

CHAPTER 10: BEST AVAILABLE RETROFIT TECHNOLOGY (BART) EVALUATION

10.1 Introduction

In 1999, the EPA published a final rule to address a type of visibility impairment known as regional haze. *See* 64 Fed. Reg. 35714, July 1, 1999. The regional haze rule requires States to submit state implementation plans (SIPs) to address regional haze visibility impairment in 156 Federally-protected parks and wilderness areas. The 1999 rule was issued to fulfill a long-standing EPA commitment to address regional haze under the authority and requirements of sections 169A and 169B of the Clean Air Act (CAA).¹

As required by the CAA, the EPA included in the final regional haze rule a requirement for Best Available Retrofit Technology (BART) for certain large stationary sources. The regulatory requirements for BART were codified at 40 CFR § 51.308(e) and in definitions that appear in 40 CFR § 51.301.

The BART-eligible sources are those sources which have the potential to emit 250 tons per year or more of a visibility impairing air pollutant, were put in place between August 7, 1962 and August 7, 1977, and whose operations fall within one or more of 26 specifically listed source categories. Under the CAA, BART is required for any BART-eligible source which a State determines “emits any air pollutant which may reasonably be anticipated to cause or contribute to any impairment of visibility in any such area.” Accordingly, for stationary sources meeting these criteria, States must address the BART requirement when they develop their regional haze SIPs.

The EPA published a second rulemaking on June 6, 2005 that made changes to the Final Rule published July 1, 1999. The second rulemaking was in response to a U.S. Court of Appeals for the D.C. Circuit ruling that vacated part of the regional haze rule, *American Corn Growers v. EPA*, 291 F.3d 1 (D.C. Cir. 2002). The June 6, 2005 Final Rule required the BART analysis to include an analysis of the degree of visibility improvement resulting from the use of control technology at BART-subject sources; included new BART Guidelines contained in a new Appendix Y to Part 51; and added the requirement that States use Appendix Y for determining BART at certain large electrical generating units (EGUs).

The Guidelines also contained specific presumptive limits for SO₂ and NO_x for certain large EGUs based on fuel type, unit size, cost effectiveness, and presence or absence of pre-existing controls. The Guidelines directs states to generally require owners and operators to meet the presumptive limits at coal-fired EGUs greater than 200 MW at power plants with a total generating capacity greater than 750 MW, unless the state determines that an alternative control level is justified based on consideration of the statutory factors. The presumptive limits for NO_x are based on coal type, boiler type and whether post-combustion controls are already installed at the source.

As originally adopted by the Board on June 3, 2011, this Chapter 10 of New Mexico’s § 309(g) SIP contained the Department’s determinations of BART for the San Juan Generating Station (“San Juan”) with respect to sulfur dioxide (“SO₂”), particulate matter (“PM”), and nitrogen oxides (“NO_x”). In November 2012, the EPA promulgated final approval of these BART determinations with respect to SO₂ and PM, but took no action on New Mexico’s NO_x BART determination for San Juan. 77 Fed. Reg. 36,044 (Nov. 27, 2012). EPA had previously issued a federal implementation plan (“FIP”) containing a different NO_x BART determination for San Juan. 76 Fed. Reg. 52,388 (Aug. 22, 2011).

In an attempt to resolve litigation arising from New Mexico’s and EPA’s incompatible San Juan NO_x BART determinations, New Mexico, the U.S. EPA, and PNM reached a tentative agreement on an alternative plan to address pollution control requirements for the San Juan Generating Station under the

Clean Air Act's requirements for regional haze and interstate transport for visibility. *See* Appendix G, Term Sheet Between the U.S. Environmental Protection Agency, Public Service Company of New Mexico and the State of New Mexico ("Term Sheet"). This plan, referred to hereinafter as the "State Alternative," calls for the complete shutdown of Units 2 and 3 by the end of 2017, and the installation of selective non-catalytic reduction ("SNCR") on Units 1 and 4.

Under the process and schedule provided in the Term Sheet, NMED agreed to seek approval by the Environmental Improvement Board ("Board") of a SIP revision containing the substantive provisions of the Term Sheet, including a five-factor analysis of the State Alternative as a NO_x BART determination. This revised Chapter 10 and the BART analysis in revised Appendix D fulfill that requirement of the Term Sheet. If approved by the Board, this SIP revision will be submitted to EPA for approval, disapproval, or partial approval, in accordance with applicable notice-and-comment rulemaking requirements. As stipulated in the Term Sheet, "NMED and EPA intend that the Regional Haze and Interstate Transport¹ SIP revisions as adopted and submitted to EPA will, if approved by EPA, lead to EPA action withdrawing the federal implementation plan for [San Juan]."

In light of this agreement to submit a revised SIP and in accordance with the Term Sheet schedule, on February 22, 2013 NMED requested that EPA hold in abeyance its consideration of the portion of New Mexico's 2011 Regional Haze SIP addressing a NO_x BART determination for San Juan.

In order to maintain New Mexico's BART analyses together in one location within the SIP in addition to meeting the Term Sheet requirements, this revised Chapter 10 continues to contain a description of the statewide BART determination process, reviews the 2011 BART determinations for San Juan, and evaluates the State Alternative, including voluntary unit retirements as a new alternative operating scenario that had not previously been analyzed.

In summary, this revised Chapter 10 of the New Mexico SIP adopts the State Alternative as New Mexico's NO_x BART determination for San Juan and, if approved by EPA, will supersede the San Juan NO_x BART determination contained in the 2011 Regional Haze SIP.

10.2 SO₂: Regional SO₂ Milestone and Backstop Trading Program

New Mexico is a "§ 309" (40 CFR § 51.309) state participating in the Regional SO₂ Milestone and Backstop Trading Program. Section 308(e)(2) provides states with the option to implement or require participation in an emissions trading program or other alternative measure rather than to require sources subject to BART to install, operate, and maintain additional control technology to meet an established emission limit on a continuous basis. However, the alternate program must achieve greater reasonable progress than would be accomplished by installing BART at each source subject to BART. A demonstration that the alternate program can achieve greater reasonable progress is prescribed by §308(e)(2)(i). Section 309(d)(4)(i) requires that the SO₂ milestones established under the Plan "...must be shown to provide for greater reasonable progress than would be achieved by application of BART pursuant to §51.308(e)(2)."

New Mexico participated in creating a detailed report entitled "Demonstration that the SO₂ Milestones Provide Greater Reasonable Progress than BART" covering SO₂ emissions from all states participating in the Regional SO₂ Milestone and Backstop Trading Program. The document is included in New Mexico's §309 Regional Haze SIP submittal to EPA.

¹ NMED is requesting approval of the related Interstate Transport SIP revision in a separate hearing before the Board.

As part of the §309 program, participating states, including New Mexico, must submit an annual Regional Sulfur Dioxide Emissions and Milestone Report that compares actual emissions to pre-established milestones. Participating states have been filing these reports since 2003. Each year, states have been able to demonstrate that actual SO₂ emissions are well below the milestones. The actual emissions and their respective milestones are shown in Table 10-1 below:

Table 10-1: Regional Sulfur Dioxide Emissions and Milestone Report Summary

Year	Reported SO₂ Emissions (tons)	3-year Milestone Average (tons)
2003	330,679	447,383
2004	337,970	448,259
2005	304,591	446,903
2006	279,134	420,194
2007	273,663	420,637
2008	244,189	378,398

On November 27, 2012, the EPA approved New Mexico’s SO₂ backstop trading program under 40 CFR §§ 51.309 and 51.308(e)(2) as achieving greater reasonable progress than BART. 77 Fed. Reg. 36,044. Notwithstanding the fact that the BART requirement has thus been satisfied statewide with respect to SO₂, additional SO₂ reductions will be made at the San Juan Generating Station under the “State Alternative” described below.

10.3 Determination of Sources Subject to BART

Under the BART Guidelines, a state is required to take the following steps in its BART analysis: (a) identify all “BART eligible” sources, (b) identify sources “subject to BART,” (c) determine what BART is for each source subject to BART, and (d) establish emission limits consistent with the BART determination for each source subject to BART. *See* 70 Fed. Reg. at 39,158. In New Mexico, the result of steps (a) and (b) was the determination that only one source is subject to BART, the San Juan Generating Station, as discussed below. Steps (c) and (d) as applied to San Juan are discussed in section 10.4 below.

10.3.1 BART Eligible Sources

Under the CAA and the BART Guidelines, states are required to identify each source that satisfies all of the following criteria: it falls within the 26 listed source categories as listed in the CAA, it was “in existence” on August 7, 1977 but was not “in operation” before August 7, 1962, and it has a current potential to emit that is greater than 250 tons per year of any single visibility impairing pollutant.

In May 2006, the Department conducted a review of sources potentially subject to the BART rule. New Mexico identified 11 sources as BART-eligible sources as part of this review. The 11 BART eligible sources identified in New Mexico are Giant Refining, Ciniza Refinery (now Western Refining Southwest, Gallup Refinery); Public Service Company of New Mexico, San Juan Generating Station Boilers 1 through 4; Giant Refining San Juan Refinery (now Western Refining Southwest, Bloomfield Refinery) Unit #1 fluid catalytic cracking unit electrostatic precipitator; DEFS Artesia Gas Plant (now DCP Midstream Artesia Gas Plant) sulfur recovery unit; Amoco Empire Abo (now Frontier Field Services Empire Abo Gas Plant) sulfur recovery unit; Marathon Indian Basin Gas Plant (now Oxy USA WTP Indian Basin Gas Plant) sulfur recovery unit; DEFS Linam Ranch Gas Plant (now DCP Midstream Linam Ranch Gas Plant) sulfur recovery unit, Dynegy Saunders (now Versado Gas Processors Saunders Gas Plant) sulfur recovery unit; Southwestern Public Service Cunningham Station; Southwestern Public Service Maddox Station; El Paso Rio Grande Generating Station.

10.3.2 Sources Subject to BART

After determining BART-eligibility, the State must then determine whether the source is subject-to-BART. EPA finalized several options that allowed States flexibility when making the determination of whether a source “emits any pollutants which may reasonably be anticipated to cause or contribute to any visibility impairment.”

Option 1: All BART-eligible sources are Subject to BART

EPA provided the States with the discretion to consider all BART-eligible sources within the State to be “reasonably anticipated to cause or contribute” to some degree of visibility impairment in a Class I area. EPA held that this option is consistent with the *American Corn Growers* court's decision, as it would be an impermissible constraint of State authority for the EPA to force States to conduct individualized analyses in order to determine that a BART-eligible source “emits any air pollutant which may reasonably be anticipated to cause or contribute to any impairment of visibility in any [Class I] area.”

Option 2: All BART-Eligible Sources Do Not Cause or Contribute to Regional Haze

EPA also provided States with the option of performing an analysis to show that the full group of BART-eligible sources in a State may not, as a whole, be reasonably anticipated to cause or contribute to any visibility impairment in Class I areas. Although the option was provided, EPA did also state that it anticipated that in most, if not all States, BART eligible-sources are likely to cause or contribute to some level of visibility impairment in at least one Class I area.

Option 3: Case-by-Case BART Analysis

The final option provided to the States was to consider the individual contributions of a BART-eligible source to determine whether the facility is subject-to-BART. Specifically, EPA allowed States to choose to undertake an analysis of each BART-eligible source in the State in considering whether each such source “emit[s] any air pollutant which may reasonably be anticipated to cause or contribute to any impairment of visibility in any [Class I] area.” The Guidelines provide that a source with a visibility impact of 1.0 dv should be considered to *cause* visibility impairment, and a source with a visibility impact of 0.5 dv should be considered to *contribute* to visibility impairment. Alternatively, States may choose to presume that all BART-eligible sources within the State meet this applicability test, but provide sources with the ability to demonstrate on a case-by-case basis that this is not the case.

The Department determined that the third option is the most consistent with the *American Corn Growers* case, as this option provides a rebuttable method for the evaluation of the visibility impact from a single source. If the air dispersion modeling analysis shows that a facility causes or contributes to Regional Haze, then it is required to address BART. A State is also provided with flexibility under this option, as it may exempt from BART any source that is not reasonably anticipated to cause or contribute to visibility degradation in a Class I area.

The Western Regional Air Partnership (WRAP) performed the initial BART modeling for the state of New Mexico. The procedures used are outlined in the WRAP Regional Modeling Center (RMC) BART Modeling Protocol that is available at:

http://pah.cert.ucr.edu/aqm/308/bart/WRAP_RMC_BART_Protocol_Aug15_2006.pdf

The basic assumptions in the WRAP BART CALMET/CALPUFF modeling used for New Mexico are as follows:

- Use of three years of modeling of 2001, 2002, and 2003.
- Visibility impacts due to emissions of SO₂, NO_x and primary PM emissions were calculated. PM emissions were modeled as PM_{2.5}.
- Visibility was calculated using the Original IMPROVE equation and Annual Average Natural Conditions.

Initial modeling was performed for the 11 source complexes in New Mexico with visibility estimated from the sources' SO₂, NO_x, and PM emissions. Then for those sources whose 98th percentile visibility impacts at any Class I area due to their combined SO₂, NO_x, and PM emissions exceeded the 0.5 dv significance threshold, the separate contribution to visibility at Class I areas was assessed for SO₂ alone (SO₄), NO_x alone (NO₃), PM alone (PMF) and combined NO_x plus PM emissions (NO₃ + PMF).

Of the 11 source complexes analyzed, only one source complex's visibility impacts at any Class I area due to combined SO₂, NO_x, and PM emissions exceeded the 0.5 dv threshold (PNM San Juan Generating Station Boilers #1-4). Of the 10 other source complexes, none exceed a 0.33 dv impact. See Appendix C. Consequently, only the PNM San Juan Boilers #1-4 were subjected to a BART determination.²

On November 9, 2006, the New Mexico Environment Department informed PNM that the modeling performed by the WRAP indicated the visibility impairment from the San Juan Generating Station (SJGS) was over the 0.5 dv threshold, and was therefore subject to a BART determination. The results are presented in Table 10-2 below. In response, Black & Veatch (B&V), on behalf of PNM, submitted the BART Modeling Protocol document which described the CALPUFF modeling methodology to be used as part of the BART engineering evaluation for Units 1-4 at the SJGS.

² On November 27, 2012, EPA approved all elements of New Mexico's 2011 regional haze SIP except for the NO_x BART determination for San Juan, thereby approving New Mexico's determination of which sources are subject-to-BART. 77 FR 70,693.

**Table 10-2: Visibility Impact Analysis of PNM's San Juan Generating Station
 NM SRC02 Unit # 350450902, PNM SJ #1-4: SO₂ = 35,735 TPY; NO_x = 38,763 TPY; PM = 3,884 TPY**

Annual Average Natural Conditions

Class I Area with at least 1 receptor within 300 km of source

Class I Area	Minimum Distance	98th Percentile for Each Year			98th
	(km)	2001	2002	2003	3 year AVG
Mesa Verde NP	40	5.54	5.34	5.30	5.40
Weminuche Wilderness	98	2.24	2.99	2.41	2.55
San Pedro Parks Wilderness	155	3.80	4.07	4.14	4.01
La Garita Wilderness	169	1.63	1.82	1.77	1.74
Canyonlands NP	170	6.21	4.33	4.44	4.99
Black Canyon Gunnison NM	203	2.38	2.27	2.43	2.36
Bandelier NM	210	2.47	2.90	3.08	2.82
Petrified Forest NP	213	1.62	1.27	1.03	1.31
West Elk Wilderness	216	2.14	1.90	2.20	2.08
Arches NP	222	4.06	3.71	3.59	3.79
Capitol Reef NP	232	4.00	2.02	2.35	2.79
Pecos Wilderness	248	2.17	2.63	2.81	2.53
Wheeler Peak Wilderness	258	1.94	1.73	1.97	1.88
Great Sand Dunes NM	269	1.47	1.59	1.74	1.60
Maroon Bells-Snowmass WA	271	1.19	1.27	1.15	1.21
Grand Canyon NP	285	2.12	1.50	1.18	1.60

**NM SRC02 Unit # 350450902, PNM SJ #1-4: PM Only (PM = 3,884 TPY)
Annual Average Natural Conditions
Class I Area with at least 1 receptor within 300 km of source**

Class I Area	Minimum Distance	98th Percentile for Each Year			98th
	(km)	2001	2002	2003	3 year AVG
Mesa Verde NP	40	0.86	0.96	1.13	0.98
Weminuche Wilderness	98	0.15	0.24	0.25	0.21
San Pedro Parks Wilderness	155	0.25	0.28	0.22	0.25
La Garita Wilderness	169	0.06	0.08	0.09	0.08
Canyonlands NP	170	0.28	0.20	0.22	0.23
Black Canyon Gunnison NM	203	0.09	0.11	0.07	0.09
Bandelier NM	210	0.13	0.19	0.17	0.16
Petrified Forest NP	213	0.05	0.03	0.05	0.05
West Elk Wilderness	216	0.07	0.09	0.07	0.08
Arches NP	222	0.19	0.19	0.15	0.17
Capitol Reef NP	232	0.12	0.07	0.09	0.09
Pecos Wilderness	248	0.08	0.10	0.10	0.09
Wheeler Peak Wilderness	258	0.07	0.06	0.07	0.06
Great Sand Dunes NM	269	0.07	0.05	0.06	0.06
Maroon Bells-Snowmass WA	271	0.04	0.04	0.03	0.04
Grand Canyon NP	285	0.08	0.04	0.05	0.05

**NM SRC02 Unit # 350450902, PNM SJ #1-4: NOx Only (NOx = 38,763 TPY)
Annual Average Natural Conditions
Class I Area with at least 1 receptor within 300 km of source**

Class I Area	Minimum Distance	98th Percentile for Each Year			98th
	(km)	2001	2002	2003	3 year AVG
Mesa Verde NP	40	3.59	3.73	3.24	3.52
Weminuche Wilderness	98	1.66	2.15	1.71	1.84
San Pedro Parks Wilderness	155	2.70	2.74	2.89	2.78
La Garita Wilderness	169	1.09	1.30	1.22	1.20
Canyonlands NP	170	4.28	3.22	2.79	3.43
Black Canyon Gunnison NM	203	1.67	1.72	1.86	1.75
Bandelier NM	210	1.69	2.13	2.23	2.02
Petrified Forest NP	213	0.80	0.70	0.30	0.60
West Elk Wilderness	216	1.22	1.44	1.60	1.42
Arches NP	222	3.22	2.50	2.40	2.71
Capitol Reef NP	232	2.89	0.92	1.45	1.75
Pecos Wilderness	248	1.49	1.72	1.94	1.72
Wheeler Peak Wilderness	258	1.15	1.09	1.36	1.20
Great Sand Dunes NM	269	1.09	1.00	1.10	1.07
Maroon Bells-Snowmass WA	271	0.76	0.88	0.88	0.84
Grand Canyon NP	285	1.56	0.80	0.44	0.93

**NM SRC02 Unit # 350450902, PNM SJ #1-4: SO₂ Only (SO₂ = 35,735 TPY)
Annual Average Natural Conditions
Class I Area with at least 1 receptor within 300 km of source**

Class I Area	Minimum Distance	98th Percentile for Each Year			98th
	(km)	2001	2002	2003	3 year AVG
Mesa Verde NP	40	2.78	3.17	3.14	3.03
Weminuche Wilderness	98	1.28	1.23	0.89	1.13
San Pedro Parks Wilderness	155	1.77	2.13	1.72	1.87
La Garita Wilderness	169	0.81	0.89	0.70	0.80
Canyonlands NP	170	2.65	1.79	2.06	2.17
Black Canyon Gunnison NM	203	0.92	1.03	0.89	0.95
Bandelier NM	210	1.17	1.62	1.24	1.34
Petrified Forest NP	213	0.94	0.83	0.94	0.91
West Elk Wilderness	216	0.75	0.79	0.59	0.71
Arches NP	222	1.74	1.22	1.33	1.43
Capitol Reef NP	232	1.68	1.47	1.32	1.49
Pecos Wilderness	248	1.09	1.16	1.24	1.16
Wheeler Peak Wilderness	258	1.00	0.86	1.06	0.97
Great Sand Dunes NM	269	0.64	0.69	0.68	0.67
Maroon Bells-Snowmass WA	271	0.54	0.62	0.36	0.51
Grand Canyon NP	285	1.18	0.78	0.73	0.90

NM SRC02 Unit # 350450902, PNM SJ #1-4: PM plus NO_x (NO_x = 38,763 TPY; PM = 3,884 TPY)

**Annual Average Natural Conditions
Class I Area with at least 1 receptor within 300 km of source**

Class I Area	Minimum Distance	98th Percentile for Each Year			98th
	(km)	2001	2002	2003	3 year AVG
Mesa Verde NP	40	4.27	4.06	3.46	3.93
Weminuche Wilderness	98	1.74	2.28	1.76	1.93
San Pedro Parks Wilderness	155	2.85	2.87	3.07	2.93
La Garita Wilderness	169	1.15	1.36	1.30	1.27
Canyonlands NP	170	4.39	3.33	2.91	3.54
Black Canyon Gunnison NM	203	1.73	1.84	1.90	1.82
Bandelier NM	210	1.77	2.29	2.31	2.12
Petrified Forest NP	213	0.83	0.72	0.31	0.62
West Elk Wilderness	216	1.26	1.50	1.64	1.47
Arches NP	222	3.30	2.65	2.50	2.82
Capitol Reef NP	232	3.06	0.95	1.50	1.83
Pecos Wilderness	248	1.55	1.77	2.04	1.79
Wheeler Peak Wilderness	258	1.20	1.12	1.40	1.24
Great Sand Dunes NM	269	1.14	1.05	1.15	1.11
Maroon Bells-Snowmass WA	271	0.78	0.91	0.91	0.87
Grand Canyon NP	285	1.60	0.82	0.45	0.96

10.4 Summary of BART Determinations for San Juan

Clean Air Act § 169A(g)(7) directs States to consider five factors in making BART determinations. The regional haze rule codified these factors in 40 CFR § 51.308(e)(1)(ii)(B), which directs States to identify the “best system of continuous emissions control technology” taking into account “the technology available, the costs of compliance, the energy and non-air quality environmental impacts of compliance, any pollution control equipment in use at the source, and the remaining useful life of the source.”

The BART regulations define BART as meaning “...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 ... [a BART-eligible source].” In its guidance, EPA was clear that each State must determine the appropriate level of BART control for each source that is determined to be subject-to-BART. In making a BART determination, a State must consider the following factors:

- (1) The costs of compliance;
- (2) The energy and non-air quality environmental impacts of compliance;
- (3) Any existing pollution control technology in use at the source;
- (4) The remaining useful life of the source; and
- (5) The degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology.

To consider these factors, New Mexico applied the following 5 step process as specified in the BART Guidelines at Appendix Y to 40 CFR Part 51:

Step 1 – Identify All Available Retrofit Control Technologies

Step 2 – Eliminate Technically Infeasible Options

Step 3 – Evaluate Control Effectiveness of Remaining Control Technologies

Step 4 – Evaluate Impacts and Document the Results

- a) Costs of Compliance
- b) Energy Impacts
- c) Air quality environmental impacts
- d) Non-air environmental impacts
- e) Remaining useful life

Step 5 – Evaluate Visibility Impacts

The Department applied the 5 step process to San Juan, as described in detail in Appendix D. The results are summarized below.

10.4.1 Particulate Matter

Based on the five factor analysis, the Department determined in 2011 that BART for Units 1-4 for particulate matter (“PM”) is the existing pulse jet fabric filter control technology and an existing emission rate of 0.015 lb/MMBtu. The Department’s determination of BART was based on the following results of the full five factor analysis:

1. Each of Units 1-4 is equipped with a pulse jet fabric filter (PJFF) and is subject to a federally-enforceable emission limit of 0.015 lb PM/MMBtu.
2. The Department reviewed both the cost-effectiveness and incremental cost-effectiveness of additional control technology (WESP) and found these costs to be excessive.

3. There are no non-air impacts associated with the WESP technology.
4. There are additional energy impacts associated with the WESP technology and the Department considers these costs to be reasonable.
5. The Department reviewed the visibility improvement that resulted from the installation of the consent decree technology (PJFF and LNB/OFA) and that would result from the addition of WESP technology. The Department determined that on a facility-wide basis the visibility improved by 1.06 deciviews (dv) from the installation of the consent decree technology at Mesa Verde National Park (Mesa Verde). The installation of WESP would result in a facility-wide improvement of 0.62 dv at Mesa Verde.

On November 27, 2012, the EPA approved New Mexico's determination that PJFF is BART for PM at San Juan. 77 Fed. Reg. 36,044. Notwithstanding the fact that the BART requirement has thus been satisfied with respect to PM, additional PM reductions will be made at the San Juan Generating Station under the "State Alternative" described below.

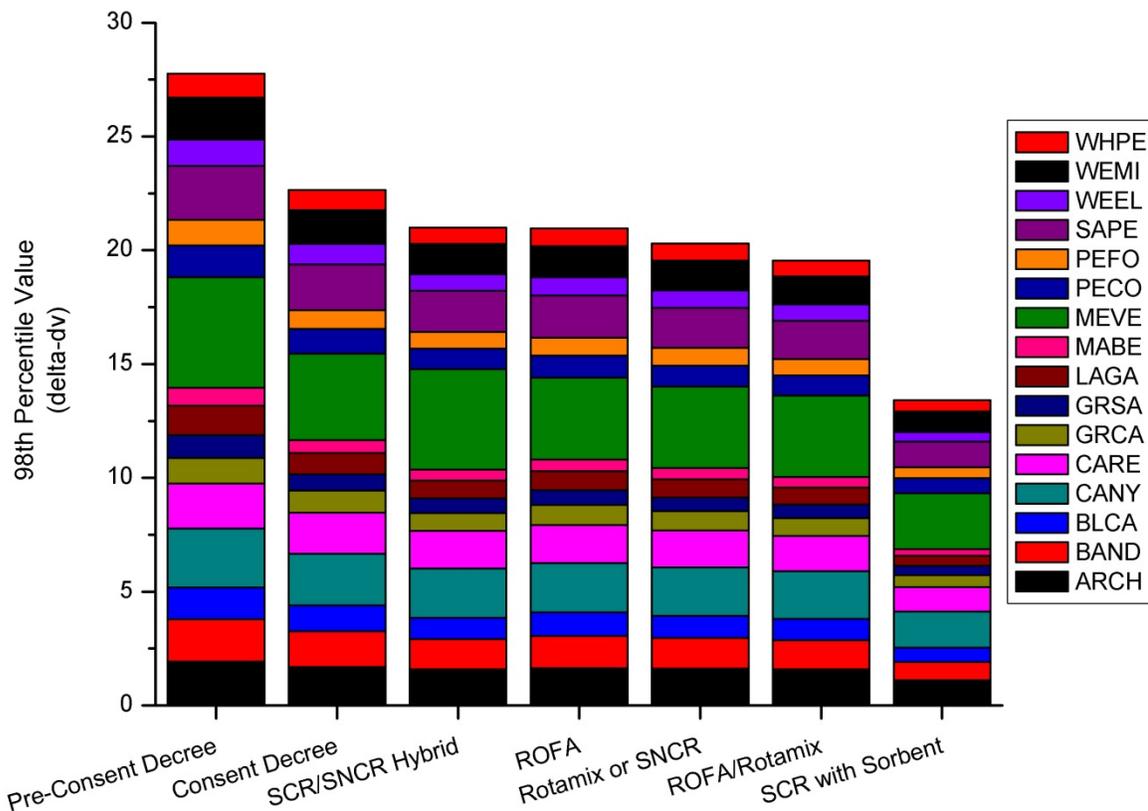
10.4.2 Nitrogen Oxides

Based on the five factor analysis, the Department determined in 2011 that BART for Units 1-4 for NO_x is SNCR technology and an emission rate of 0.23 lb/MMBtu on a 30-day rolling average. The Department's determination of BART was based on the following results of the five factor analysis:

1. SNCR technology is considered cost-effective at an average cost of \$3,494 dollars per ton of NO_x removed. SNCR technology will reduce the facility annual NO_x emissions by 4,900 tons.
2. The SNCR technology will result in additional energy impacts and non-air impacts. The SNCR technology will require a new reagent system and a reagent storage system. The Department considered these additional costs in the review of the overall cost-effectiveness of SNCR and found these costs to be reasonable.
3. The Department reviewed the visibility improvement that resulted from the installation of the SNCR technology. The Department determined that on a facility-wide basis the visibility improved by 0.25 dv at San Pedro Parks, 0.22 dv at Mesa Verde, and 0.21 at Bandelier.
4. An emission limit of 0.23 lb NO_x/MMBtu at each of Units 1-4 equals the EPA's established presumptive limit for dry-bottom, wall-fired boilers burning sub-bituminous coal.
5. The Department reviewed additional economic information provided by PNM that analyzed the economic impact to ratepayers in New Mexico. PNM estimates indicate the cost of control technology beyond SNCR would be financially burdensome and cause economic hardship to low-income New Mexicans. According to the U.S. Census Bureau, as of 2009, 18 percent of New Mexicans were living below the poverty line, as defined by the federal poverty standards. PNM estimates a rate increase of \$11.50 per year per residential ratepayer from the installation of SNCR versus an estimated rate increase of \$82.00 per year from the installation of SCR.

The visibility improvement projected for each Class I area from the installation of various NOx control technologies is shown in Figure 10-1.

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



Notwithstanding this 2011 NOx BART determination applicable to all four units, which the Department believes would satisfy all applicable requirements, the Department has determined that the State Alternative would result in additional visibility improvements and other air and non-air benefits, as described below, and therefore is preferable to the 2011 NOx BART determination.

10.4.3 State Alternative

As noted in the Introduction above, on February 15, 2013, New Mexico, EPA, and PNM signed a tentative agreement (Term Sheet) to address the CAA requirements for regional haze and interstate transport for visibility at the San Juan Generating Station. Although the agreement arose from a dispute over the NOx BART determination, its terms will also result in reduction of PM, SO₂, and other pollutants including greenhouse gases.

In accordance with the Term Sheet, PNM submitted to the Department in March 2013 a revised 5-factor BART analysis that includes consideration of the State Alternative including voluntary unit retirements as a new alternative operating scenario that had not previously been analyzed. As documented in Appendix

D of this SIP, the Department has reviewed the revised BART analysis, and has determined that the State Alternative satisfies the BART requirements of the CAA and 40 C.F.R Part 51 Appendix Y.

The comparison of the State Alternative (SNCR on Units 1 and 4 and the shutdown of Units 2 and 3, or 2 SNCR/2 Shutdown) to the Department's 2011 BART determination of SNCR on all four units (4 SNCR) and the installation of SCR on all four units (4 SCR) (EPA's Federal Implementation Plan decision; 76 FR 52388, August 22, 2011) is summarized in Table 10-3.

Table 10-3: Facility-Wide Pollutant Emissions from 2 SNCR/2 Shutdown, 4 SNCR and 4 SCR Scenarios

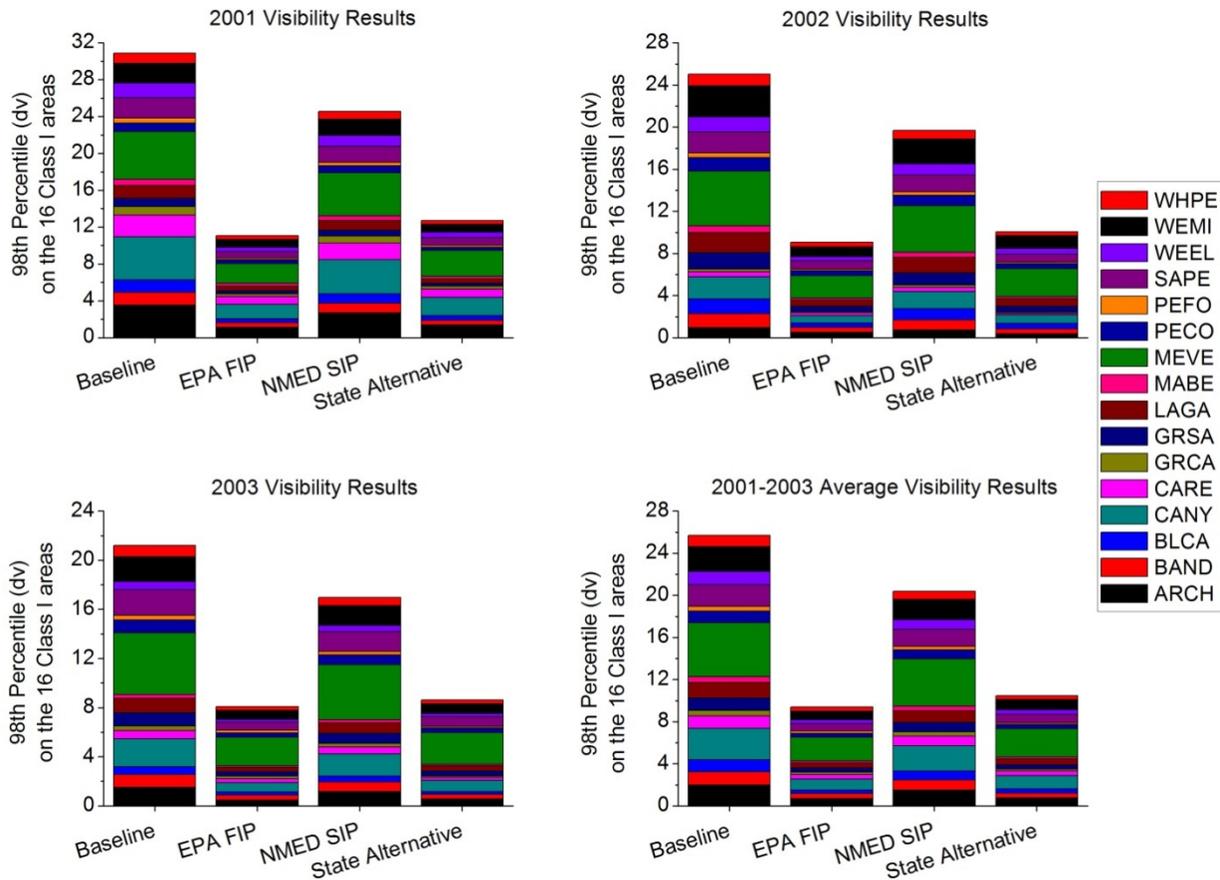
Scenario	NO _x	SO ₂	PM	CO	CO ₂	VOC	Mercury	Non-Hg	Acid Gases
Current	21,000	10,500	2,380	33,507	14,669,968	210	0.0842	5.4	1,488
2 SNCR/2 Shutdown	8,011	3,483	1,184	18,615	7,314,801	104	0.042	2.7	744
2 SNCR/2 Shutdown % Reduction	62%	67%	50%	44%	50%	50%	50%	50%	50%
4 SNCR	16,100	10,500	2,380	33,507	14,699,968	210	0.0842	5.4	1,488
4 SNCR % Reduction	23%	0%	0%	0%	0%	0%	0%	0%	0%
4 SCR	3,502	10,500	2,380	33,507	14,699,968	210	0.0842	5.4	1,488
4 SCR % Reduction	83%	0%	0%	0%	0%	0%	0%	0%	0%

Visibility improvements were compared for the current configuration (Baseline), 4 SNCR, 4 SCR, and 2 SNCR/2 Shutdown. Figure 10-2 shows the differences in visibility between the alternatives at the 16 Class I areas within 300 kilometers of SJGS. Table 10-4 shows the average visibility improvement for the years 2001-2003 for the 4 SCR, 4 SNCR and 2 SNCR/2 Shutdown scenarios. The 2 SNCR/2 Shutdown scenario provides similar visibility improvement as the 4 SCR scenario. See Appendix D for additional details.

Table 10-4: 2001-2003 Average Visibility Improvement for 4 SCR, 4 SNCR and 2 SNCR/2 Shutdown Scenarios

Class I Area	4 SCR	4 SNCR	2 SNCR/2 Shutdown	Difference 4 SCR to 4 SNCR	Difference 4 SCR to 2 SNCR/2 Shutdown
Arches	1.06	0.37	0.97	0.69	0.09
Bandelier	0.61	0.23	0.64	0.38	-0.03
Black Canyon	0.37	0.16	0.41	0.21	-0.04
Canyonlands	1.54	0.48	1.38	1.06	0.16
Capitol Reef	0.34	0.10	0.42	0.24	-0.08
Grand Canyon	0.18	0.08	0.25	0.10	-0.07
Great Sand Dunes	0.73	0.27	0.69	0.46	0.04
La Garita	0.78	0.29	0.73	0.49	0.05
Maroon Bells	0.20	0.07	0.22	0.13	-0.02
Mesa Verde	2.69	0.55	2.41	2.14	0.28
Pecos	0.70	0.25	0.66	0.45	0.04
Petrified Forest	0.16	0.07	0.25	0.09	-0.09
San Pedro	1.41	0.49	1.29	0.92	0.12
West Elk	0.45	0.17	0.43	0.28	0.02
Weminuche	1.29	0.41	1.23	0.88	0.06
Wheeler Peak	0.59	0.24	0.58	0.35	0.01

Figure 10-2: Comparison of Visibility Improvement of Alternatives at San Juan Generating Station



Note: WHPE – Wheeler Peak Wilderness Area, NM; WEMI – Weminuche Wilderness Area, CO; WEEL – West Elk Wilderness Area, CO; San Pedro Parks Wilderness Area – NM; PEFO – Petrified Forest National Park, AZ; PECO – Pecos Wilderness Area, NM; MEVE – Mesa Verde National Park, CO; MABE – Maroon Bells Wilderness Area, CO; LAGA – La Garita Wilderness Area, CO; GRSA – Great Sand Dunes National Monument, CO; GRCA – Grand Canyon National Park, AZ; CARE – Capitol Reef National Park, UT; CANY – Canyonlands National Park, UT; BLCA – Black Canyon of the Gunnison National Park, CO; BAND – Bandelier Wilderness Area, NM; ARCH – Arches National Park, UT

The Department considered the terms of the non-binding agreement between the EPA, NMED and PNM, signed February 15, 2013 (the “State Alternative”), and the resulting significant environmental improvements of this alternative and compared this scenario to the 4 SNCR and 4 SCR scenarios previously evaluated. The Department’s determination of BART was based on consideration of the BART statutory factors in the context of the following elements of the State Alternative (2 SNCR/2 Shutdown).

- 1) PNM will retire Units 2 and 3 by December 31, 2017. These retirements do not give rise to control equipment costs requiring amortization. The remaining useful life of the source is defined as 30 years for the three scenarios described (4 SCR, 4 SNCR, 2 SNCR/2 Shutdown). Therefore, the statutory factor of the remaining useful life of the source does not weigh in favor of any option over another.
- 2) PNM will obtain the necessary construction permit modification to limit the SO₂ emission rates at Units 1 and 4 to 0.10 lb/MMBtu on a daily rolling 30-day average basis. These SO₂ emission

reductions occur separately and apart from the SO₂ backstop trading program that EPA has already approved as satisfying BART. In addition to increased visibility improvement, these SO₂ reductions will lead to non-air quality environmental benefits, such as decreased acid deposition.

- 3) The retirement of Units 2 and 3 will reduce the facility annual NO_x emissions by an additional 10,550 tons. When added to the controlled emission rate of Units 1 and 4, total annual NO_x emission will be reduced by 12,989 tons. Additionally, PNM will conduct performance testing to determine if the SNCRs installed on Units 1 and 4 can achieve significantly less than 0.23 lb/MMBtu.
- 4) The 2 SNCR/2 Shutdown scenario would result in less material usage than the 4 SCR and 4 SNCR scenarios. See Table 23. This will result in less limestone required to be transported and mined, less diesel fuel that would need to be refined for this power plant, less coal mined and less carbon that would need to be activated. Closure of two units will result in up to 53 percent less water used, from 21,000 acre-feet to 10,161 acre-feet; wastewater generated will be reduced by up to 50 percent, from 41 million gallons to 21 million gallons; and solid waste generated will be reduced by up to 50 percent, from 1.71 million tons per year to 854,130 tons per year.

Table 23: Raw Material Usage Comparison

Raw Material	2 SNCR/2 Shutdown (TPY)	Baseline, 4 SNCR, and 4 SCR
Limestone ⁽¹⁾	86,052	172,104
Activated Carbon ⁽¹⁾	130	261
Coal ⁽²⁾	2,667,364	5,334,729
No. 2 Diesel Oil ⁽²⁾	1,007,336	2,014,671

(1) Based on 2012 material usage data.

(2) Based on 2011 material usage data.

The energy and non-air quality environmental benefit of these resource savings weighs heavily in favor of the 2 SNCR/2 Shutdown scenario over the 4 SCR and 4 SNCR scenarios.

- 5) The two-unit retirement scenario will result in a substantial decrease in particulate matter emissions from coal processing, handling and transportation, as well as a substantial reduction in greenhouse gas emissions, mercury and other hazardous air pollutant emissions, and acid gas emissions as detailed in Table 24 below. The non-air quality environmental benefits of these reductions, such as less impact on climate and less deposition of mercury to waterways, weigh heavily in favor of the 2 SNCR/2 Shutdown scenario
- 6) Table 22 shows the average visibility improvement between the three scenarios of 4 SCR, 4 SNCR and 2 SNCR/2 unit shutdown. The 2 SNCR/2 Shutdown scenario achieves significant visibility improvements as compared to the baseline and installation of SNCR on Units 1-4. The visibility improvements from the State Alternative of SNCR on two units and two units shutdown compare very closely with the SCR installation scenario as contained in the FIP (less than 0.3 dv impact at any Class I area). For the 4 SCR and 2 SNCR/2 Shutdown scenarios, the average difference over three years is 0.28 dv at Mesa Verde and 0.16 dv at Canyonlands.

Therefore, with respect to the statutory factor of the degree of visibility improvement anticipated, the 2 SNCR/2 unit shutdown scenario is superior to the 4 SCR scenario, and substantially equivalent to the 4 SCR scenario.

- 7) Table 10 includes the cost in dollars per ton for SCR and SNCR, as well as other scenarios. The total capital investment of the FIP 4 SCR scenario is estimated at nearly \$861,871,000, as compared to \$34,556,000 for the installation of SNCR at Units 1 and 4. This additional and significant capital expenditure that would be required to comply with the 4 SCR scenario is not justified given the slight improvement in visibility of the 4 SCR scenario over the 2 SCR/2 Shutdown scenario.
- 8) Finally, with respect to the statutory requirement to consider existing pollution controls at the source, such existing pollution control equipment was evaluated for all alternatives beginning in Step 1 of the analysis, and is outlined in Table 10. NMED determined that existing control equipment is not sufficient to meet BART requirements for NO_x at San Juan Generating Station. This factor has no further relevance in selecting among the control options in this case .

Weighing all the above considerations as required by CAA § 169A, the Department has determined that the State Alternative (2 SNCR/2 Shutdown), which achieves substantial environmental benefits beyond the requirements of the FIP (4 SCR), the SIP (4 SNCR) and the requirements of the BART Guidelines at 40 CFR Part 51 Appendix Y at a significantly lower cost than the FIP scenario of 4 SCRs, satisfies the statutory and regulatory requirements of BART.

10.5 Implementation of the State Alternative

In accordance with 40 CFR § 51.308(e)(1)(iv), the Department determines that the schedule provided in the Term Sheet will result in the installation of BART controls as expeditiously as practicable. Therefore, in accordance with the Term Sheet, the following requirements apply to the San Juan Generating Station.

- a. Fifteen (15) months after EPA final approval of this revised SIP, no earlier than January 31, 2016, Public Service Company of New Mexico (PNM) will complete installation of selective non-catalytic reduction (SNCR) technology on SJGS Unit 1 and 4 of no greater than 0.23 lb/MMBtu on a daily rolling 30-day average basis.
- b. Testing Program. PNM shall comply with the following. Dates that follow with an asterisk(*) in items (i) – (iv) shall be revised accordingly if the installation date extends past January 31, 2016 due to delay in EPA's SIP approval:
 - i. PNM will commence a program of testing and evaluation, after the installation of the SNCRs. The Testing Program consisting of SNCR Performance Testing, Fuel Performance Testing, and Long-Term Performance Evaluation is to be completed no later than January 31, 2017,* unless the Long-Term Performance Evaluation is delayed per the language in paragraph b.iv below.
 - ii. SNCR Performance Testing will be conducted to develop a targeted ammonia/urea injection rate range at various load levels without exceeding a to-be-agreed-upon preliminary slip limit of between 5 and 10 ppm, with the goal of minimizing NO_x emissions. PNM shall provide the results of the performance tests, recommended final slip limit, and target ammonia/urea injection rates to NMED and EPA by April 1, 2016.* PNM will allow up to April 30, 2016* for the agencies to either concur with PNM's slip limit recommendation or to concur on a different slip limit that PNM will comply with for Units 1 and 4.

- iii. PNM will conduct Fuel Performance Testing (in conjunction with the SNCR Performance Testing) of its pre-treated coal technology, so long as it has not been previously determined to result in any detrimental effect to SJGS Units 1 and 4 or their operation, with the objective of further reducing NOx emissions. If the Fuel Performance Testing demonstrates that it does not: (i) measurably increase NOx emissions, or (ii) adversely impact overall unit operations, PNM shall also use such pre-treated coal for the 9-month Long-Term Performance Evaluation Period described below. PNM will also use pre-treated coal on units 2 and 3 when used on units 1 and 4.
- iv. Long-Term Performance Evaluation Period. PNM will begin collecting NOx emission and ammonia/urea injection rate data from Units 1 and 4 on a daily rolling 30-day average basis for nine continuous months beginning on May 1, 2016* and provide such data and any recommendations on the NOx emission limit to NMED and EPA by February 28, 2017* or no later than 28 days after completing the Long-Term Performance Evaluation Period. PNM may request more time if a slip limit is not agreed upon by April 30, 2016.* The Long-Term Performance Evaluation Period must include 60 days between June 1st and August 30th and 60 days between December 1st and February 28th. The Demonstrated Emission Rate will be the highest daily rolling 30-day average emission rate during the 9-month Long-Term Performance Evaluation Period (not including periods of malfunction or abnormal operating conditions) adjusted to three significant digits. If the Demonstrated Emission Rate is greater than or equal to 0.200 lb/MMBtu on a daily rolling 30-day average basis no adjustment to the NOx emission rate for units 1 and 4 will be made. If the Demonstrated Emission Rate is less than 0.200 lb/MMBtu on a daily rolling 30-day average basis PNM will apply for a permit modification by March 31, 2017* (or no later than 60 days after completing the Long-Term Performance Evaluation Period) to reduce the permitted emission rate by 60% of the difference between 0.23 lb/MMBtu and the Demonstrated Emission Rate, provided the revised emission rate does not adversely impact overall unit operations. The permit modification will include the agreed upon ammonia slip limit.
- c. No later than six months from the Board's adoption this SIP revision, PNM will comply with a sulfur dioxide ("SO₂") emission rates at Units 1 and 4 of 0.10 lb/MMBtu on a daily rolling 30-day average basis.
- d. PNM shall diligently seek all necessary regulatory approvals to allow for retirement of SJGS Units 2 and 3 by December 31, 2017, and if such approvals are granted, shall retire SJGS Units 2 and 3 by December 31, 2017.
- e. Nothing in this SIP shall relieve the SJGS from its obligations to comply with all applicable federal, state, and local laws and regulations, including laws, regulations, and compliance deadlines that become applicable after the date that this SIP revision is approved by EPA.

In accordance with 40 CFR § 51.308(e)(1)(v), San Juan Generating Station shall maintain the control equipment required by this chapter and establish procedures to ensure such equipment is properly operated and maintained.