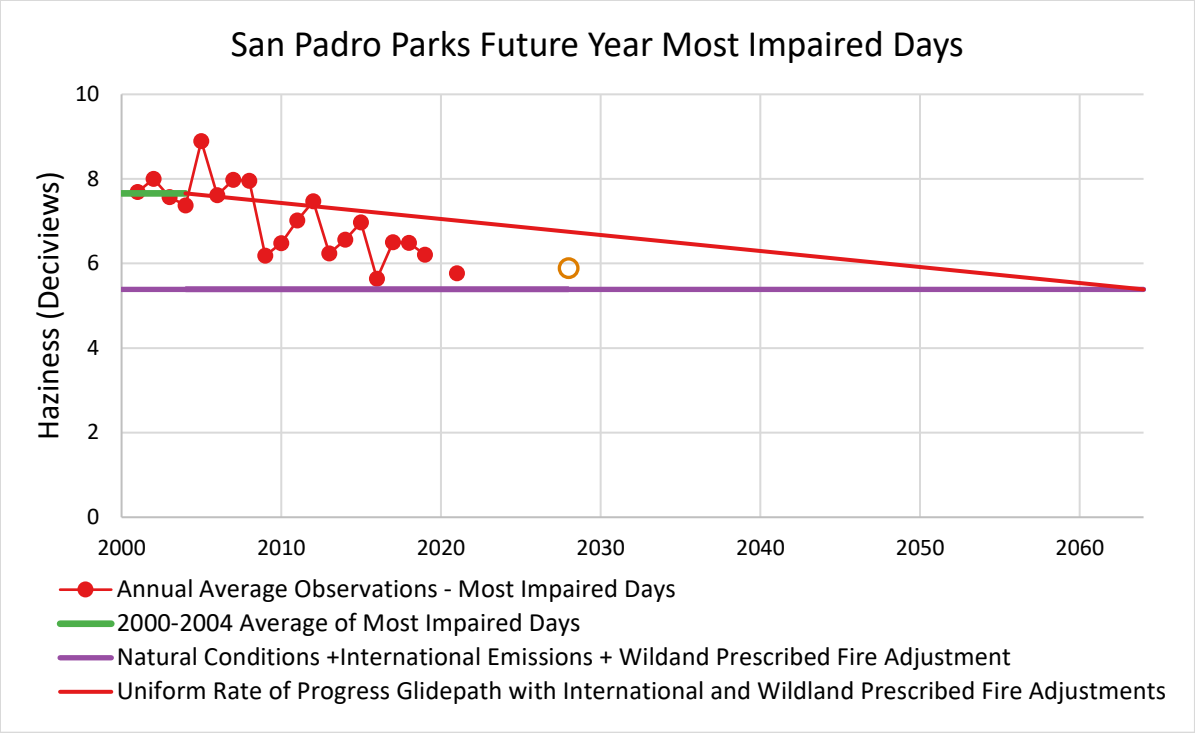
9.2.6 Salt Creek Wilderness Area

Figure 9-6 Reasonable Progress Goals for Salt Creek Wilderness Area



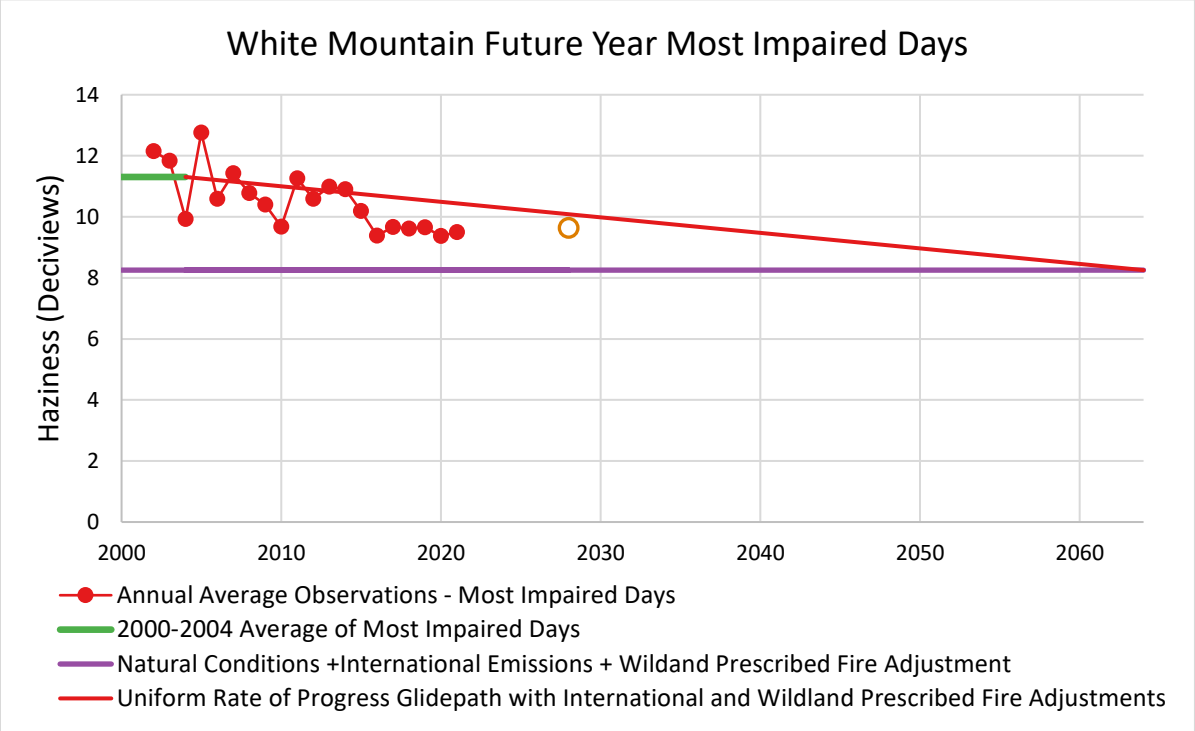
9.2.7 San Pedro Parks Wilderness Area

Figure 9-7 Reasonable Progress Goals for San Padro Parks Wilderness Area



9.2.8 White Mountain Wilderness Area

Figure 9-8 Reasonable Progress Goals for White Mountain Wilderness Area

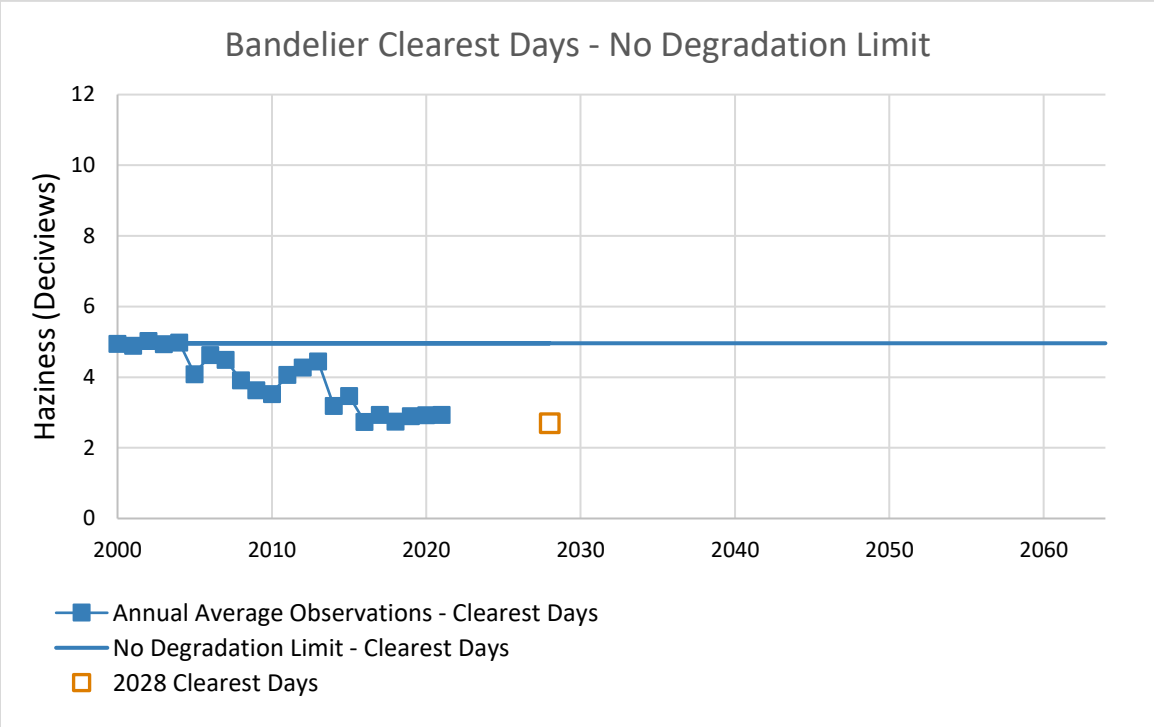


9.3 Modeled Future Year Clearest Days for New Mexico Class I Areas

Section 9.3 shows the reasonable progress goals as modeled future year clearest days for each Class I Area in New Mexico. Modeled future year clearest days are based on the WRAP 2028 'On the Books' modeling scenario (2028OTBa2). The future year visibility on the clearest days is projected to be below the no degradation limit at all Class I Areas in New Mexico.

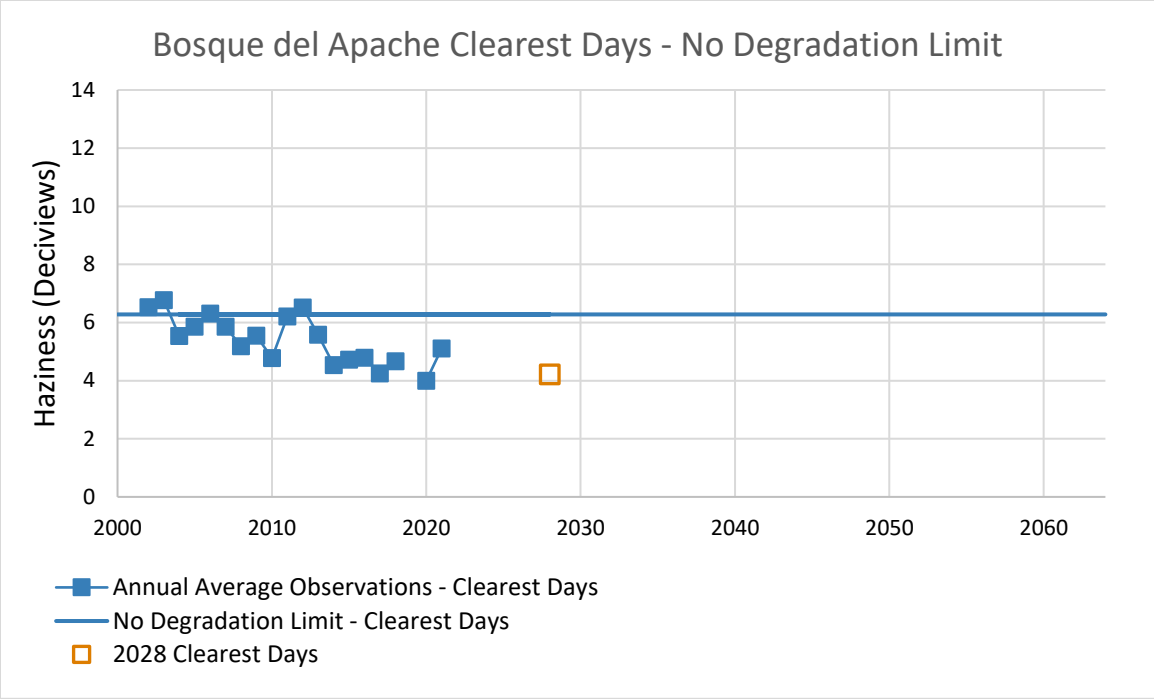
9.3.1 Bandelier National Wilderness Area

Figure 9-9 Future Year Clearest Days at Bandelier National Wilderness Area



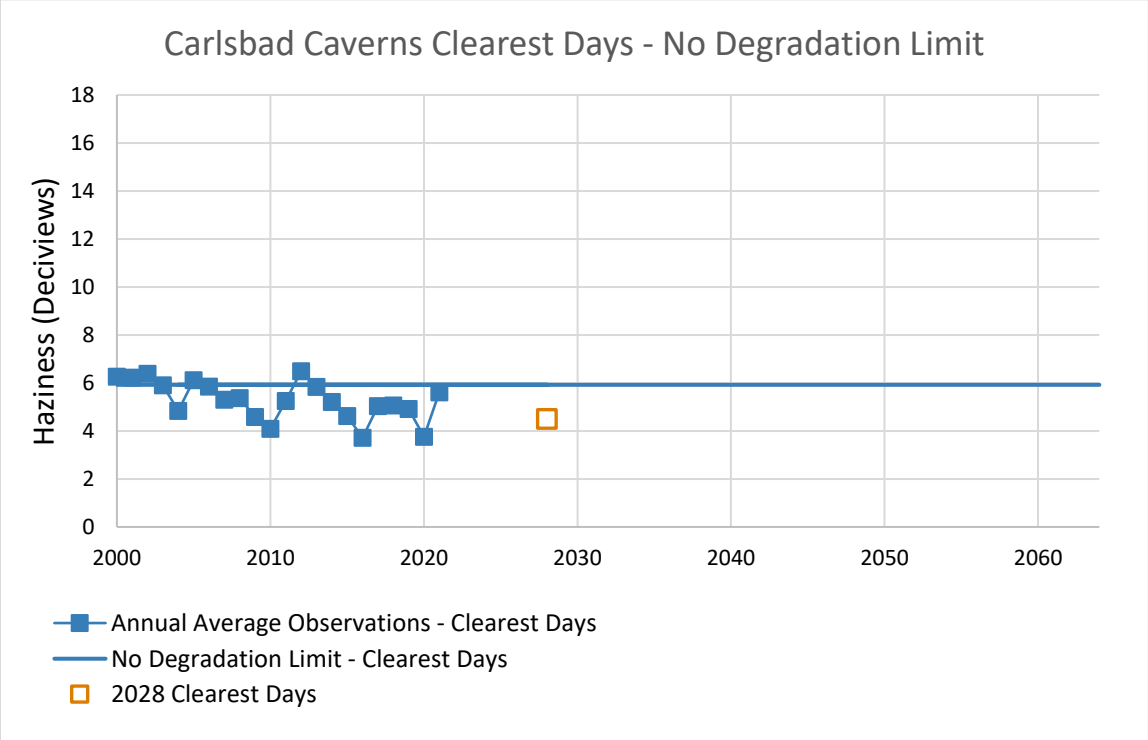
9.3.2 Bosque del Apache Wilderness Area

Figure 9-10 Future Year Clearest Days at Bosque del Apache National Wildlife Refuge



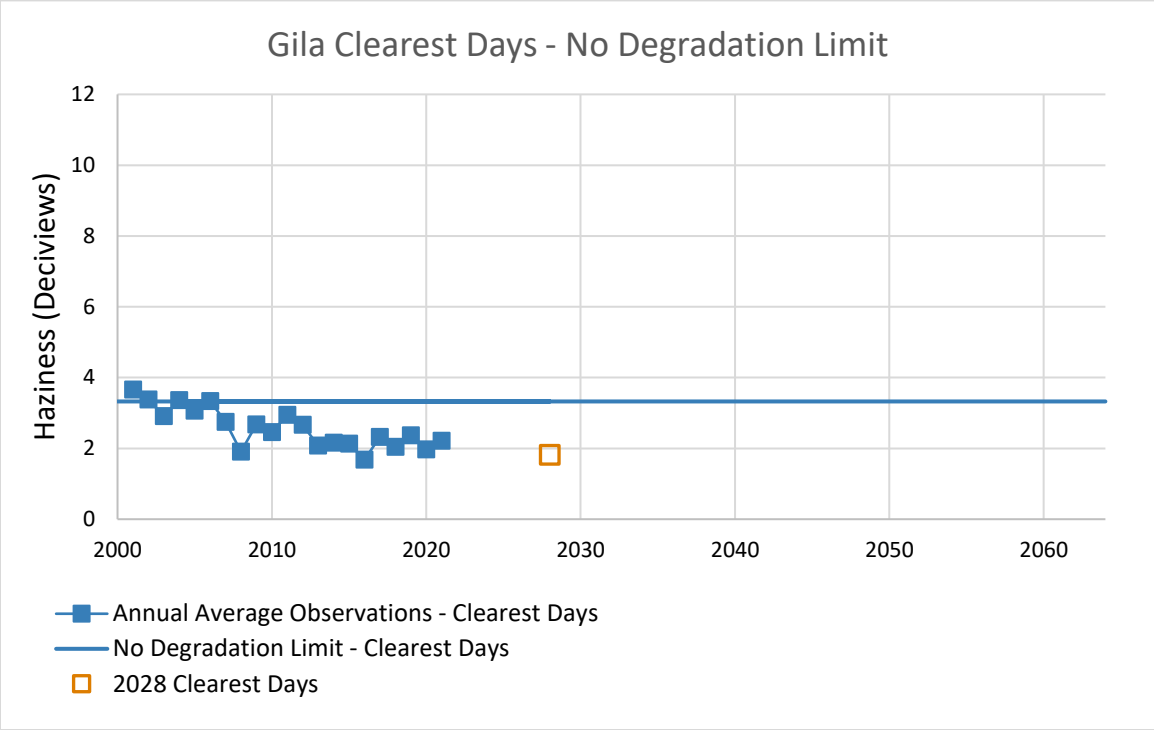
9.3.3 ***Carlsbad Caverns Wilderness Area***

Figure 9-11 Future Year Clearest Days at Carlsbad Caverns National Park



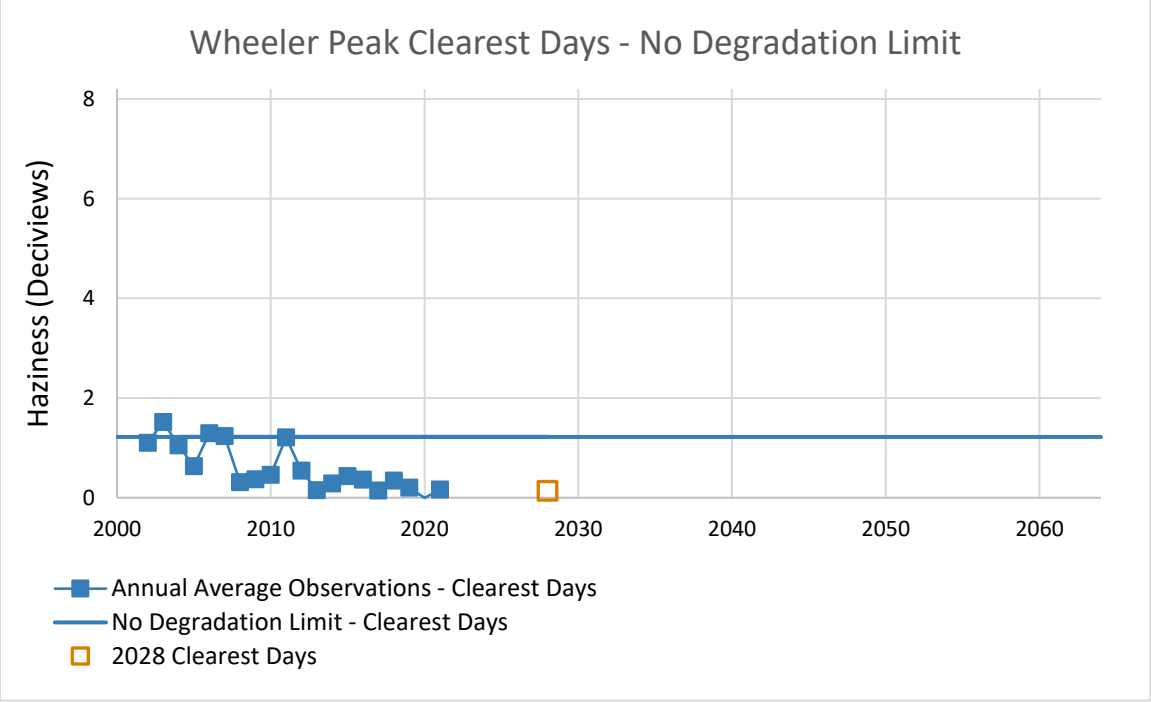
9.3.4 *Gila Wilderness Area*

Figure 9-12 Future Year Clearest Days at Gila Wilderness Area



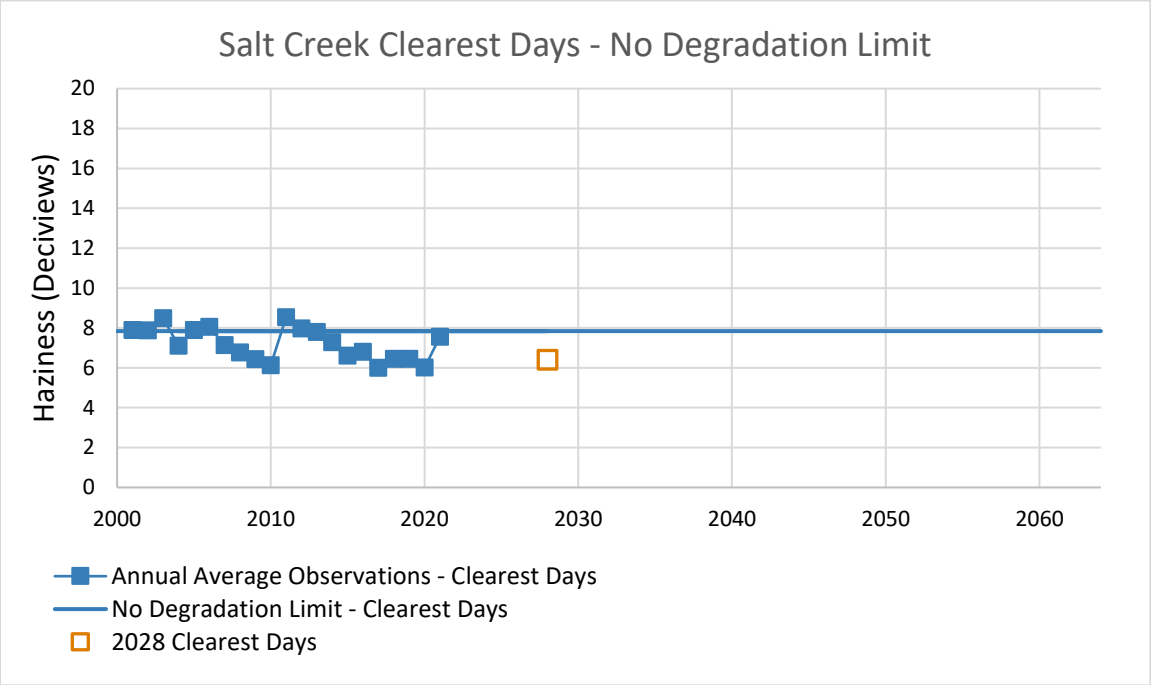
9.3.5 *Pecos Wilderness Area & Wheeler Peak Wilderness Area*

Figure 9-13 Future Year Clearest Days at Wheeler Peak Wilderness Area



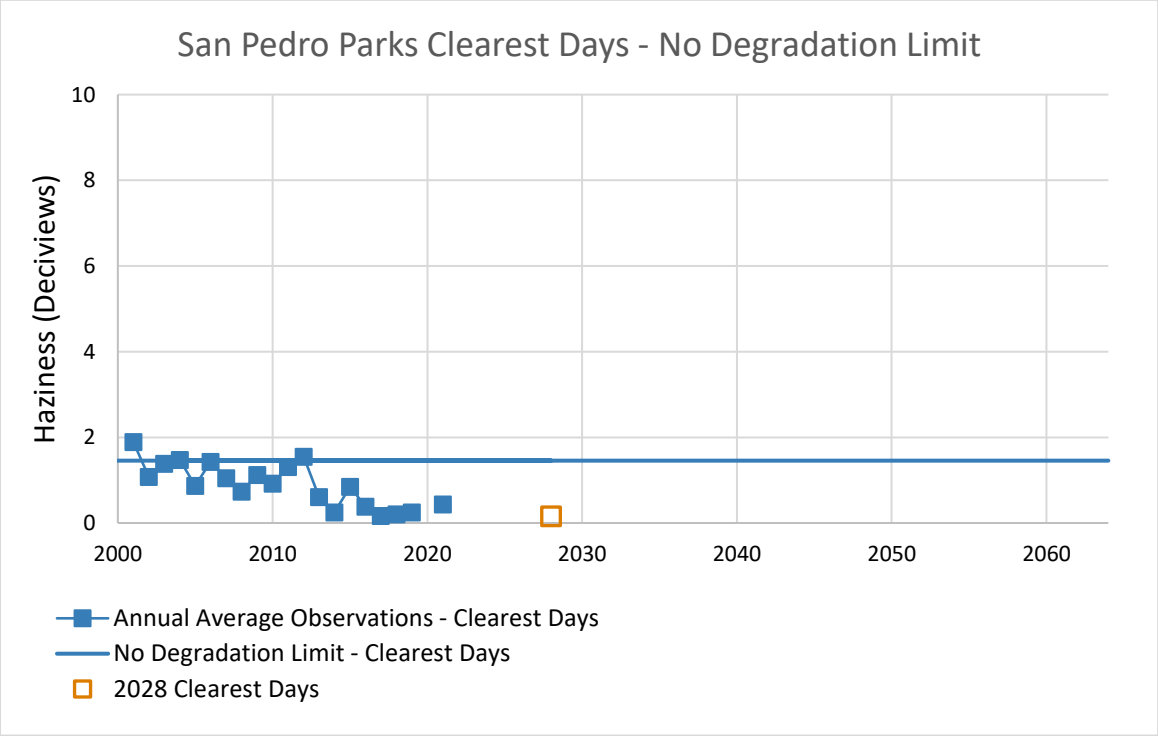
9.3.6 *Salt Creek Wilderness Area*

Figure 9-14 Future Year Clearest Days at Salt Creek Wilderness Area



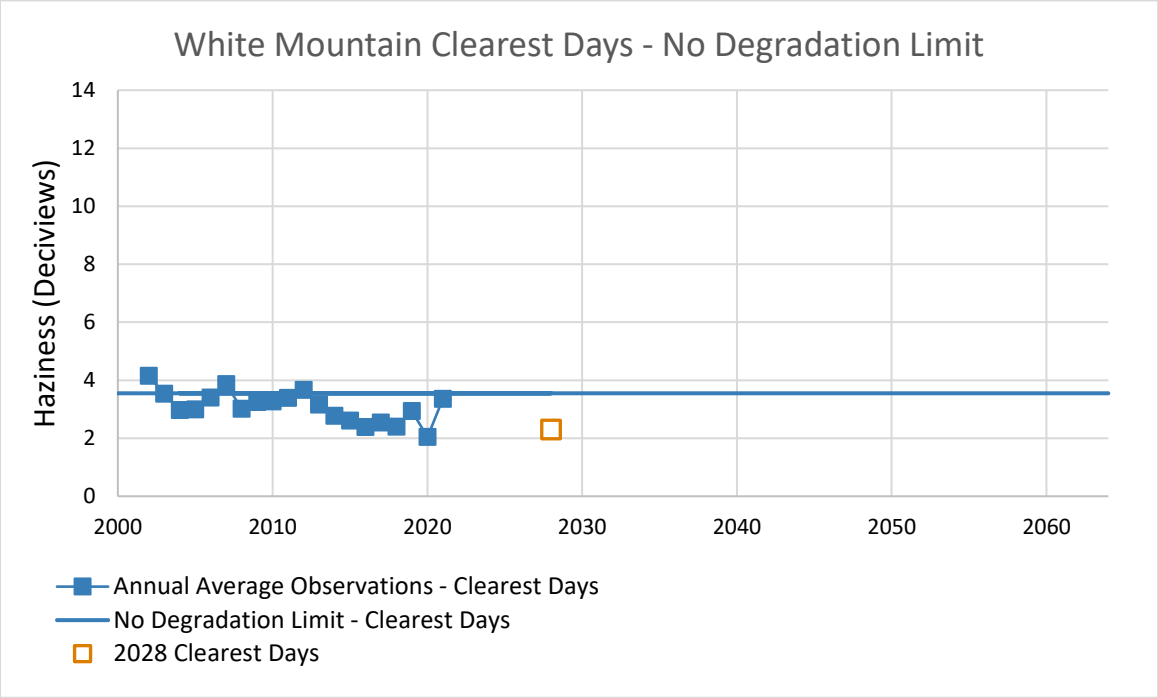
9.3.7 *San Padro Parks Wilderness Area*

Figure 9-15 Future Year Clearest Days at San Pedro Parks Wilderness Area



9.3.8 White Mountain Wilderness Area

Figure 9-16 Future Year Clearest Days at White Mountain Wilderness Area



10 Progress, Degradation, and URP Glidepath Checks for Class I Areas in New Mexico

10.1 Regulatory Requirements for Uniform Rate of Progress Glidepath Check and No Degradation Limits

The 2017 Regional Haze Rule, 40 CFR 51.308(f)(1)(vi), requires that a Uniform Rate of Progress (URP) be calculated for each mandatory Class I Area in the state by calculating the rate of improvement needed to reach the natural visibility condition in 2064 from the baseline visibility condition for the most impaired days (MIDs). States may propose adjustments to the URP for: 1) international emissions, and 2) impacts from wildland prescribed fires.[252] The Western Regional Air Partnership (WRAP) estimated these adjustments. New Mexico has elected to use them in consideration of Reasonable Progress Goals. Further discussion of these adjustments can be found in Chapter 3.

The 2017 Regional Haze Rule, 40CFR 51.308(f)(3)(i), requires that states establish reasonable progress goals that reflect the visibility conditions that are projected to be achieved by the end of the implantation period as a result of the long-term strategy. The long-term strategy and the reasonable progress goals must provide for an improvement in visibility for the most impaired days since the baseline period. Reasonable progress goals, as future year modeling, are shown for each New Mexico Class I Area in section 10.2.

The 2017 Regional Haze Rule, 40 CFR 51.308(f)(3)(ii)(A), requires that any state containing a Class I Area with a slower rate of improvement than the URP must provide a robust demonstration. This robust demonstration should include the criteria used to determine which sources were evaluated and how the four factors required by 40 CFR 51.308(f)(2)(i) were taken into consideration in in selecting the measures for including in its long-term strategy. This obligation does not require that states demonstrate that the long-term strategy will be sufficient to be on the URP glidepath; rather, states should demonstrate that they have taken all reasonable measures to improve visibility at the Class I Area. A robust demonstration for Salt Creek Wilderness Area is shown in the NMED regional haze SIP for the second planning period.

The long-term strategy and reasonable progress goals must also ensure that there is no degradation in visibility for the clearest days since the baseline period. Demonstrations of no degradation in future years for each New Mexico Class I Area are shown in section 10.3.

10.2 URP Glidepath Check for Most Impaired Days at each Class I Area in New Mexico

Section 9.2 shows the reasonable progress goals as modeled future year most impaired days for each Class I Area in New Mexico. Modeled future year most impaired days are based on the WRAP 2028 'On the Books' modeling scenario (2028OTBa2)[253]. This modeling scenario includes regulations already adopted by regulatory agencies as of September 2020. The future year visibility on the MID at each Class I Area in New Mexico is projected to be below the URP glidepath adjusted for international emissions

[252] https://www.wrapair2.org/pdf/2028_Vis_Proj_Glidepath_Adj_2021-03-01draft_final.pdf
[253] https://views.cira.colostate.edu/iwdw/docs/WAQS_and_WRAP_Regional_Haze_spec_sheets.aspx

and wildland prescribed fire, with the exception of Salt Creek Wilderness area. The Salt Creek Wilderness area is projected to be above the URP glidepath in the future year (2028).

WRAP TSS WEP data indicates that Albuquerque-Bernalillo County has an extremely minimal, if any, impact on the Salt Creek Class 1 Area. Additionally, the Salt Creek Wilderness area is not in Bernalillo County's jurisdiction, being a local jurisdiction within the state. Therefore, the Salt Creek Wilderness area robust demonstration is not included in this SIP element. See the NMED regional haze SIP revision for the robust demonstration for the Salt Creek Wilderness area.

10.3 No Degradation Check for the Clearest Days at Each New Mexico Class I Area

Section 9.3 shows the reasonable progress goals as modeled future year clearest days for each Class I Area in New Mexico. Modeled future year clearest days are based on the WRAP 2028 'On the Books' modeling scenario (2028OTBa2). The future year visibility on the clearest days is projected to be below the no degradation limit at all Class I Areas in New Mexico.

10.4 Conclusions

New Mexico is projected to be below the glidepath for all Class 1 Areas in the state with the exception of the Salt Creek Wilderness Area. NMED's SIP provides a robust demonstration for Salt Creek. While there are no Class 1 Areas within Bernalillo County, analysis of the visibility data at Class 1 Areas is looked at on a statewide level, since Bernalillo County is a separate jurisdiction within a larger state.

11 Coordination and Discussions with Other Parties

This section describes the federal requirements regarding stakeholder input in the air quality regulatory process that were incorporated into this SIP, including requirements related to the public hearing to consider this SIP for submittal to EPA.

For purposes of this SIP, stakeholders in the air quality regulatory process include:

- State and local air quality agencies in states outside New Mexico.
- Indian tribes.
- Federal Land Mangers ("FLMs") for the agencies that administer the Class I Areas, which are the following:
    - U.S. Forest Service, Department of Agriculture;
    - Bureau of Land Management, Department of the Interior;
    - Fish and Wildlife Service, Department of the Interior;
    - National Park Service; U.S. Department of the Interior.
- The U.S EPA.
- Facilities subject to air quality regulations in Albuquerque - Bernalillo County and the remainder of the state of New Mexico.
- Public interest groups.
- Other stakeholders, such as businesses, nonprofits, or other individuals and organizations concerned with visibility protection in Class I Areas

Because the pollutants that lead to regional haze can originate from sources located across broad geographic areas, EPA has encouraged the states and tribes across the U.S. to address visibility impairment from a regional perspective, through regional planning organizations (RPOs). Albuquerque-Bernalillo County and New Mexico belong to the Western Regional Air Partnership (WRAP).

As with earlier chapters in this SIP, this chapter provides a general overview of the regulatory provisions governing content of this chapter before explaining the federal regulatory language in more detail.

11.1 Overview

Out of state Class I Areas were included in developing EHD and NMED's proposed source selection (Ch. 6) Q/d assessment, which was agreed on with FLMs in 2019 timeframe.

To date, EHD has not received any requests from any other states or Tribes to expand our source selection for the second implementation period. More specific discussions on particular individual point sources or groups of sources would need to be discussed with NMED more through additional consultations on interstate emissions. Due to the timing of these WRAP TSSv2 work products becoming available (see WRAP memo on modeling delays) (after WRAP states did source screening and after states reached out to sources for conducting four factor analyses), this information may be more helpful to be part of follow-up discussions for the third planning period and subsequent implementation.

Stakeholder participation in the development of this SIP took place in the following stages:

1) Initial WRAP planning process, 2017-2019

2) Outreach to additional stakeholders, 2019-2024
    a. Four Factor Analysis facilities;
    b. Air quality regulatory agencies in other states;
    c. FLMs;
    d. stakeholders in general.
3) Circulation of draft SIP for preliminary public comment, 2024 (July 2024)
4) Public hearing process through the AQCB, 2024 (September 2024)

In the work performed during these stages, EHD and NMED met EPA's public participation requirements, as this chapter will demonstrate. The Regional Haze Rule provides that states whose emissions may affect Class I Areas in other states must consult each other on coordinated emission management strategies. The Rule also provides that states must consult with FLMs for Class I Areas early enough in the SIP development process for FLM recommendations to meaningfully inform the state's decision on emission control measures. Finally, the rule allows state, local, and tribal air agencies to rely, for the substance of their SIP, upon technical analysis provided by an RPO.

Apart from these provisions, EPA regulations also require that any SIP submittal, on Regional Haze or another topic, meet certain public participation requirements. The public hearing on the SIP submittal to EPA must be held after prominent advertisement in the affected area for a minimum public notice period of 30 days. EPA regulations also require that documentation related to the hearing be available for public inspection and that notice of the hearing be given specifically to EPA and to other affected local and state air quality agencies.

To meet these requirements, EHD and NMED began consultation with other affected stakeholders well in advance of filing requests for a formal public hearing on their proposed Regional Haze SIPs.

Beginning in 2017, when EPA amended certain aspects of the Regional Haze Rule,[254] EHD and NMED cooperated on Regional Haze planning with each other and with the members of WRAP. Because the WRAP includes FLMs in its membership, EHD and NMED also began consulting early with the FLMs using WRAP as a forum. EHD and NMED consulted with WRAP members, including state, local, and tribal air agencies, in the context of regular WRAP meetings and teleconferences. EHD and NMED held individual state-to-state consultations with the air quality agencies for Arizona and Colorado, the two WRAP states bordering New Mexico. EHD and NMED also held consultations with state air agencies outside the WRAP, including Texas, Nebraska, and Arkansas. EHD and NMED opened specific consultation with permitted facilities subject to a Four Factor Analysis for potential new control measures directed at visibility impairing pollutants. The two agencies also made the general public aware of their statewide planning process for New Mexico through internet-based outreach and webinar-format educational events. EHD will make available this draft for public comment in accordance with notice requirements prior to a hearing on the SIP.

At each stage in this process of stakeholder participation prior to the public hearing process, EHD and NMED sought input on the SIP development process from stakeholders.

[254] 82 Fed. Reg. 3,078 (Jan. 10, 2017).

This chapter will summarize significant written comments and the response from EHD or NMED (if received). The full text of all written comments and responses received prior to the public hearing process appear as part of the final SIP submittal.[255]

11.2 Regulatory Requirements

The specific federal regulatory provisions regarding stakeholder participation in the Regional Haze planning process are as follows:

1) Where emissions from outside a state are "reasonably anticipated to contribute to visibility impairment" at a Class I Area within a state, the two states must consult with each other to "develop coordinated emissions strategies containing the emission reductions necessary to make reasonable progress." 40 CFR § 51.308(f)(2)(ii).
    a. This chapter describes the process by which EHD and NMED consulted with other states in accordance with this provision. It does not include discussion of the data characterizing such impacts or the control measures necessary to address them.
    b. Discussion of data characterizing cross state visibility impacts appears in Chapter 4 of this SIP. Discussion of potential emission reduction measures to address those impacts appears in Chapter 8 of this SIP.

2) The Regional Haze Rule requires that a SIP document the technical basis upon which it relies to determine emission reduction measures necessary to make reasonable progress, including information and data related to emissions inventories, modeling, air quality monitoring, cost, and engineering. 40 CFR § 51.308(f)(2)(iii). A SIP may meet this documentation requirement "by relying on technical analyses developed by a regional planning process and approved by all state participants." *Id*.
    a. As described in this chapter, WRAP provided the "regional planning process" that meets this requirement.
    b. Also as described in this chapter, WRAP's technical analyses, upon which this SIP relies, were approved by all state participants.

3) Where a 2028 Reasonable Progress Goal ("RPG") for a Class I Area in a state is above (i.e. slower than) the Uniform Rate of Progress ("URP") required to return the area to natural visibility conditions by 2064, and emissions in another state "are reasonably anticipated to contribute to visibility impairment" at this Class I Area, the other state must conduct a "robust demonstration" that "no additional emission reduction measures... would be reasonable to include" in the other state's Long Term Strategy. 40 CFR § 51.308(f)(2)(iii).
    a. Refer to the SIP element prepared by NMED for a robust demonstration for the Salt Creek Wilderness Area.

4) The SIP must document that the state or local jurisdiction provided FLMs for Class I Areas "with an opportunity for consultation, in person at a point early enough in the State's policy analyses

[255] Written comments and responses received after EHD and NMED files formal hearing requests with their respective boards will appear in documentation submitted to each board as part of the hearing process. That documentation will appear in the eventual SIP submittal to EPA. EPA regulations require that the submittal include written comments received by the state and the state's response. 40 CFR Part 51, Appendix V, 2.1(h).

of its long-term strategy emission reduction obligation so that information and recommendations provided by [the FLMs] can meaningfully inform the State's decisions on the long-term strategy." 40 CFR § 51.308(i)(2).[256]

a. The FLM consultation opportunity is "early enough" if it takes place "at least 120 days prior to holding any public hearing or other public comment opportunity" on a Regional Haze SIP. *Id*.

b. The FLM consultation requirement must take place "no less than 60 days prior to said public hearing or public comment opportunity." *Id*.

c. The consultation must include an opportunity for the "affected Federal Land Manager" to discuss the FLM's "assessment of visibility impairment in any mandatory Class I Federal area" and "recommendations on the development and implementation of strategies to address visibility impairment." 40 CFR § 51.308(i)(2)(i) and (ii).

d. The SIP must discuss how it addressed comments provided by the FLMs during consultation. 40 CFR § 51.308(i)(3).

5) The SIP must "provide procedures for continuing consultation" between the state and FLMs on implementation of the SIP, including consultation regarding future plan revisions and progress reports. The SIP must also provide for future consultation with FLMs regarding implementation not only of the Regional Haze SIP but also "other programs having the potential to contribute to impairment of visibility" in Class I Areas. 40 CFR § 51.308(i)(4).

6) EPA regulations establish procedural requirements for public hearings on any SIP submittal to EPA, including a Regional Haze SIP submittal. 40 CFR § 51.102.

a. The state must provide a public hearing or an opportunity for a public hearing. 40 CFR § 51.102(a).

b. The state must provide a minimum of 30 days' notice of a public hearing. 40 CFR § 51.102(d).

i. The notice must be given "by prominent advertisement in the area affected" and must specify the date, time, and place of the hearing. 40 CFR § 51.102(d)(1).
ii. The notice must make the proposed SIP submittal available for public inspection. 40 CFR § 51.102(d)(2).
iii. The notice must be provided to the EPA regional office. 40 CFR § 51.102(d)(3).
iv. Notice must be provided to local air pollution agencies "significantly impacted" by the SIP submittal. 40 CFR § 51.102(d)(4).
v. "In the case of an interstate region," notice must be given to states that are significantly impacted" by the SIP submittal. 40 CFR § 51.102(d)(5).

11.3 WRAP Coordination Process

Soon after the EPA revised the Regional Haze Rule in January 2017, the WRAP began region-wide planning to assist state, local, and tribal air agencies in preparing their Regional Haze SIPs. This section

[256] This citation is not a typographical error. The use of the lower case "i" in the citation here refers to the English lower-case letter "i." At other places in the Code of Federal Regulations, the "i" may be used as a lower-case Roman numeral, but such is not the case here.

describes the major aspects of the WRAP planning process, how it developed data and guidance used in this Regional Haze SIP for Albuquerque-Bernalillo County, and how the WRAP process documented in this SIP helped fulfil regulatory requirements.

The purpose of the information presented in this section is to demonstrate in detail that EHD, in preparing this SIP for consideration by the Albuquerque - Bernalillo County Air Quality Control Board ("AQCB" or "Board") received support from an extensive network of air quality experts and associated information resources working in a coordinated, multi-year planning effort. The regional planning support that EHD received was in accordance with the Regional Haze Rule provision that an air quality agency may rely on a regional planning process in preparing a SIP. 40 CFR § 51.308(f)(2)(iii).

This regional planning process also helped satisfy the Regional Haze Rule requirement that an air agency must consult with federal land managers, and must consult with other states on potential cross-state visibility impacts of their emissions to develop coordinated emission reduction strategies. 40 CFR § 51.308(i)(2) (FLM consultation); 40 CFR § 51.308(f)(2)(ii) (consultation on cross-state visibility impacts).

WRAP data resources and guidance

During the first Regional Haze planning period, 2008 to 2018, the WRAP supplied local, state, and tribal air agencies with critical guidance on how to approach SIP preparation. The WRAP also supplied data necessary for that preparation. Because the Regional Haze Rule requires region-wide data from ambient air monitoring, emissions inventories, and modeling, most air agencies are unable to prepare the necessary data on their own. The Regional Haze Rule therefore provides for regional planning organizations, such as the WRAP, to fill this critical need.

Initial planning, 2017

The WRAP's initial Regional Haze planning efforts consisted of a series of informational webinars for state, local, and tribal air quality planners throughout 2017. These webinars were sponsored by WRAP's Regional Haze Planning Workgroup. Webinars sponsored by the Workgroup provided an introduction to the planning process and how WRAP member agencies would coordinate with each other in preparing individual SIPs based on a common framework and common datasets. This process culminated with an in-person meeting in Denver, Colorado, in December 2017. At this meeting, staff from the member organizations discussed the process by which WRAP would develop data and share information with members during the SIP preparation process extending through the EPA deadline for SIP submittal on July 31, 2021.[257]

Detailed planning, 2018-2020

In 2018, the WRAP's Regional Haze Planning Workgroup formed specific subcommittees to develop Regional Haze data sets and recommendations on how to use the data.

The initial subcommittees and their responsibilities were as follows:

[257] Records of the 2017 planning meets are available at the WRAP's Regional Haze Planning Workgroup web page, https://www.wrapair2.org/RHPWG.aspx.

- **Monitoring Data and Glidepath Subcommittee**. This subcommittee developed recommendations on how to use ambient air quality monitoring data from the IMPROVE monitors at Class I Areas in preparing Regional Haze SIPs.
- **Shared Database Subcommittee**. This subcommittee worked with WRAP information technology professionals to develop the Technical Support System ("TSS"), Version 2, which is an online database providing the data necessary for an air agency to prepare a Regional Haze SIP. The TSS, Version 2, is available at https://views.cira.colostate.edu/tssv2/default.aspx.[258]
- **Consultation and Coordination Subcommittee**. This subcommittee developed recommendations on how state, local, and tribal air agencies should conduct outreach to Regional Haze stakeholders during SIP preparation, including FLMs, other states, and Indian tribes.
- **Emissions Inventory and Modeling Protocol Subcommittee**. This subcommittee developed data on reported emissions from air contaminant sources in WRAP jurisdictions, computer modeling of emissions and visibility conditions, and recommendations on how to use the emissions and modeling data in preparation of SIPs.
- **Control Measures Subcommittee**. This subcommittee developed recommendations on how to identify emission sources that would be subject to a Four Factor Analysis for potential control measures.
- **Tribal Data Work Group.** The Tribal Data Work Group of the WRAP convened monthly from September 2018 to January 2020 and developed a WRAP Communication Framework for Regional Haze Planning, reviewed several data products of interest to the work group. That information is located on the WRAP Tribal Data Work Group website: https://www.wrapair2.org/TDWG.aspx

In early 2019, the WRAP consolidated three of the above subcommittees into a new, single subcommittee. At that time, the above-described subcommittees on Monitoring and Glidepath, Shared Database, and Consultation and Coordination merged to form the Coordination and Glidepath Subcommittee. The new subcommittee performed the same functions as the former subcommittees but under a single body with a single purview.

The WRAP Regional Haze Planning workgroup, its subcommittees, and documents they have produced during the Regional Haze planning process are described on the WRAP web page at: https://www.westar.org/regional-haze-planning-work-group/

The Regional Haze Planning workgroup and its subcommittees received substantial support from another key WRAP component entity, the Technical Steering Committee. The Technical Steering Committee oversees more specialized WRAP workgroups, including the workgroup on Regional Haze, as well as Fire and Smoke, Oil and Gas, Regional Technical Operations, and Tribal Data. The Technical Steering Committee holds these workgroups accountable to deadlines and deliverables specified in an annual WRAP work plan.

[258] TSS, Version 1 was the database that WRAP developed for Regional Haze planning during the first planning period, 2008 to 2018. It is available at http://vista.cira.colostate.edu/tss/ (last accessed October 12, 2020).

The web page of the Technical Steering Committee describes the Committee's work in more detail: https://www.westar.org/wrap-technical-steering-committee/

Both EHD and NMED were part of a rigorous multistate process to develop a common framework for Regional Haze and a common pool of technical resources for individual states to use in preparing their SIPs. EHD also reached out to WESTAR for guidance on application of WRAP tools for this SIP element.

11.4 Coordination with Other States

EHD and NMED both met with neighboring states to consult about strategy for addressing interstate emissions related to regional haze. EHD also shared a draft of this SIP revision with neighboring states and jurisdictions, including NMED, Arizona, Colorado, Utah, Oklahoma, and Texas.

11.5 Federal Land Manager (FLM) Coordination Process

EHD and NMED consulted closely with FLMs on the Q/d process for selecting sources subject to four factor analyses across the state, with the FLMs signing off on the final Q/d process decision (see Appendix C).

EHD and NMED held consultations on Long Term Strategy with FLMs in summer and fall 2020. More recently, there were informal check-ins with the NPS and USFS with NMED in the fall of 2023. Finally, the 60-day FLM review period took place from April 3, 2024 to June 3, 2024. During that review period, EHD conducted two video meetings with the US Forest Service, the US National Park Service, and the US Fish & Wildlife Service. These agencies manage Class 1 Areas in New Mexico. The two video meetings took place on April 22, 2024 and May 29, 2024. EPA Region 6 also attended the final video meeting. EHD initially offered to meet with the FLMs in person, however, the FLMs waived that offer and preferred to meet over video out of convenience. After the formal FLM consultation period, the NPS was the only FLM that provided substantive written feedback on the SIP element.

EHD kept the FLMs in the loop of further edits to the draft including the permit modification language. The NPS e-mailed EHD on August 15, 2024 and said EHD’s approach outlined in the permit modification for the optimization of SNCR was reasonable and will reduce haze causing emissions.

11.6 Coordination with New Mexico Indian tribes

EHD sent e-mails to all tribes in New Mexico on June 25, 2024 with letters attached describing the regional haze SIP planning effort, and contact information if tribes wanted to learn more or set up a time to meet about the draft. The goal was to allow tribes a chance to provide feedback prior to the start of any formal public comment period. EHD worked closely with the City of Albuquerque Intergovernmental Tribal Liaison regarding approach to reaching out to the tribes and the content of the letters. The tribal liaison commended EHD on efforts to reach out to all tribes in New Mexico, as well as the executive director from the All Pueblo Council of Governors (APCG).

Any comments received from tribes will be included in the record, and EHD will include any response to those comments prior to the final submittal to EPA. As of July 30, 2024, no comments from the tribes have been received. There was one request for a copy of the draft SIP from the Pueblo of Sandia, and

EHD sent a copy of the draft SIP, along with associated exhibits, to the Pueblo of Sandia on June 27, 2024.

11.7 General Stakeholder Participation Process

EHD engaged early with NMED on a stakeholder event process that included webinars, as well as providing information on the website about regional haze planning for the second planning period, including resources from the WRAP and information about the four-factor analysis and ERG review. A presentation by EHD about regional haze planning for the second planning period was also provided to the AQCB on September 9, 2020, as well as updates about the SIP more recently.

EHD conducted two public input sessions on the draft SIP element, with one in person at the Albuquerque International District Library, and one virtual. Those public input sessions took place on July 30, 2024 and August 6, 2024. EHD received limited public comment at those sessions, and responded in person to a verbal comment received at the in-person session.

11.8 Federal Public Hearing Requirements and EPA Coordination

EHD and the AQCB followed the public hearing requirements of 40 CFR 51.102. EHD, along with NMED, worked closely with EPA Region 6 throughout the process of developing this SIP element. That coordination included monthly check ins, as well as regular calls with EPA Region 6 staff to discuss specifics with regards to SIP element or permit modification language.

11.9 Conclusions

This SIP meets federal requirements on stakeholder participation and provided adequate opportunity for stakeholders to provide meaningful input on the content of the SIP, which EHD/NMED addressed.

Chapter 12: Monitoring Strategy and Other Elements

12.1 Introduction

The U.S. Environmental Protection Agency's ("EPA") August 2019 guidance on Regional Haze State Implementation Plans ("SIP") for the Second Implementation Period includes a final section for "Additional Requirements for Regional Haze SIPs."[259] Much like it sounds, this section is a "catch-all" for requirements that have not already been addressed elsewhere in EPA's guidance. This SIP has been prepared according to EPA's guidance and, as allowed by EPA guidance, requires a final chapter to address the Rule requirements that have not been addressed elsewhere. This chapter adheres to that approach and addresses the regulatory requirements mentioned below.

Regulatory requirements

1) An *assessment of the current monitoring strategy* necessary for measuring, characterizing, and reporting of regional haze visibility impairment that is representative of all Class I Areas within New Mexico; for determining the contribution of emissions from within New Mexico to regional haze visibility impairment at Class I Areas in other States; for reporting all visibility monitoring data to the EPA Administrator at least annually; and for any other measure--including reporting and recordkeeping--necessary to assess and report on visibility.[260]

2) The provisions for a *statewide inventory of emissions of pollutants* that are reasonably anticipated to cause or contribute to visibility impairment in any Class I Area; and a commitment to update the inventory periodically.[261]

12.2 Assessment of current monitoring strategy

40 CFR § 51.308(f)(6) requires that "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. Compliance with this requirement may be met through participation in the Interagency Monitoring of Protected Visual Environments (IMPROVE) network".

Albuquerque - Bernalillo County assessment

For purposes of implementing the Regional Haze Rule, Albuquerque - Bernalillo County is treated as a State and operates under the federal Clean Air Act as such.

Albuquerque - Bernalillo County does not have any Class I Areas within its boundaries. However, because Albuquerque - Bernalillo County is situated within the state of New Mexico, it cooperates with

[259] EPA 2019 Guidance, pp. 52 to 56.
[260] 40 CFR § 51.308(f)(6).
[261] 40 CFR § 51.308(f)(6)(v).

the State on monitoring ambient visibility conditions. New Mexico's assessment of its monitoring strategy--included below--addresses the Rule requirements 40 CFR § 51.308(f)(6)(i), (ii), (iii), (iv), and (vi) for both the State of New Mexico and Albuquerque - Bernalillo County.

New Mexico assessment

The primary monitoring network for regional haze, both nationwide and in New Mexico, is the Interagency Monitoring of Protected Visual Environments (IMPROVE) monitoring program. IMPROVE network operations are governed by a Steering Committee that guides the management of the monitoring network and the collection of date for use in complying with the Regional Haze Rule. The IMPROVE Steering Committee consists of representatives from 10 voting member organizations. These organizations include:

- U.S. Forest Service (USFS);
- National Park Service (NPS);
- U.S. Fish and Wildlife Service (FWS);
- Bureau of Land Management (BLM);
- Environmental Protection Agency (EPA);
- National Oceanic & Atmospheric Administration (NOAA);
- National Association of Clean Air Agencies (NACAA);
- Northeast States for Coordinated Air Use Management (NESCAUM);
- Western States Air Resources Council (WESTAR); and
- Mid-Atlantic Regional Air Management Association (MARAMA).

Members of the Steering Committee are appointed by their organizations and serve an indefinite term determined by their organization. The Steering Committee also has three non-voting associate members:

- Arizona Department of Environmental Quality;
- Environment and Climate Change Canada; and
- Republic of Korea Ministry of Environment.

WESTAR is the agency that represents New Mexico's interests on the IMPROVE Steering Committee along with those of its other members.[262] The existing IMPROVE network was deemed adequate to assess whether our RPGs are being met so no additional monitoring sites are needed at this time. The Steering Committee allocates monitoring resources, which come from several agencies. The IMPROVE program arranges for the operation of monitors, the analysis of samples, and the validation and posting of the data on the internet.

The EPA takes associated program support funds for IMPROVE monitor sites from the annual State and Tribal Assistance Grant budgets, then allocates the remaining grant amount to states. EPA doesn't withhold different amounts from each state for the 110 IMPROVE sites. All funds are pooled together for any state with a Class I Area and used whenever needed. EPA sends the funds to the National Park

[262] WESTAR members include the air quality program managers from the 15 westernmost states: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming.

Service (NPS) via an interagency agreement for them to operate the network.[263] For FY 2023 and FY 2024, about $4 million of $PM_{2.5}$ monitoring funds was proposed to support visibility monitoring at 110 IMPROVE sites and two sites collocated with Clean Air Status and Trends Network monitoring sites.[264]

EPA sends the funds to the National Park Service (NPS) via an interagency agreement for them to operate the network.[265] For FY 2023 and FY 2024, about $4 million of $PM_{2.5}$ monitoring funds was proposed to support visibility monitoring at 110 IMPROVE sites and two sites collocated with Clean Air Status and Trends Network (CASTNET) monitoring sites.[266]

Given that IMPROVE 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 monitoring program. The IMPROVE measurements provide the only long-term record available for tracking visibility improvement or degradation and, therefore, New Mexico intends to continue relying on the IMPROVE monitoring program for complying with the monitoring requirements in the Regional Haze Rule.

New Mexico participates in the IMPROVE monitoring network through the representation of its interests by a State air agency representative on the IMPROVE Steering Committee and through the allocation of federal Clean Air Act air management grant funding to the IMPROVE program.[267] The IMPROVE monitoring program's practice of providing data directly to EPA satisfies the requirements in sections 51.308(f)(6)(iv) and (vi) of the Regional Haze Rule.[268]

There are eight IMPROVE monitors in New Mexico and one in Texas that provide visibility information for New Mexico's Class I Areas. These monitors and the New Mexico Class I Areas they represent are listed in Table 12-1 below, and their locations are shown in Figure 12-1. The WHPE1 monitor provides data for both the Pecos Wilderness Area and Wheeler Peak Wilderness Area. The GUMO1 monitor provided visibility monitoring information for Carlsbad Caverns National Park prior to the establishment of the CAVE1 monitor in 2017.

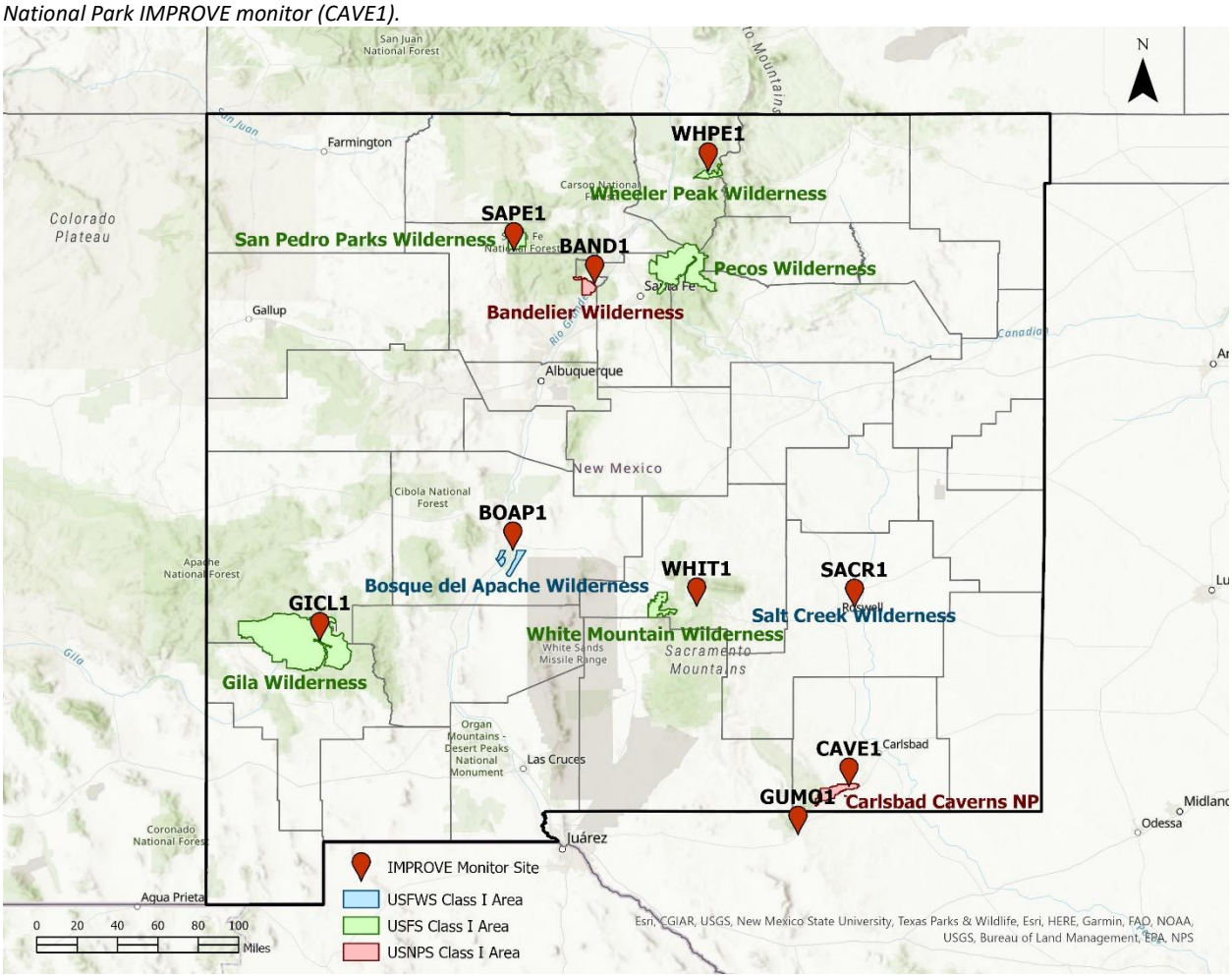
Table 12-2: IMPROVE monitors representing New Mexico's Class I Areas.

IMPROVE Monitor	**Class I Area(s) Represented**	**Federal Land Manager**
SAPE1	San Pedro Parks Wilderness Area	USFS
WHPE1	Pecos Wilderness Area & Wheeler Peak Wilderness Area	USFS
BAND1	Bandelier National Monument	NPS
BOAP1	Bosque del Apache National Wildlife Refuge Wilderness	USFWS
WHIT1	White Mountain Wilderness Area	USFS
SACR1	Salt Creek National Wildlife Refuge Wilderness	USFWS
GICL1	Gila Wilderness Area	USFS

[263] EPA FY2023 and 2024 National Program Manager Guidance Monitoring Appendix. https://www.epa.gov/amtic/national-program-manager-npm-guidance-monitoring-appendix
[264] Ibid. Page 25 of 31.
[265] EPA FY2023 and 2024 National Program Manager Guidance Monitoring Appendix. https://www.epa.gov/amtic/national-program-manager-npm-guidance-monitoring-appendix
[266] Ibid. Page 25 of 31.
[267] EPA 2019 Guidance, p. 55.
[268] EPA 2019 Guidance, p. 55.

CAVE1	Carlsbad Caverns National Park	NPS
GUMO1 (Texas)	Guadalupe Mountains (Carlsbad Caverns)	NPS

Figure 12-1: Map showing IMPROVE monitor sites representing New Mexico's Class I Areas, including the new Carlsbad Caverns National Park IMPROVE monitor (CAVE1).



12.3 Statewide Emissions Inventory

40 CFR § 51.308(f)(6)(v) requires that the implementation plan must also provide for "A statewide inventory of emissions of pollutants that are reasonably anticipated to cause or contribute to visibility impairment in any mandatory Class I Federal area. The inventory must include emissions for the most recent year for which data are available, and estimates of future projected emissions. The State must also include a commitment to update the inventory periodically".

EHD and NMED prepare their emission inventories in compliance with the Air Emissions Reporting Requirements in 40 CFR Part 51 Subpart A, thereby satisfying the requirement to provide for the preparation of an emissions inventory for the most recent year for which data are available.[269]

[269] EPA 2019 Guidance, p. 55.

Additionally, each year EHD submits an Emissions Inventory Quality Assurance Project Plan (QAPP) to EPA for review and approval.

Estimates of future projected emissions for regional haze planning are typically developed by EPA and multi-jurisdictional organizations such as the WRAP, with state and local agency coordination. For the second planning period WRAP developed several future year emission inventory projections for western states that were made available publicly through the WRAP TSS.

Appendices:

Appendix A: WRAP TSS Emissions Methods, Results, and References[270]

The WRAP Technical Support System (TSS) hosts the visibility monitoring, emissions, and air quality modeling analyses that support the 15 western states in developing regional haze state implementation plans (SIPs). The Emissions Methods, Results, and References document describe the WRAP emissions analyses and illustrates how the TSS products can be applied and interpreted to support the 2028 visibility progress demonstrations for western U.S. Class I Areas.

Appendix B: WRAP TSS Modeling Methods, Results, and References[271]

The WRAP Technical Support System (TSS) hosts the visibility monitoring, emissions, and air quality modeling analyses that support the 15 western states in developing regional haze state implementation plans (SIPs). The Modeling Methods, Results, and References document describe the WRAP modeling analyses and illustrates how the TSS products can be applied and interpreted to support the 2028 visibility progress demonstrations for western U.S. Class I Areas.

[270] WRAP Technical Support System for Regional Haze Planning: Modeling Methods, Results, and References September 30, 2021 – Final: https://views.cira.colostate.edu/tssv2/Docs/WRAP_TSS_emissions_reference_final_20210930.pdf

[271] WRAP Technical Support System for Regional Haze Planning: Modeling Methods, Results, and References September 30, 2021 – Final: https://views.cira.colostate.edu/tssv2/Docs/WRAP_TSS_modeling_reference_final_20210930.pdf

Appendix C: NPS e-mail regarding Source Selection
Appendix D: GCC Four Factor Analysis Redacted
Appendix E: EHD letter to GCC
Appendix F: GCC Four Factor Response Letter
Appendix G: Draft ERG Four Factor Analysis Review
Appendix H: Revised ERG Four Factor Analysis Review
Appendix I: GCC Response to Four Factor Analysis Review
Appendix J: Revised ERG Review 2023 Dollars
Appendix K: Source Selection Background Data
Appendix L: Revised ERG Review 2019-2021 Baseline Data
Appendix M: EHD Presentation for FLMs- Formal FLM Review Period
Appendix N: National Park Service Presentation- Formal FLM Review Period
Appendix O: National Park Service Formal Comment on Draft
Appendix P: US Forest Service Formal Comment on Draft
Appendix Q: EPA Region 6 Initial Comments on Draft
Appendix R: Tribal Outreach Letter
Appendix S: E-mails to New Mexico tribes and All Pueblo Council of Governors
Appendix T: Letter to GCC notification of Permit Re-Opening
Appendix U: Permit Modification Language
Appendix V: E-mail to FLMs with Permit Modification Language
Appendix W: Listserv Notice of Public Comment Period and Hearing
Appendix X: E-mail to EPA on Notice of Public Comment Period and Hearing
Appendix Y: GCC's NSR permit prior to regional haze modification
Appendix Z: EHD response to NPS comment
Appendix AA: EHD response to USFS non-substantive comment
Appendix BB: Public Input Session Presentation
Appendix CC: NPS Slideshow
Appendix DD: Formal FLM Review Dialogue
Appendix EE: Letter to GCC on Four Factor
Appendix FF: NM Source Selection Analysis
Appendix GG: WRAP PAC Analysis
Appendix HH: EHD Regional Haze Planning Website Notice
Appendix II: EHD Outreach Webinar Website Notice
Appendix JJ: NPS Response to EHD Comment
Appendix KK: EHD Published Notice for Regional Haze SIP Element Hearing
Appendix LL: EHD E-mail with Pueblo of Sandia
Appendix MM: Received Public Comment and EHD Response

Appendix NN: Hearing Transcript
Appendix OO: GCC Permit Modification Final
Appendix PP: Letter to GCC Permit Modification
Appendix QQ: GCC Permit Regulatory Review
Appendix RR: EHD Response to EPA Region 6 Comment
Appendix SS: Transmittal Letter EHD to NMED
Appendix TT: Signed Transmittal Letter NMED to EPA Region 6
Appendix UU: Published Notice of Permit Modification English
Appendix VV: Published Notice of Permit Modification Spanish
Appendix WW: Signatory Delegation of Authority
Appendix XX: EPA Region 6 Comment
Appendix YY: Q/D Emissions Information
Appendix ZZ: Q/D Calculations