New Mexico State Implementation Plan

Regional Haze
Section 309(g)

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Table 6-3: 2064 Natural Conditions Goal for 20% Worst and Best Days

Mandatory Federal Class I Area	IMPROVE Monitor	2064 Natural Conditions for 20% Best and Worst Visibility Days (dv)	
		20% Worst	20% Best
Bandelier Wilderness	BAND1	6.26	1.29
Bosque del Apache NWR	BOAP1	6.73	2.16
Carlsbad Caverns NP	GUMO1	6.65	0.99
Gila Wilderness	GICL1	6.66	0.52
Pecos Wilderness, Wheeler Peak Wilderness	WHPE1	6.08	-0.57
Salt Creek Wilderness	SACR1	6.81	2.12
White Mountain Wilderness	WHIT1	6.8	0.66

6.5 Uniform Progress

For the 20% worst days, uniform progress for each Class I area is the calculation of a URP goal per year to achieve natural conditions in 60 years [40 CFR 51.308(d)(1)(i)(B)]. In this SIP submittal, the first benchmark is the 2018 deciview level based on the uniform rate of progress (URP) applied to the first fourteen years of the program. This is also shown in Table 6-3 in the column titled "2018 URP Goal".

For the 20% worst days, the uniform rate of progress (URP) in deciviews per year (i.e., slope of the glide path) is determined by the following equation:

URP = [Baseline Condition – Natural Condition]/60 years

Multiplying the URP by the number of years in the first planning period calculates the uniform progress needed by 2018 in order to be on the glidepath towards achieving the 2064 natural conditions goal.

2018 UPG = [URP] x [14 years]

The first planning period spans 14 years, which includes the four years between the end of the baseline period and the SIP submittal plus the standard 10 year planning period for the subsequent SIP revisions.

More detailed information on the 20% worst visibility days along with the glide slope associated with each Class I area can be found in Chapter 9. The calculations are consistent with EPA's *Guidance for Setting Reasonable Progress Goals Under the Regional Haze Rule* (June 1, 2007).

For the 20% best visibility days at each Class I area, the State must ensure no degradation in visibility for the least impaired days over the same period. WRAP modeling predicts visibility degradation at Carlsbad Caverns National Park for the 20% best days. However, Figure 6-1 shows that visibility is actually improving on the best days from 2005 through 2009. The over-prediction for area sources is likely responsible for this modeled projection of worsening visibility on the best days.

Figure 6-1: Visibility in Deciviews, Best Days, Carlsbad Caverns National Park

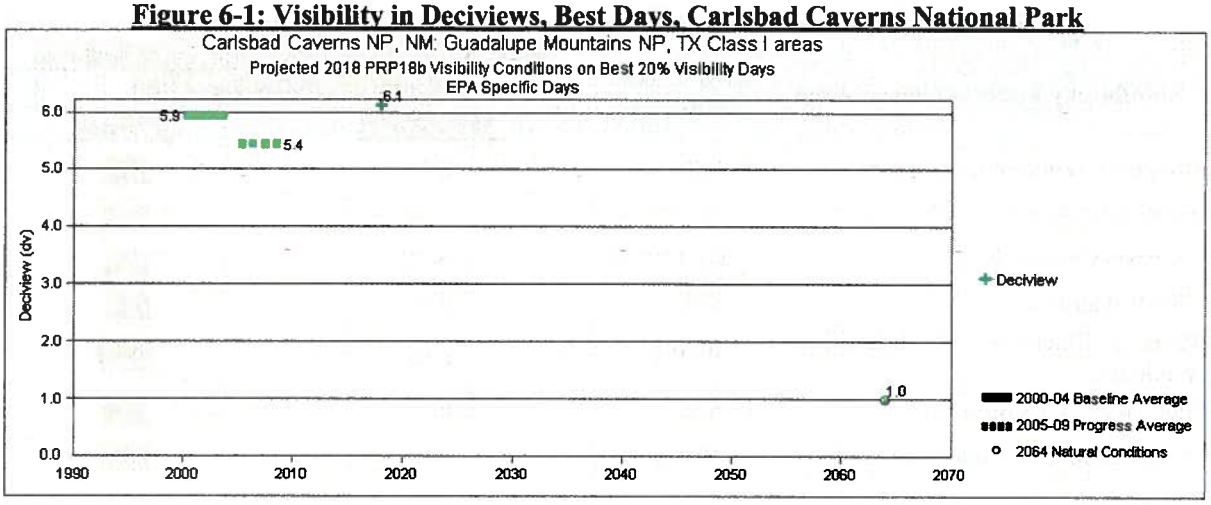


Table 6-4 shows the 2018 URP for the 20% worst days and the baseline that must not be exceeded over the years in order to maintain the best days. As with natural conditions, the URP can be adjusted as new visibility information becomes available.

Table 6-4: Summary of Best and Worst Visibility Days for New Mexico Class I Areas

	20% Worst Days Visibility			20% Best Days Visibility		
New Mexico Class I Area	**Worst Days Baseline (dv)**	**2018 URP Goal (dv)**	**2018 Projected Visibility (dv)**	**Best Days Baseline (dv)**	**2018 Projected Visibility (dv)**	**2018 Projection less than Baseline?**
Bandelier W	12.22	10.83	11.9	4.95	4.89	Y
Bosque del Apache NWR	13.80 [~~18.03~~]	12.15 [~~15.41~~]	13.59 [~~17.33~~]	6.28 [~~7.84~~]	6.10 [~~7.43~~]	Y
Carlsbad Caverns NP	17.19	14.73	16.93	5.95	6.14	N
Gila W	13.11	11.61	12.99 [~~15.17~~]	3.31	3.2 [~~3.45~~]	Y [~~N~~]
Pecos W, Wheeler Peak W	10.41	9.40	10.23	1.22	1.13	Y
Salt Creek W	18.03	15.41	17.33	7.84	7.43	Y
White Mountain W	13.7	12.09	13.27	3.55	3.42	Y

Table 6-5: Baseline Versus Natural Conditions for 20% Best and Worst Days

New Mexico Class I Area	20% Worst Days Visibility			20% Best Days Visibility		
	Worst Days Baseline (dv)	Natural Conditions (dv)	Difference (dv)	Best Days Baseline (dv)	Natural Conditions (dv)	Difference (dv)
Bandelier W	12.22	6.26	5.96	4.95	1.29	3.66
Bosque del Apache NWR	13.80	6.73	7.07	6.28	2.16	4.12
Carlsbad Caverns NP	17.19	6.65	10.54	5.95	0.99	4.96
Gila W	13.11	6.66	6.45	3.31	0.52	2.79
Pecos W, Wheeler Peak W	10.41	6.08	4.33	1.22	-0.57	1.79
Salt Creek W	18.03	6.81	11.22	7.84	2.12	5.72
White Mountain W	13.70	6.80	6.90	3.55	0.66	2.89

Table 6-6: Years to Natural Conditions for 20% Worst Days

Area	*Baseline 2000-2004 (Plan02d rev)*	*Projected 2018 (prp18b)*	*Natural Conditions*	*dv/year Improvement*	*Years to Natural Conditions*
BAND1	12.22	11.90	6.26	0.0229	261
BOAP1	13.80	13.59	6.73	0.0150	397
GUMO1	17.19	16.93	6.65	0.0186	321
GICL1	13.11	12.99	6.66	0.0086	695
WHPE1	10.41	10.23	6.08	0.0129	464
SACR1	18.03	17.33	6.81	0.0500	119
WHIT1	13.70	13.27	6.80	0.0307	194

The PSAT algorithm was also used, in a limited application (e.g. no state or regional attribution) due to resource constraints, to track natural and anthropogenic species of organic aerosols at each Class I Area. The organic aerosol tracer tracked both primary and secondary organic aerosols (POA & SOA).

Weighted Emissions Potential
The Weighted Emissions Potential (WEP) is a screening tool that helps to identify source regions that have the potential to contribute to haze formation at specific Class I areas. Unlike PSAT, this method does not account for chemistry or deposition. The WEP combines emissions inventories, wind patterns, and residence time of air mass over each area where emissions occur, to estimate the percent contribution of different pollutants. Like PSAT, the WEP tool compares baseline (2000-2004) to 2018, to show the improvement expected by the 2018 URP, for sulfate, nitrate, organic carbon, elemental carbon, fine PM, and coarse PM.

9.2 Summary of Modeling Results for CMAQ

This section provides the visibility projections for New Mexico's Class I areas using the CMAQ model. The projections were calculated from modeled results by multiplying a species-specific relative response factor (RRF) with the baseline monitored results, and then converting to extinction and deciview. The RRF is defined as the ratio of future-to-current modeled mass. The projected visibility conditions are used to define the reasonable progress goals found in Chapter 11.

Table 9-1 provides the 2018 uniform progress for each Class I area and the visibility modeling projection for 2018 for both 20% worst and 20% best days. None of New Mexico's Class I areas are projected to meet the URP for 2018, although all [~~but one (Gila Wilderness)~~] are projected to be below baseline conditions on the worst 20% days. Modeling shows degradation on best days for [~~two~~] one of the IMPROVE monitors, Guadalupe Mountain which includes Carlsbad Caverns National Park. The following section provides a breakdown of the visibility impairment for each pollutant. [~~This is addressed in the~~] The Chapter 12 discussion regarding the Long Term Strategy addresses New Mexico's strategies for improving visibility at all Class I areas.

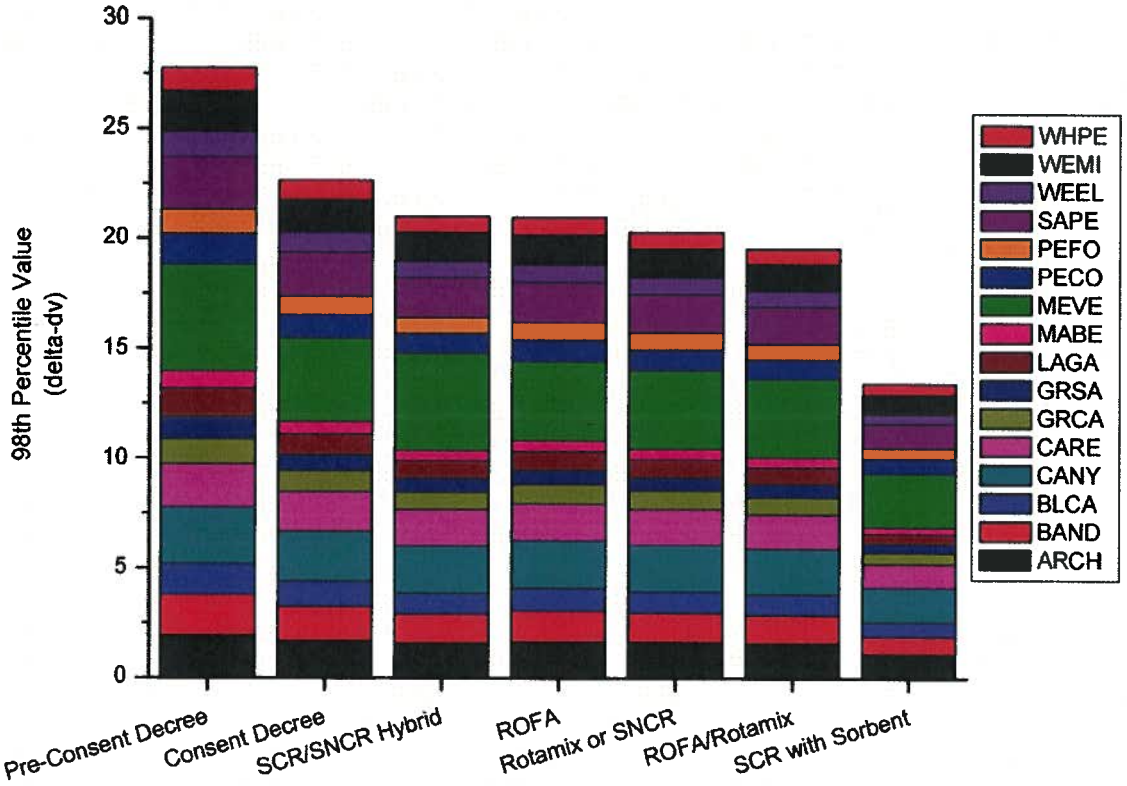
Table 9-1: Summary of CMAQ Modeling Progress Towards 2018

New Mexico Class I Area	20% Worst Days Visibility			20% Best Days Visibility		
	2000-2004 Baseline (dv)	2018 URP Goal (dv)	2018 Projected Visibility (dv)	2000-2004 Baseline (dv)	2018 Projected Visibility (dv)	2018 Projection less than Baseline?
Bandelier W	12.22	10.83	11.9	4.95	4.89	Y
Bosque del Apache NWR	13.80 [~~18.03~~]	12.15 [~~15.41~~]	13.59 [~~17.33~~]	6.28 [~~7.84~~]	6.10 [~~7.43~~]	Y
Carlsbad Caverns NP	17.19	14.73	16.93	5.95	6.14	N
Gila W	13.11	11.61	12.99 [~~15.17~~]	3.31	3.2 [~~3.45~~]	Y [~~N~~]
Pecos W, Wheeler Peak W	10.41	9.40	10.23	1.22	1.13	Y
Salt Creek W	18.03	15.41	17.33	7.84	7.43	Y
White Mountain W	13.7	12.09	13.27	3.55	3.42	Y

10.5 Visibility Improvement Resulting from BART Evaluation in New Mexico

The visibility improvement resulting from the installation of BART that will be achieved in each Class I area as a result of the emission reduction achievable from San Juan Generating Station is shown in Figure 10-1. The BART determination, including visibility modeling analysis, is included as Appendix D.

Figure 10-1: Visibility Improvement from BART Controls at San Juan Generating Station



10.6 BART Implementation

In accordance with 40 CFR 51.308(e)(1)(iv), the Department determines that SNCR shall be installed on each of the four units as expeditiously as practicable, but in no event later than 5 years after approval by the EPA of this implementation plan revision. San Juan Generating Station shall be required to maintain the control equipment required by this chapter and to establish procedures to ensure such equipment is properly operated and maintained.

CHAPTER 12: LONG-TERM STRATEGY (LTS)

12.1 Overview

The Regional Haze Rule requires states to submit a 10-15 year long-term strategy (LTS) to address regional haze visibility impairment in each Class I area in the state, and for each Class I area outside the state which may be affected by emissions from the state. The LTS must include enforceable measures necessary to achieve reasonable progress goals, and identify all anthropogenic sources of visibility impairment considered by the state in developing the long-term strategy. Where the state contributes to Class I visibility impairment in other states it must consult with those states and develop coordinated emission management strategies, and demonstrate it has included all measures necessary to obtain its share of the emission reductions. If the state has participated in a regional planning process, the state must include measures needed to achieve its obligations agreed upon through that process.

Summary of all Anthropogenic Sources of Visibility Impairment Considered in Developing the Long-Term Strategy
Section 51.308(d)(3)(iv) of the Regional Haze Rule requires the identification of "all anthropogenic sources of visibility impairment considered by the State when developing its long-term strategy." Chapter 8 of this Plan describes New Mexico's statewide emissions, including projections of emissions reductions from anthropogenic sources from 2002 to 2018. Section 9.3 of this Plan provides source apportionment results, including projected reductions from anthropogenic sources during the same period. Chapter 9 addresses anthropogenic sources from all potential sources in the world. Together, these chapters show the major anthropogenic sources affecting regional haze in New Mexico and in the West. Chapter 11 further describes the major anthropogenic source categories evaluated through the four-factor analysis.

Summary of Interstate Transport and Contribution
Sections 51.308(d)(3)(i) and (ii) of the Regional Haze Rule requires that the Long-Term Strategy address the contribution of interstate transport of haze pollutants between states. Chapter 8 of this Plan illustrated New Mexico's statewide emissions, while Chapter 9 identified interstate transport of pollutants from larger source categories based on source apportionment results.

12.2 Other States' Class I Areas Affected by New Mexico Emissions

New Mexico used baseline period visibility data from the IMPROVE monitors along with the WRAP baseline modeling results to estimate New Mexico's emissions impact on neighboring states' Class I areas (see Figure 12-1 through Figure 12-12). New Mexico focused on anthropogenic emissions transported to other states, primarily sulfates and nitrates.

The charts and tables below show the contribution of particle mass calculated from the modeled concentrations of nitrates and sulfates for the baseline years. The charts and tables illustrate the probable share of New Mexico's emissions contributing to the pollutant species in surrounding states.

12.2.1 Nitrate Contributions from New Mexico on Surrounding States' Class I Areas

New Mexico's NOx emissions contribute up to 24% percent of the nitrate concentrations at some neighboring states on the worst 20% days according to modeling. As shown in the table below, however, nitrate contributes only up to 19 percent of the visibility impairment in neighboring states. By 2018, NOx emissions from New Mexico are projected by the WRAP to decrease by 57,975 tons, which will help reduce New Mexico's impact to out of state Class I areas. [~~Actual decreases are~~

~~expected to be higher due to additional NOx reductions at the San Juan Generating Station under EPA's BART determination.~~]

Table 12-1: Nitrate Contribution to Haze in Baseline Years for Worst 20% Days

State	2000-2004 Average Annual Nitrate Share of Particle Light Extinction (measured values)	2000-2004 New Mexico's Average Annual Share of Nitrate Concentration (based on modeling)
Arizona	13.5%	2.7%
Colorado	10.0%	24.7%
Nevada	19.1%	0.1%
Utah	15.9%	6.0%
Texas	6.0%	11.2%
Wyoming	9.9%	0.3%

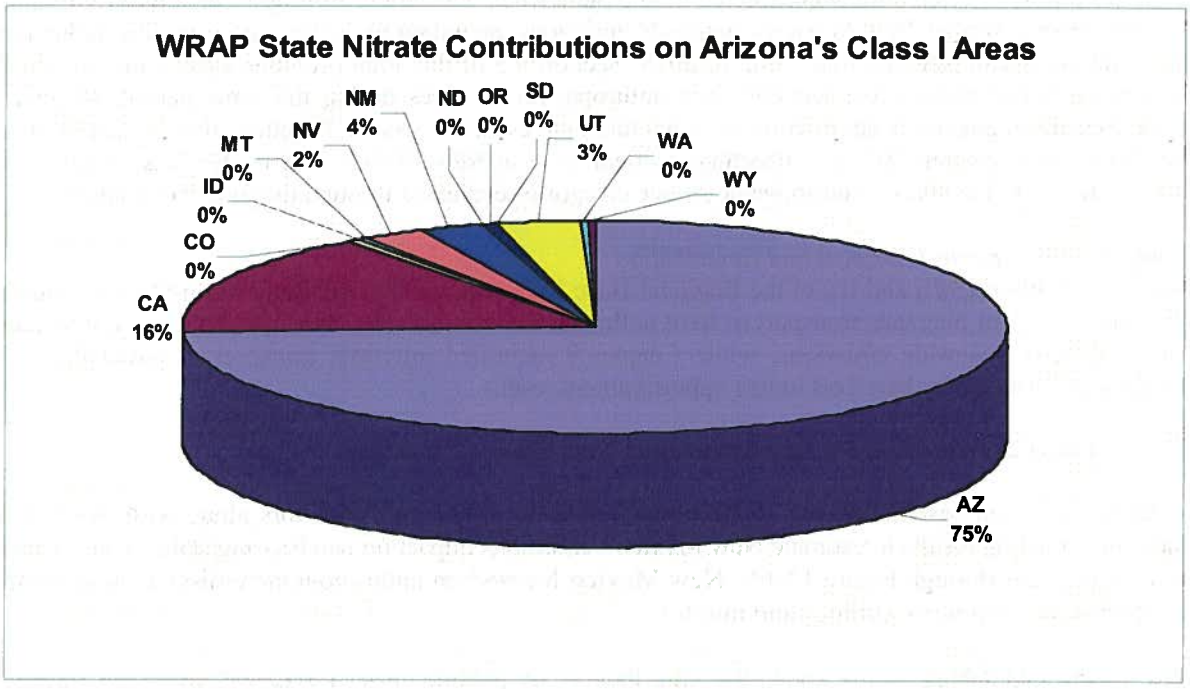



Figure 12-1: Nitrate Contributions from New Mexico on Arizona Class I Areas