Chapter Five – Best Available Retrofit Technology

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5.1 OVERVIEW OF THE BART PROCESS

The Regional Haze Rule (RHR) at 40 CFR 51.308(e) requires the installation of Best Available Retrofit Technology (BART) controls on a specific set of existing sources as one tool to meet the CAA visibility protection provisions. A BART-eligible source is one which meets the following criteria:

1. Contains an emission unit from one of 26 source categories identified in the CAA and regulations,
2. The emission unit was in existence on August 7, 1977; however, not in operation before August 7, 1962.
3. The potential emissions from all the emission units identified in steps 1 and 2 are currently 250 tons per year or more of any air pollutant.

A BART-eligible source that is responsible for a 1.0 deciview (dv) change or more is considered to "cause or contribute" to visibility impairment. Although the appropriate threshold may vary, the USEPA guidelines indicate that the cause or contribute threshold used for BART applicability should not exceed 0.5 dv. Thus, Nevada considers a BART-eligible source that is responsible for a 0.5 dv increase or more to cause or contribute to visibility impairment. Any BART-eligible source determined to cause or contribute to visibility impairment in any mandatory Class I area is subject to a BART determination.

To assess visibility impairment from BART-eligible sources in Nevada, an individual source attribution approach was used to predict single source contribution. The USEPA guidelines direct that states review sulfur dioxide (SO_2), nitrogen oxides (NO_x) and particulate matter (PM) emissions in determining whether sources cause or contribute to visibility impairment. States may use their best judgment to determine whether volatile organic compounds or ammonia emissions are likely to have an impact on visibility in an area.

Sources identified as subject to BART are required, through a BART engineering analysis, to identify what types of controls, if any, should be placed on the source. The RHR also requires states to consider the following factors in making BART determinations:

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

Upon determination of BART, each source is required to install and operate BART as expeditiously as practicable, but in no event later than 5 years after approval of the SIP.

5.2 BART–ELIGIBLE SOURCES IN NEVADA

The BART-eligible sources were identified using the methodology in the *Guidelines for BART Determinations under the Regional Haze Rule* or "Guidelines" found in 40 CFR 51, Appendix Y.

Fourteen units at seven facilities were identified as BART-eligible. The BART-eligible facilities are: NV Energy's generating stations at Tracy, Fort Churchill, Reid Gardner and Sunrise; Southern California Edison's (SCE) generating station at Mohave; Nevada Cement Company's Fernley facility; and Chemical Lime Company's Apex facility. BART-eligible sources in Nevada are listed in Table 5-1.

TABLE 5-1

BART-ELIGIBLE SOURCES IN NEVADA

Source	Location	Unit	Source Category	Date in Operation	Facility Potential to Emit (tons per year)		
					NO_x	SO_2	PM_{10}
Tracy	Mustang, NV	Boiler 1	Electric Generating Station	1963	1,167	21	125
		Boiler 2		1965			
		Boiler 3		1974			
Fort Churchill	Yerington, NV	Boiler 1	Electric Generating Station	1968	2,221	9	41
		Boiler 2		1971			
Reid Gardner	Moapa, NV	Boiler 1	Electric Generating Station	1965	7,045	1,020	1,343
		Boiler 2		1968			
		Boiler 3		1976			
Sunrise	Las Vegas, NV	Boiler 1	Electric Generating Station	1964	851	1	13
Mohave	Laughlin, NV	Boiler 1	Electric Generating Station	1969	20,267	40,347	1,958
		Boiler 2		1969			

Source	Location	Unit	Source Category	Date in Operation	Facility Potential to Emit (tons per year)		
					NO_x	SO_2	PM_{10}
Nevada Cement Company	Fernley, NV	Kiln 1	Portland Cement Plant	1963	2,065	96	80
		Kiln 2		1967-1968			
Chemical Lime Company	Apex, NV	Kiln 3	Portland Cement Plant	1968	1,121	178	241

5.3 EXEMPTION MODELING SETUP AND ANALYSIS

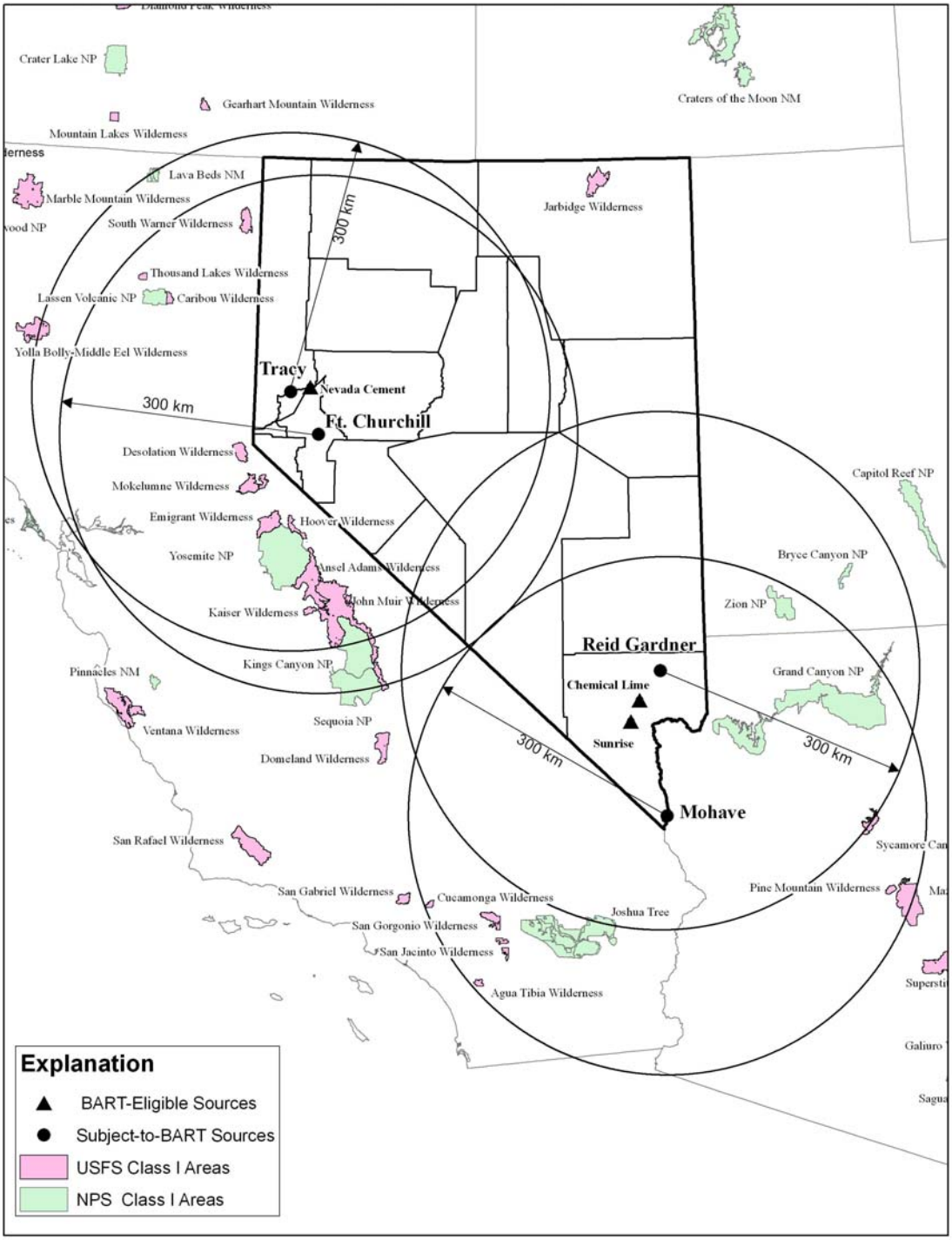
Air quality modeling was conducted by the Western Regional Air Partnership (WRAP) Regional Modeling Center (RMC), at the request of Nevada, to initially assess which BART-eligible sources are subject to a full BART determination and which are exempt. Modeling was conducted for all of the sources listed in Table 5-1 by the WRAP. Nevada Cement Company later exercised their option to conduct their own assessment.

WRAP's BART modeling was performed in accordance with the WRAP Modeling Protocol (2006) and the April 2007 explanation of changes using the CALPUFF modeling system (Version 6). The modeling analysis utilized three years (2001, 2002, 2003) of 36-km MM5 meteorological data, processed through CALMET. Modeled emissions represent the 24-hour average actual emission rate from the highest emitting day of the meteorological period modeled. The results for a given year of meteorology are presented as the 98th percentile delta dv for each Class I area and the number of days that exceed 0.5 delta dv. In other words, the results are based on the eighth highest delta dv results for each year of analysis. Modeled species included SO_2, NO_x and PM_{10}. The modeling procedures used are outlined in the WRAP *BART Modeling Protocol* and *Explanation of Changes in the April 2007 Revised Final Modeling Analysis* available at http://pah.cert.ucr.edu/aqm/308/bart.shtml . The modeling domain included all mandatory Class I areas within 300 km of the BART–eligible sources. Figure 5-1 depicts the location of the facilities and Class I areas.

Nevada Cement developed their own exemption modeling protocol consistent with the WRAP's modeling protocol with the exception of refinements to the meteorological data and the use of the EPA-approved version of the CALPUFF modeling system (i.e., Version 5). Their protocol is available at http://ndep.nv.gov/baqp/planmodeling/rhaze.html.

FIGURE 5-1

LOCATION OF NEVADA'S BART SOURCES



5.4 SUMMARY OF EXEMPTION MODELING RESULTS

BART-eligible sources responsible for a 0.5 dv change or more in visibility at any Class I area are subject to a full BART determination to identify and implement BART. BART-eligible sources that do not cause or contribute to visibility impairment at a threshold greater than 0.5 dv are exempt from further BART determination. The RMC produced BART exemption modeling reports for BART-eligible sources, available at http://ndep.nv.gov/baqp/planmodeling/rhaze.html. Nevada Cement Company conducted their own exemption modeling, and their report is also available at http://ndep.nv.gov/baqp/planmodeling/rhaze.html.

5.4.1 Subject-to-BART Sources

Four BART-eligible facilities modeled above the 0.5 dv "cause or contribute" visibility impairment threshold and are subject to a full BART analysis. These subject-to-BART facilities are the generating stations at Tracy, Fort Churchill, Reid Gardner and Mohave. Table 5-2 lists the Class I areas within 300 km of each source and identifies the 98th percentile dv value for 2001 through 2003 and the number of days the modeled impact exceeded the 0.5 dv threshold. Only those Class I areas impacted by visibility impairment at a value of 0.5 dv or greater are listed.

TABLE 5-2

BART EXEMPTION MODELING RESULTS – SOURCES SUBJECT TO BART[1]

Facility	Class I Area	Distance to Class I Area (km)	98th Percentile dv 2001-2003	Days > 0.5 dv 2001-2003
Tracy	Desolation	81	1.20	47
	Mokelumne	101	0.88	32
	Hoover	142	0.52	11
	Yosemite	153	0.50	11
	Caribou	170	1.03	48
	Lassen Volcanic	175	0.94	44
	South Warner	189	0.99	62
	Lava Beds	286	0.74	25
Fort Churchill	Mokelumne	78	1.24	69
	Desolation	85	1.25	72
	Hoover	99	1.00	32
	Emigrant	100	0.68	25
	Yosemite	112	1.00	29
	Ansel Adams	132	0.70	28
	John Muir	169	0.56	24
	Caribou	226	0.77	34

[1] A summary of the WRAP RMC BART modeling for these facilities is available at http://ndep.nv.gov/baqp/planmodeling/rhaze.html.

Facility	Class I Area	Distance to Class I Area (km)	98th Percentile dv 2001-2003	Days > 0.5 dv 2001-2003
	Lassen Volcanic	231	0.77	33
	South Warner	245	0.72	62
	Thousand Lakes	265	0.60	21
Reid Gardner	Grand Canyon	85	1.72	60
	Zion	148	0.83	38
	Joshua Tree	292	0.88	48
Mohave	Grand Canyon	110	4.61	498
	Joshua Tree	137	4.58	248
	Sycamore Canyon	223	1.51	111
	San Gorgonio	225	1.44	75
	San Jacinto	234	1.62	74
	Zion	262	2.58	270
	Pine Mountain	265	1.21	49
	Dome Land	268	1.97	72
	Mazatal	279	1.19	45
	Agua Tibia	286	1.15	54
	Cucamonga	287	1.38	51

5.4.2 BART-Exempt Sources

Three facilities modeled below the 0.5 dv visibility impairment threshold and are not required to perform a BART determination. These facilities are the Sunrise Generating Station, the Nevada Cement Company facility and the Chemical Lime Company facility. The 98th percentile dv value for 2001 through 2003 and the number of days the dv value exceeded 0.5 dv are presented in Table 5-3.

TABLE 5-3

BART MODELING RESULTS – BART-EXEMPT SOURCES[2]

Facility	Class I Area	Distance to Class I Area (km)	98th Percentile dv 2001-2003	Days > 0.5 dv 2001-2003
Sunrise	Grand Canyon	95	0.20	1
	Zion	207	0.11	0
	Joshua Tree	228	0.16	0
	Dome Land	237	0.08	0
	San Gorgonio	271	0.08	0
	John Muir	282	0.06	0
	Bryce Canyon	284	0.04	0

[2] A summary of the WRAP RMC BART exemption modeling for these facilities is available at http://ndep.nv.gov/baqp/planmodeling/rhaze.html.

Facility	Class I Area	Distance to Class I Area (km)	98th Percentile dv 2001-2003	Days > 0.5 dv 2001-2003
	Sequoia	288	0.04	0
	San Jacinto	290	0.06	0
	Sycamore Canyon	290	0.03	0
Nevada Cement Company	Desolation	101	0.27	3
	Mokelumne	115	0.31	3
	Emigrant	148	0.16	0
	Hoover	150	0.22	0
	Yosemite	161	0.22	0
	Caribou	185	0.48	6
	Ansel Adams	186	0.18	0
	Lassen Volcanic	191	0.46	6
	South Warner	224	0.49	7
	John Muir	224	0.14	0
	Thousand Lakes	254	0.26	4
	Kaiser	267	0.08	0
	Kings Canyon	294	0.11	0
	Lava Beds	294	0.22	0
Chemical Lime Company	Grand Canyon	89	0.05	0
	Zion	185	0.03	0
	Joshua Tree	254	0.04	0
	Dome Land	256	0.02	0
	Bryce Canyon	263	0.01	0
	John Muir	290	0.01	0
	Sycamore	292	0.01	0
	Sequoia	296	0.01	0
	San Gorgonio	297	0.02	0

5.5 SUMMARY OF BART CONTROL ANALYSES

A full BART determination was completed for the generating stations at Tracy, Fort Churchill, Reid Gardner and Mohave. Emission limitations for BART were 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 or unit, the remaining useful life of the unit and the degree of improvement in visibility which may reasonably be anticipated to result from the use of control technology.

The control measures identified by Nevada as BART will be installed and operating for NV Energy's generating stations at Tracy, Fort Churchill and Reid Gardner on or before January 1, 2015 or no later than 5 years after approval of Nevada's RH SIP by the USEPA, whichever occurs sooner. SCE's generating station at Mohave is temporarily shut down; they must have

BART installed and operating at the time each unit resumes operation.[3] The designated BART controls, emission limits and compliance deadlines are enforceable through Nevada state regulation R190-08, adopted on February 11, 2009[4] (see Appendix A). BART will be incorporated into the NV Energy facilities' Title V operating permits over the normal course of renewals. A modification to Mohave's Title V permit incorporating BART was submitted in December 2008 and is being reviewed.

NV Energy and SCE prepared BART determinations for the eligible units at their respective facilities. Based on the data presented by NV Energy, Nevada determined that the BART conclusions proposed for Tracy and Fort Churchill were not supported for NO_x, but were acceptable for SO_2 and PM_{10}. The BART conclusions for Reid Gardner were not supported for NO_x, whereas for SO_2 and PM_{10}, the proposed control technologies were acceptable, but the emission limits were not supported. Mohave's BART determination was fully accepted by Nevada. Detailed BART determination reports from the facility for each of these sources and Nevada's BART determination reviews of NV Energy's reports are available at http://ndep.nv.gov/baqp/planmodeling/rhaze.html (see Appendix B).

Where facility BART determinations were not accepted, the state made its own determinations using the facility reports as a foundation. NDEP prepared BART determination reviews for each of the NV Energy facilities including an economic analysis summary. The economic analysis summaries are presented in Table 1 in each of NDEP's BART determination review reports.

NDEP established baseline emissions representative of actual emissions using acid rain data for NO_x and, where available, for SO_2. For PM_{10}, annual emissions data reported to NDEP were used to establish a baseline. Nevada used the NDEP baseline data in its cost analyses and NO_x BART control technology determinations. The NDEP baseline data were also used to establish the BART emission limits for PM_{10} at Reid Gardner and NO_x at all three NV Energy facilities. An alternative dataset was used in conjunction with the baseline emissions to establish the BART SO_2 emission limits for Reid Gardner. Finally, the NDEP baseline heat input was used in conjunction with the BART emission limits to calculate the post-BART-control annual emissions for the NV Energy facilities. The following describes how Nevada established baseline emissions for the NV Energy facilities.

For Tracy and Fort Churchill, NDEP established baseline emission scenarios for NO_x and SO_2 using acid rain data reported for calendar years 2002 through 2007. These years were determined to be most representative of operations for these units since they are load-following and not base-load units. For Mohave, a base-load unit, NDEP used acid rain data reported for calendar years 2001 through 2005 for the SO_2 and NO_x baseline. Mohave suspended operation at the end of 2005. Reid Gardner is also a base-load unit; therefore, NDEP used acid rain data

[3] On June 10, 2009, the owners of the Mohave Generating Station, including Southern California Edison (SCE), announced the decision to decommission the station and remove the generating facility from the site. The SCE news release states that in 2010, the plant's generating equipment will be removed and its operating permits terminated (http://www.edison.com/pressroom/pr.asp?bu=sce&year=2009&id=7234).

[4] In response to public comments on the draft RH SIP (contained in Appendix D), Nevada is revising the BART requirements at NV Energy's Reid-Gardner Generating Station. A regulatory amendment lowering the SO_2 emission limits for units 1, 2 and 3 from 0.25 to 0.15 lb/MMBtu, 24-hour average, has been submitted to the State Environmental Commission for presentation at their December 9, 2009 Hearing. See Appendix A.

for NO_x and SO_2 reported for calendar years 2001 through 2007 to calculate baseline emissions. The baseline emissions scenario for PM_{10} was established from the annual emissions data reported to NDEP for the calendar years indicated above for each facility.

Consistent with the calculation of baseline emissions for the Prevention of Significant Deterioration program, the average of the highest two consecutive years of annual emissions, on a pollutant-by-pollutant basis, were used to establish a baseline emission scenario for each pollutant, except Reid Gardner, which was established as follows. The SO_2 acid rain data for Reid Gardner contained periods (Q1, 2003) of invalid data due to O_2 monitor problems identified by NDEP during a compliance investigation, which lead to the joint NDEP/EPA enforcement action and consent agreement described in Chapter Six, section 6.5.2.2. Therefore, NDEP omitted the invalid data from the calculation of baseline SO_2 emissions. The omission of the invalid data effectively lowered the baseline emissions, in lb/MMBtu, by nearly half.

The baseline annual heat input and baseline annual emissions were used to calculate baseline emission rates in lb/MMBtu. The control efficiencies provided by NV Energy were then applied to the baseline NO_x emission rates to calculate the BART emission limits in lb/MMBtu and the post-BART annual emissions, as shown in Table 1 of the NDEP BART reviews.

Nevada initially (for the January 2009 FLM review draft) used the NDEP baseline in its determination of the BART SO_2 emissions limits for the three units at Reid Gardner. The 98th percentile emissions value, after discarding the invalid data, was determined to be the SO_2 BART emission limit for Reid Gardner's units. These BART emission limits allowed for future operation within 98 percent of historical emissions (after discard of the invalid data) and provided some flexibility under a new post-BART operating scenario including operation under a balanced draft versus forced draft scenario due to the installation of fabric filters and a potential change in coal type.

However, in late 2008 and early 2009, fabric filters required by the consent decree described in section 6.5.2.2 of this SIP were installed at Reid Gardner upstream of the existing wet soda ash FGD, resulting in a new dataset to evaluate the proposed SO_2 BART emission limit. NDEP conducted further review of NV Energy's BART analyses and the acid rain dataset. Because the acid rain data is not compliance data, Nevada incorporated the recent 40 CFR Part 60 CEMS emissions compliance data into the evaluation. These data represent actual operations of the fabric filter controls coupled with the existing wet soda ash FGD system and provided the basis of the SO_2 BART emission limit for all three units at Reid Gardner.

A comparison of the post-BART annual emissions from the 2001 through 2003 WRAP baseline and the NDEP baseline are presented for each facility below. The WRAP calculated baseline emissions using the highest 24-hour emissions rate from each unit at each facility for the period 2001 through 2003. The WRAP emissions rates result in an inflated annual baseline emissions scenario because the units did not operate at the highest 24-hour rate consistently for the full year. Nevada deems the NDEP baseline annual emissions as more representative of actual baseline emissions from each unit at each facility on a per pollutant basis than those of the WRAP. The BART control technologies, emissions limit for each unit and the estimated emissions reductions upon implementation of BART are presented for each facility below.

5.5.1 BART at Tracy

For units 1 and 2, BART for NO_x is low NO_x burners (LNB) with flue gas recirculation (FGR) with emission limits of 0.15 lb/MMBtu and 0.12 lb/MMBtu, based on a 12-month rolling average, respectively. For unit 3, BART for NO_x is LNB with selective non-catalytic reduction (SNCR) with an emission limit of 0.19 lb/MMBtu, based on a 12-month rolling average. For all units at Tracy, BART for SO_2 is pipeline natural gas (PNG) and/or No. 2 fuel oil with an emission limit of 0.05 lb/MMBtu, based on a 24-hour averaging period. For PM_{10}, BART is also PNG and/or No. 2 fuel oil, but with an emission limit of 0.03 lb/MMBtu, based on a 3-hour averaging period, for all units.

The emission reductions resulting from the installation of BART control technologies and the associated emission limits are shown below. NDEP used the NDEP baseline heat input and BART emission limits to calculate the post-BART annual emissions for NO_x, SO_2 and PM_{10}. Table 5-4 shows the annual emission reductions from the WRAP baseline, as well as emission reductions from the NDEP baseline.

TABLE 5-4

TRACY: BART EMISSIONS REDUCTIONS IN TONS PER YEAR

	WRAP				NDEP		
	Baseline Emissions	**Emissions after BART Controls**	**Emission Reductions**		**Baseline Emissions**	**Emissions after BART Controls**	**Emission Reductions**
Unit 1 - 55 MW							
NO_x	1,361	133	1,228		221	133	88
SO_2	3	44	-41		1	44	-43
PM_{10}	6	27	-21		34	27	7
Unit 2 - 83 MW							
NO_x	1,728	156	1,572		321	156	165
SO_2	2,317	65	2,252		2	65	-63
PM_{10}	836	39	797		70	39	31
Unit 3 - 113 MW							
NO_x	1,587	521	1,066		795	521	274
SO_2	2,720	137	2,583		82	137	-55
PM_{10}	267	82	185		122	82	40
Total NO_x	4,676	810	3,866		1,337	810	527
Total SO_2	5,040	246	4,794		85	246	-161
Total PM_{10}	1,109	148	961		226	148	78

Note: Negative values reflect annual emissions increases.

5.5.2 BART at Fort Churchill

For units 1 and 2 at Ft. Churchill, BART for NO_x is LNB with FGR with emission limits of 0.20 lb/MMBtu and 0.16 lb/MMBtu, based on a 12-month rolling average, respectively. For SO_2, BART is PNG and/or No. 2 fuel oil for all units with an emission limit of 0.05 lb/MMBtu, based on a 24-hour averaging period. For PM_{10}, BART is also PNG and/or No. 2 fuel oil for all units, with an emission limit of 0.03 lb/MMBtu, based on a 3-hour averaging period.

The annual emission reductions resulting from the installation of BART controls and the associated emission limits are shown below. NDEP used the NDEP baseline heat input and BART emission limits to calculate the post-BART annual emissions for NO_x, SO_2 and PM_{10}. Table 5-5 shows the annual emission reductions from the WRAP baseline, as well as emission reductions from the NDEP baseline.

TABLE 5-5

FORT CHURCHILL: BART EMISSIONS REDUCTIONS IN TONS PER YEAR

	WRAP				NDEP		
	Baseline Emissions	**Emissions after BART Controls**	**Emission Reductions**		**Baseline Emissions**	**Emissions after BART Controls**	**Emission Reductions**
Unit 1 - 113 MW							
NO_x	2,509	547	1,962		1,209	547	662
SO_2	3,364	137	3,227		8	137	-129
PM_{10}	110	82	28		166	82	84
Unit 2 - 113 MW							
NO_x	2,405	416	1989		862	416	446
SO_2	3,601	130	3,471		11	130	-119
PM_{10}	231	78	153		160	78	82
Total NO_x	4,914	963	3,951		2,071	963	1,108
Total SO_2	6,965	267	6,698		19	267	-248
Total PM_{10}	341	160	181		326	160	166

Note: Negative values reflect annual emissions increases.

5.5.3 BART at Reid Gardner

For all units at Reid Gardner, BART controls for NO_x are rotating opposed fire air (ROFA) with Rotamix with emission limits of 0.20 lb/MMBtu for units 1 and 2, and 0.28 lb/MMBtu for unit 3, based on a 12-month rolling average. Rotamix is a technology for adding SNCR using ammonia or urea-based reagent. BART controls for SO_2 are wet soda ash flue gas desulfurization on all units with an emission limit of 0.15 lb/MMBtu, based on a 24-hour averaging period. For PM_{10}, BART controls are fabric filter on all units with an emission limit of 0.015 lb/MMBtu, based on a 3-hour averaging period.

The emission reductions resulting from the installation of BART controls and the associated emission limits are shown below. NDEP used the NDEP baseline heat input and BART emission limits to calculate the post-BART annual emissions for NO_x, SO_2 and PM_{10}. Table 5-6

shows the emission reductions from the WRAP baseline, as well as emission reductions from the NDEP baseline.

TABLE 5-6

REID GARDNER: BART EMISSIONS REDUCTIONS IN TONS PER YEAR

	WRAP				NDEP		
	Baseline Emissions	**Emissions after BART Controls**	**Emission Reductions**		**Baseline Emissions**	**Emissions after BART Controls**	**Emission Reductions**
Unit 1 - 100 MW							
NO_x	3,145	982	2,163		2,267	982	1,285
SO_2	1,751	736	1015		621	736	-115
PM_{10}	252	74	178		602	74	528
Unit 2 - 100 MW							
NO_x	3,379	1,050	2,329		2,445	1,050	1,395
SO_2	1,490	788	702		398	788	-390
PM_{10}	234	79	155		653	79	574
Unit 3 - 100 MW							
NO_x	3,207	1,409	1,798		2,268	1,409	859
SO_2	1,734	755	979		422	755	-333
PM_{10}	217	75	142		658	75	583
Total NO_x	9,731	3,441	6,290		6,980	3,441	3,539
Total SO_2	4,975	2279	2,696		1,441	2,279	-838
Total PM_{10}	703	228	475		1,913	228	1,685

Note: Negative values reflect annual emissions increases.

5.5.4 BART at Mohave

Mohave is currently in a temporary period of non-operation and will not operate in the future without first meeting the requirements specified in the Nevada visibility federal implementation plan (FIP) (40 CFR 52.1488). Notably, these requirements are based on the consent decree entered into by SCE and the Grand Canyon Trust, the Sierra Club and the National Parks and Conservation Association on December 15, 1999. The NDEP was not a party to the consent decree. In addition, state regulation requires Mohave to install and operate BART controls prior to the time that each unit resumes operation (Appendix A).

The baseline emissions modeled by the WRAP reflect maximum coal-fired operations at Mohave for 2001 through 2003. SCE has proposed a fuel conversion from coal to natural gas as part of their BART determination. Despite the fuel conversion to natural gas, the Nevada visibility FIP prohibits Mohave from emitting pollutants in amounts greater than that allowed by paragraph (d) of 40 CFR 52.1488. SCE's BART determination proposes that the installation of LNB with OFA will meet or exceed the emission reductions specified in the consent decree and the requirements of the visibility FIP.

For units 1 and 2, BART for NO_x is LNB with OFA and a fuel conversion to PNG with an emission limit of 0.15 lb/MMBtu, on a 12-month rolling average, and a mass emission limit of 788 lb/hr. For SO_2 and PM_{10}, BART is conversion to PNG only with emission limits of 0.0019 lb/MMBtu, on a 30-day rolling average, and 0.0077 lb/MMBtu, on a 3-hour average, respectively.

The emission reductions resulting from the installation of BART controls and the associated emission limits are shown below. NDEP used the NDEP baseline heat input and BART emission limits to calculate the post-BART annual emissions for SO_2 and PM_{10}. The post-control NO_x annual emission rates were calculated using an hourly mass emission rate of 788 lb/hr and applying the annual capacity factor calculated from the acid rain data. Table 5-7 shows the emission reductions from the WRAP baseline, as well as emission reductions from the NDEP baseline.

TABLE 5-7

MOHAVE: BART EMISSIONS REDUCTIONS IN TONS PER YEAR

	WRAP				NDEP		
	Baseline Emissions	**Emissions after BART Controls**	**Emission Reductions**		**Baseline Emissions**	**Emissions after BART Controls**	**Emission Reductions**
Unit 1 - 790 MW							
NO_x	16,342	2,457	13,885		10,761	2,457	8,304
SO_2	27,852	50	27,802		21,507	50	21,457
PM_{10}	1,564	230	1,361		1,317	230	1,114
Unit 2 - 790 MW							
NO_x	15,007	2,423	12,579		10,068	2,423	7,645
SO_2	27,195	49	27,146		21,083	49	21,034
PM_{10}	1,853	200	1,653		1,342	200	1,142
Total NO_x	31,344	4,880	26,464		20,829	4,880	15,949
Total SO_2	55,047	99	54,948		42,590	99	42,491
Total PM_{10}	3,417	403	3,014		2,659	403	2,256

5.5.5 Cumulative Emissions Reductions

Substantial reductions in NO_x, SO_2 and PM_{10} emissions result from the installation of BART controls. Post-BART emissions reductions from the WRAP baseline are calculated to be 40,571 tpy for NO_x, 69,136 tpy for SO_2 and 4,631 tpy for PM_{10}. Comparatively, post-BART emissions reductions from the NDEP baseline, calculated from the reported acid rain data, are 21,123 tpy for NO_x, 41,244 tpy for SO_2 and 4,185 tpy for PM_{10}. Figures 5-2 and 5-3 show cumulative pre-BART and post-BART emissions for NO_x, SO_2 and PM_{10} as calculated from the WRAP and NDEP baselines, respectively.

FIGURE 5-2

CUMULATIVE PRE-BART AND POST-BART EMISSIONS
CALCULATED FROM WRAP BASELINE

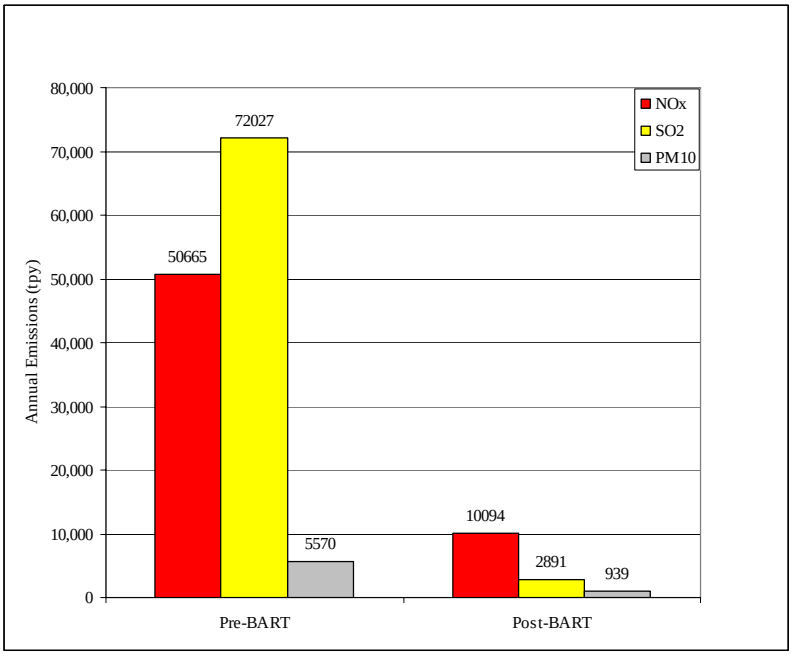


FIGURE 5-3

CUMULATIVE PRE-BART AND POST-BART EMISSIONS
CALCULATED FROM NDEP BASELINE

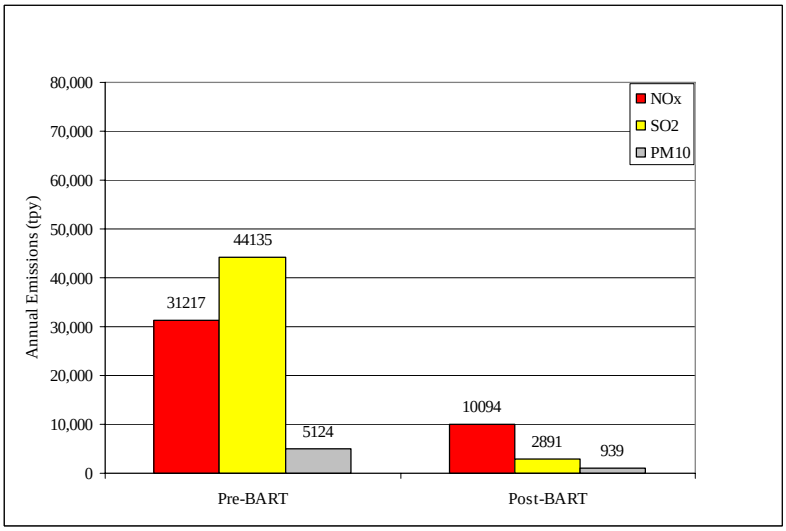


Table 5-8 compares the emission rates in both lb/MMBtu and tons per year for WRAP's BART exemption modeling, NV Energy's modeled rates (discussed in the following section) and the NDEP BART emission limits.

TABLE 5-8

COMPARISON OF EXEMPTION MODELING EMISSION RATES, NVENERGY-MODELED EMISSION RATES AND BART EMISSION LIMITS

Facility and Unit		NO_x (lb/10^6Btu)	SO_2 (lb/10^6Btu)	PM_{10} (lb/10^6Btu)	NO_x (tpy)	SO_2 (tpy)	PM_{10} (tpy)
WRAP Exemption Modeling Rates							
Tracy	Unit 1	0.425	0.001	0.002	1361	3	6
	Unit 2	0.393	0.527	0.019	1728	2317	836
	Unit 3	0.315	0.540	0.053	1587	2720	267
Fort Churchill	Unit 1	0.434	0.582	0.019	2509	3364	110
	Unit 2	0.416	0.623	0.040	2405	3601	231
Reid Gardner	Unit 1	0.591	0.329	0.0474	3,145	1,751	252
	Unit 2	0.635	0.280	0.044	3,379	1,490	234
	Unit 3	0.592	0.320	0.040	3,207	1,734	217
NVEnergy Modeled Rates							
Tracy	Unit 1	0.40	0.05	0.03	269	34	20
	Unit 2	0.40	0.05	0.03	580	73	44
	Unit 3	0.40	0.05	0.03	1,169	146	88
Fort Churchill	Unit 1	0.40	0.05	0.03	1,079	135	81
	Unit 2	0.40	0.05	0.03	1,102	138	81
Reid Gardner	Unit 1	0.46	0.40	0.03	1,962	1,706	128
	Unit 2	0.46	0.40	0.03	2,050	1,783	134
	Unit 3	0.46	0.40	0.03	2,081	1,810	136
NDEP BART Emission Limits							
Tracy	Unit 1	0.15	0.05	0.03	133	44	27
	Unit 2	0.12	0.05	0.03	156	65	39
	Unit 3	0.19	0.05	0.03	521	137	82
Fort Churchill	Unit 1	0.20	0.05	0.03	547	137	82
	Unit 2	0.16	0.05	0.03	416	130	78
Reid Gardner	Unit 1	0.20	0.15	0.015	982	736	74
	Unit 2	0.20	0.15	0.015	1,050	788	79
	Unit 3	0.28	0.15	0.015	1,409	755	75

5.6 VISIBILITY IMPROVEMENT DUE TO BART IMPLEMENTATION

A comparison of the visibility improvement between pre-BART and post-BART controls at the Tracy, Fort Churchill, Reid Gardner and Mohave facilities is presented in Tables 5-9 through 5-12. These comparisons summarize visibility impacts presented in each facility's BART determination report and indicate future visibility improvement based upon installation of BART controls. Nevada anticipates even greater visibility improvement at each Class I area because

more stringent final emission limits than those proposed and modeled by NV Energy will be implemented at Tracy and Fort Churchill for NO_x. Likewise, more stringent emission limits for NO_x, SO_2 and PM_{10} will be implemented at Reid Gardner. In general, there is a linear relationship in CALPUFF modeled visibility and emission rates. The emissions data are presented in Table 5-8 above, to provide comparison of the modeled emission rates and BART emission limits. The visibility improvement resulting from BART installation is expected to be proportional to the difference in modeled annual emissions and the annual NDEP BART emissions.

5.6.1 Tracy

Emission reductions due to the installation of BART controls at Tracy result in 82 less days with visibility impacts greater than 0.5 dv at Class I areas with 300 km of the facility, as shown in Table 5-9. In addition, most Class I areas show a decrease in the 98th percentile dv impact, although for some Class I areas the visibility impact remains the same or slightly increases. The improvement in visibility impairment resulting from BART controls is significant. However, Nevada anticipates even greater visibility improvement than that shown in Table 5-9, as the total annual post-control emissions are 50 percent of the modeled emissions.

TABLE 5-9

TRACY
PRE-BART AND POST-BART CONTROL MODELED VISIBILITY RESULTS

Class I Area	**Distance (km)**	**Unit**	**98th Percentile**			
			NV Energy Baseline		**NV Energy Modeled Rate**	
			dv	**days >0.5 dv**	**dv**	**days >0.5 dv**
Desolation	81	1	0.22	1	0.26	1
		2	0.52	11	0.30	2
		3	0.57	13	0.33	5
Mokelumne	101	1	0.17	1	0.19	1
		2	0.42	5	0.25	1
		3	0.44	6	0.28	1
Emigrant	139	1	0.09	0	0.09	0
		2	0.23	2	0.13	0
		3	0.27	2	0.16	1
Hoover	143	1	0.10	0	0.11	0
		2	0.23	1	0.15	0
		3	0.25	2	0.18	1
Yosemite	153	1	0.10	0	0.10	0
		2	0.23	2	0.14	0
		3	0.26	2	0.17	0
Caribou	171	1	0.24	1	0.26	1
		2	0.53	9	0.34	3

Class I Area	Distance (km)	Unit	98th Percentile			
			NV Energy Baseline		NV Energy Modeled Rate	
			dv	days >0.5 dv	dv	days >0.5 dv
		3	0.51	9	0.36	5
Lassen Volcanic	176	1	0.22	1	0.25	1
		2	0.54	8	0.32	2
		3	0.45	6	0.28	1
Ansel Adams	182	1	0.06	0	0.06	0
		2	0.17	1	0.08	0
		3	0.19	1	0.095	0
South Warner	190	1	0.18	1	0.19	1
		2	0.44	7	0.25	2
		3	0.46	8	0.30	3
Thousand Lakes	210	1	0.11	0	0.12	0
		2	0.31	5	0.17	0
		3	0.33	6	0.21	1
John Muir	221	1	0.07	0	0.07	0
		2	0.19	0	0.09	0
		3	0.21	0	0.11	0
Kaiser	249	1	0.04	0	0.04	0
		2	0.14	0	0.06	0
		3	0.15	0	0.07	0
Kings Canyon	265	1	0.06	0	0.06	0
		2	0.18	0	0.09	0
		3	0.20	0	0.10	0
Lava Beds	286	1	0.09	0	0.09	0
		2	0.22	1	0.12	0
		3	0.24	1	0.14	0
Yolla Bolly	287	1	0.04	0	0.04	0
		2	0.16	2	0.06	0
		3	0.20	2	0.07	0

5.6.2 Fort Churchill

Emission reductions due to the installation of BART controls at Fort Churchill result in 227 less days with visibility impacts greater than 0.5 dv at Class I areas with 300 km of the facility, as shown in Table 5-10. In addition, all Class I areas show significant decreases in the 98th percentile dv impact (e.g., approximately half of the pre-BART value). The improvement in visibility impairment resulting from BART controls is significant. However, NDEP anticipates substantially greater visibility improvement than that shown in Table 5-10, as the total annual post-control emissions are 53 percent of those modeled.

TABLE 5-10

FORT CHURCHILL
PRE-BART AND POST-BART CONTROL MODELED VISIBILITY RESULTS

Class I Area	Distance (km)	Unit	98th Percentile			
			NV Energy Baseline		NV Energy Modeled Rate	
			dv	days >0.5 dv	dv	days >0.5 dv
Mokelumne	79	1	1.07	41	0.58	14
		2	1.08	41	0.58	14
Desolation	86	1	1.02	29	0.54	15
		2	1.02	29	0.53	14
Hoover	99	1	0.55	13	0.27	1
		2	0.56	13	0.27	1
Emigrant	101	1	0.57	14	0.27	3
		2	0.58	15	0.27	3
Yosemite	112	1	0.48	11	0.24	2
		2	0.49	11	0.24	2
Ansel Adams	133	1	0.32	4	0.14	1
		2	0.33	4	0.14	1
John Muir	170	1	0.36	4	0.18	0
		2	0.37	5	0.18	0
Kaiser	200	1	0.22	1	0.09	0
		2	0.24	1	0.09	0
Kings Canyon	212	1	0.36	5	0.17	0
		2	0.37	5	0.17	0
Caribou	227	1	0.48	9	0.25	3
		2	0.50	9	0.26	3
Lassen Volcanic	231	1	0.48	9	0.25	3
		2	0.49	9	0.24	3
South Warner	246	1	0.62	15	0.35	5
		2	0.62	15	0.35	5
Thousand Lakes	266	1	0.36	5	0.17	1
		2	0.37	5	0.17	1
Sequoia	274	1	0.38	4	0.18	1
		2	0.39	4	0.18	1

5.6.3 Reid Gardner

Emission reductions due to the installation of BART controls at Reid Gardner result in only 5 less days with visibility impacts greater than 0.5 dv at Class I areas with 300 km of the facility, as shown in Table 5-11. In addition, most Class I areas show a decrease in the 98th percentile dv impact, although for some Class I areas the visibility impact remains the same or slightly

increases. However, NDEP anticipates significantly greater visibility improvement than shown in Table 5-11, as the total annual post-BART control emissions are 50 percent of those modeled. Specifically, the total annual post-BART control NO_x emissions are 57 percent of those modeled, SO_2 is 43 percent and PM_{10} is 57 percent.

TABLE 5-11

REID GARDNER
PRE-BART AND POST-BART CONTROL MODELED VISIBILITY RESULTS

Class I Area	Distance (km)	Unit	98th Percentile			
			NV Energy Baseline		NV Energy Modeled Rate	
			dv	days >0.5 dv	dv	days >0.5 dv
Grand Canyon	86	1	0.85	19	0.83	19
		2	0.86	21	0.73	15
		3	0.79	17	0.73	18
Zion	148	1	0.22	3	0.22	2
		2	0.22	3	0.19	2
		3	0.22	3	0.20	2
Bryce Canyon	227	1	0.13	0	0.12	0
		2	0.13	0	0.12	0
		3	0.13	0	0.13	0
Sycamore Canyon	289	1	0.06	0	0.06	0
		2	0.06	0	0.06	0
		3	0.07	0	0.07	0
Joshua Tree	292	1	0.32	3	0.33	4
		2	0.32	3	0.32	3
		3	0.33	3	0.34	4

5.6.4 Mohave

Emission reductions due to the installation of BART controls at Mohave result in 538 less days with visibility impacts greater than 0.5 dv at Class I areas with 300 km of the facility, as shown in Table 5-12. For many of the Class I areas within 300 km of Mohave the number of days with visibility impact greater than 0.5 dv has been reduced to zero. In addition, the 98th percentile dv impacts are approximately 5 to 15 percent of the pre-BART impacts. The improvement in visibility impairment resulting from BART controls is significant.

TABLE 5-12

MOHAVE
PRE-BART AND POST-BART CONTROL MODELED VISIBILITY RESULTS

Class I Area	Distance (km)	Unit	98th Percentile			
			SCE Baseline		SCE BART Limit	
			dv	days >0.5 dv	dv	days >0.5 dv
Grand Canyon	110	1	2.91	194	0.53	8
		2				
Joshua Tree	137	1	3.96	90	0.76	14
		2				
Zion	262	1	1.45	80	0.20	0
		2				
Sycamore Canyon	223	1	1.38	29	0.12	0
		2				
Agua Tibia	286	1	1.11	19	0.10	0
		2				
Cucamonga	287	1	1.05	20	0.11	0
		2				
San Gorgonio	225	1	1.50	27	0.14	1
		2				
San Jacinto	234	1	1.46	29	0.15	1
		2				
Mazatal	279	1	0.98	25	0.04	0
		2				
Pine Mountain	265	1	0.98	23	0.04	0
		2				
Dome Land	268	1	1.34	26	0.10	0
		2				

Significant visibility improvement will be realized in Class I areas within 300 km of Nevada's subject-to-BART sources. Installation of BART controls at Mohave and Reid Gardner result in more than 500 fewer days with visibility impact of greater than 0.5 dv to Class I areas in southern California, Arizona and Utah. Installation of BART controls at Tracy and Fort Churchill result in more than 300 fewer days with visibility impact of greater than 0.5 dv to Class I areas in central and northern California. In addition, because NV Energy sources were modeled at emission rates greater than those identified as BART by Nevada, greater improvement in visibility will be realized than that presented here.