

BEFORE THE ENVIRONMENTAL QUALITY COUNCIL
STATE OF WYOMING

In the Matter of:)
Basin Electric Power Cooperative) Docket No. 10-2802
Air Quality Permit No. MD-6047)
BART Permit: Laramie River Station)

RESPONSE TO BASIN ELECTRIC'S MOTION FOR SUMMARY JUDGMENT

Decision Document, dated 12/31/09

EXHIBIT 20

**IN THE MATTER OF A PERMIT APPLICATION (AP-6047) FROM BASIN ELECTRIC
POWER COOPERATIVE FOR A BEST AVAILABLE RETROFIT TECHNOLOGY (BART)
PERMIT FOR THE LARAMIE RIVER STATION**

DECISION

I. Introduction:

The Air Quality Division received a BART permit application from Basin Electric Power Cooperative (Basin Electric) for the three coal-fired boilers (Units 1 through 3) that operate at their Laramie River Station in Platte County, Wyoming. Regulations governing the BART program have been established by the U.S. EPA in 40 CFR Part 51 - Appendix Y. As stated in the regulations, a source is eligible for BART if it belongs within a particular group of stationary source categories, was not in operation prior to August 7, 1962, was in existence on August 7, 1977, and has the potential to emit 250 tons per year (tpy) or more of any visibility impairing air pollutant. Fossil fuel boilers with more than 250 million Btu (MMBtu) per hour heat input are listed as an eligible source type. Units 1 through 3 at the Laramie River Station have heat inputs of 6,420-6,600 MMBtu per hour and were in existence on August 7, 1977. Potential emissions from each boiler for two visibility impairing air pollutants, nitrogen oxides (NO_x) and sulfur dioxide (SO₂), exceed 250 tpy and therefore the units are eligible for BART.

The Division conducted an analysis of the BART permit application for the Laramie River Station and on June 3, 2009, published in the Platte County Record Times a public notice and notice of public hearing of the proposed intent to issue BART determinations. Copies of the BART application and the Division's analysis were placed in the Platte County Clerk's office in Wheatland, Wyoming in accordance with regulations. A 65-day public notice period ran from June 3, 2009 to August 6, 2009, and a public hearing was held on August 6, 2009, at 1 p.m. at the Platte County Library, located at 904 9th Street in Wheatland.

The Division received numerous comment letters on the proposed permit during the public comment period: 1) a letter dated July 21, 2009 from the USDA Forest Service; 2) a letter dated August 3, 2009 from EPA Region 8; 3) a letter dated August 4, 2009 from PacifiCorp; 4) a letter dated August 4, 2009 from the National Park Service; 5) a letter dated August 4, 2009 from the Powder River Basin Resource Council, et al.; 6) a letter dated August 5, 2009 from the Powder River Basin Resource Council; 7) a letter received July 20, 2009 from Joanna Taylor; 8) a letter dated July 16, 2009 from Andrew H. Salter; 9) a letter received July 20, 2009 from Evelyn and Marvin Griffin; 10) a letter received July 23, 2009 from Mimi McMillen; 11) a letter received July 24, 2009 from William M. Anderson; 12) a letter received July 24, 2009 from Rebekah Smith; 13) a letter dated July 24, 2009 from Mike Shonsey; 14) a letter dated July 24, 2009 from Susie Mohrmann; 15) a letter dated July 28, 2009 from Janice H. Harris; 16) a letter dated July 28, 2009 from M. Christensen; 17) a letter dated July 27, 2009 from Clint Morrison; 18) a letter dated August 3, 2009 from Ann Fuller; 19) a letter dated August 3, 2009 from Mary Fenton; 20) 725 unsigned letters received under a signed cover letter dated July 28, 2009 from Brad Mohrmann, Sierra Club Associate Regional Representative; and 21) 89 signatures received under a signed cover letter dated July 24, 2009 from Brad Mohrmann, Sierra Club Associate Regional Representative. The Division also received a letter from Basin Electric dated August 5, 2009.

Due to the number of public comments with similar concerns, the Division grouped individual comments and developed summary comments and responses. Comments from the EPA, Forest Service, National Park Service, Powder River Basin Resource Council, et al., and PacifiCorp are addressed individually. The comments and responses are presented on the following pages. The

Division also received positive comments supporting this project. The Division appreciates these comments but they are not included in this document as no response is required.

The Division received numerous comments that were descriptive of environmental impacts other than the impacts from BART-eligible sources in Wyoming on Class I area visibility. The Division's responses are limited to the comments that dealt with the State's BART analyses.

The Division is also preparing a revised Wyoming State Implementation Plan (SIP) for Regional Haze, and has solicited comments on that SIP. Some comments have been received which were submitted as comments on the Regional Haze SIP, but were principally directed at the Division's BART analyses. These comments will be addressed by the Division as it prepares the response to comments on the Regional Haze SIP.

II. Analysis of Comments from the USDA Forest Service:

- II.1 **NO_x Step 5: Visibility Improvement Determination (Class I areas modeled)** – The Forest Service commented that all Class I areas within 300 km of a given source should be modeled and the cost of each BART alternative divided by the sum of the deciview (dv) improvement at all impacted Class I areas. If modeling exists for Class I areas that yield impacts above 0.5 dv just beyond 300 km, those results should be considered also. Savage Run Wilderness Area should also be modeled and considered.

Response – Only those Class I areas most likely to be impacted by sources subject to BART at a given facility were modeled, as determined by source/Class I area locations, distances to each Class I area, and professional judgment considering meteorological and terrain factors. The Division recognizes that more distant Class I areas may yield modeled impacts of some magnitude, but the Division is also satisfied that Class I areas at a greater distance and in directions of less frequent plume transport would not yield modeled impacts greater than those yielded by the Class I areas chosen for BART modeling. The modeling results for the Class I areas chosen for analysis allowed the Division to make an informed decision on the effect on visibility from the various BART control options. Additionally, EPA's Appendix Y BART guidance does not include any requirements for modeling distance.

EPA's Appendix Y BART guidance does mention that "dollars per deciview" (\$/dv) is a metric that could be used to evaluate the cost of BART compliance, but by no means identifies \$/dv as an essential or required metric. The Division considered capital cost, annual cost, cost effectiveness, and incremental cost effectiveness in the cost evaluation of each proposed BART control option. The Division chose not to use a hybrid metric such as \$/dv primarily because of the lack of historical precedent regarding reasonable/acceptable levels for such a metric. Additionally, the use of a hybrid cost metric such as \$/deciview can introduce uncertainty as to how the value was calculated. The value of "€/deciview" could be based on the highest modeled value in a given area or the 98th percentile modeled value. It could be based on the 98th percentile value for any one modeled year or it could be an average for multiple years. It could even be based on an average modeled value across an entire Class I area or the sum of deciview changes across multiple areas. The Division has found that \$/dv values are often presented without explanation of the basis for the calculation. To avoid these confounding factors, the Division chose to evaluate and present the cost analyses and visibility analyses separately.

EPA's Regional Haze Rule affects sources that may cause or contribute to visibility impairment at any mandatory, federal Class I Area. Because Savage Run is a state-designated Class I area, the Division was not required to include it in the BART modeling. Additionally, the Division did not include Savage Run in any of its analyses for the State's Regional Haze Visibility SIP. For BART, the Division did model the impacts at several mandatory Class I areas that are located in the same general plume transport direction downwind of Savage Run, including Mt. Zirkel Wilderness, Rawah Wilderness, and Rocky Mountain National Park. Based on the modeling results for these Class I Areas in the proximity of Savage Run, the Division anticipates similar improvements in visibility from the analyzed emission reductions.

- II.2 **NO_x Step 5: Visibility Improvement Determination (significant impact)** – The Forest Service commented that it is incorrect to dismiss a control strategy on the basis that the modeled visibility improvement is not perceptible or significant.

Response – The Division used 0.5 dv as the threshold level to exempt a source from BART or to deem modeled impacts as insignificant. EPA's *Regional Haze Regulations and Guidelines for Best Available Retrofit Technology (BART) Determinations* (Appendix Y to 40 CFR part 51), suggest that 0.5 dv can represent the level at which a source "contributes" to visibility impairment. This is also consistent with the rules which are being applied by most states in the Western Regional Air Partnership (WRAP) region.

- II.3 **NO_x Controls: SCR** – The Forest Service commented that significant, cumulative visibility improvements modeled for SCR installations at the Jim Bridger and Naughton plants indicate that SCR should be BART for all units at those two plants. The Forest Service questions why DEQ chose SCR as BART only for Naughton Unit 3 when SCR costs for other Naughton units and all Jim Bridger units are similar. Also, environmental degradation from the operation of SCR should not be a factor in the BART determinations and energy impacts from SCR should not be a factor because they have already been considered in the cost analysis.

Response – The costs for SCR controls, as described in the Division's BART analyses, were deemed by the Division to be reasonable for all units at the Jim Bridger and Naughton plants, but the Division's BART determinations for the two plants were based on consideration of all five statutory BART factors, as required by EPA's Appendix Y BART guidance. PacifiCorp proposed a BART limit for NO_x emissions from Naughton Unit 3 of 0.37 lb/MMBtu, which would be achieved by tuning the existing LNB/OFA system. For Naughton Units 1 and 2, PacifiCorp proposed a BART limit for NO_x of 0.26 lb/MMBtu for each unit using new LNB/OFA. Visibility modeling showed that the NO_x emission level proposed by PacifiCorp for Naughton Unit 3 provided less in terms of modeled visibility reductions from baseline as compared to other units at the two plants. For example, Naughton Units 1 and 2 showed a 72% to 73% reduction in the number of days with predicted impacts of 0.5 dv or more at the nearest Class I area (Bridger Wilderness) for LNB/OFA as compared to baseline. The reduction for Naughton Unit 3 for LNB/OFA vs. baseline was only 31%. Appendix A includes graphs of the modeled results at the Class I area that yielded the highest modeled impacts for the Jim Bridger and Naughton plants (Bridger Wilderness) and the Class I area that yielded the highest modeled impacts for the Wyodak, Dave Johnston, and Laramie River Station plants (Wind Cave National Park). As shown in the graphs, the LNB/OFA option reduces the 98th percentile result to less than 1.0 dv for every unit with the exception of Naughton Unit 3 (1.4 dv). The predicted number of days above 0.5 dv for the LNB/OFA option was 40 for Naughton Unit 3, and 16 or less for each of the other twelve units. The Division determined that SCR would be required on

Naughton Unit 3 to bring about additional NO_x emissions reductions and modeled visibility improvement, and these factors differentiated the Naughton Unit 3 BART analysis from the others.

It was the full consideration of all five statutory BART factors, principally the pronounced visibility improvement for LNB/OFA as compared to baseline and the lack of non-air quality environmental impacts that led the Division to conclude that LNB/OFA would be BART for NO_x control at the Jim Bridger plant and for Units 1 and 2 at the Naughton Plant. Modeled visibility impacts for Naughton Unit 3 were reduced to levels comparable to those yielded by LNB/OFA controls on Naughton Units 1 and 2 only through the addition of SCR as BART on Naughton Unit 3. Potential energy losses and environmental impacts from the operation of SCR were mentioned in the Division's BART analysis for both the Naughton and Jim Bridger plants, but were only part of the larger evaluations that considered all five statutory factors.

II.4 **NO_x Controls: SCR Efficiencies** – The Forest Service commented that greater SCR control efficiencies should be factored into the cost and visibility analyses.

Response – The Division conducted a search of the EPA RACT/BACT/LAER Clearinghouse (RBLC) to find NO_x emission limits as BACT associated with SCR control in recently issued permits. Table 2 presents a summary of the Division's RBLC search. Two plants have limits of 0.05 lb/MMBtu NO_x with a 12-month rolling average, which is significantly longer than a 30-day averaging period. Because the 0.05 lb/MMBtu limits are based on a 12-month averaging period, they are not comparable to the 30-day limits established by the Division. The two plants with 30-day averaging periods will be subjected to either a 0.08 lb/MMBtu or 0.07 lb/MMBtu limit, and the limits established by the Division meet these lower limits. A spreadsheet compiled by the National Park Service with a summary of nationwide BART determinations shows that both units outside of Wyoming for which SCR is proposed as BART will be subject to a NO_x emission limit of 0.07 lb/MMBtu, and both will be based on a 30-day averaging period.

The RBLC search showed two plants that will be subject to 24-hour NO_x limits of less than 0.07 lb/MMBtu (0.067 lb/MMBtu), but these limits are for newly constructed plants which have been engineered to meet these levels. BART will require the retrofit of significant controls at plants that were not designed to meet these lower levels. Based on the Division's evaluation, the Division is satisfied that the NO_x emission limit of 0.07 lb/MMBtu (30-day rolling average) that was evaluated for SCR control under BART is the most stringent control level likely to be achieved in a retrofit.

Table 2: SCR Permit Limits from the RBLC				
Facility/Location	Size of Source	Source Description	NO _x Permit Limit(s) for SCR Control	Permit Date
John W. Turk Power Plant/Arkansas	600 MW	6,000 MMBtu/hr PC Boiler (PRB Coal)	1) 0.067 lb/MMBtu (24-hr rolling) 2) 0.05 lb/MMBtu (12-month rolling) [SCR, BACT]	Nov 2008
Dry Fork Station/Wyoming	385 MW	PC Boiler	0.05 lb/MMBtu (12-month rolling) [SCR, BACT]	Oct 2007
WYGEN3/Wyoming	100 MW	1,300 MMBtu/hr PC Boiler	0.05 lb/MMBtu (12-month rolling) [SCR, BACT]	Feb 2007
Iatan Station/Missouri	--	PC Boiler	0.08 lb/MMBtu (30-day rolling) [SCR, BACT]	Jan 2006
Big Cajun II Power Plant/Louisiana	675 MW	PC Boiler	0.07 lb/MMBtu (annual average) [SCR, BACT]	Aug 2005
TS Power Plant/Nevada	200 MW	PC Boiler	0.067 lb/MMBtu (24-hour rolling) [SCR, BACT]	May 2005
OPPD – Nebraska City Station/Nebraska	--	--	0.07 lb/MMBtu (30-day rolling) [SCR, BACT]	Mar 2005

Note: "--" indicates that this value was not provided in the RBLC

II.5 **SO₂ Controls (Section 309)** – The Forest Service understands the role of Section 309 in exempting the State of Wyoming from making BART determinations for SO₂ controls based on the demonstration that the benefits from SO₂ emissions reductions under Section 309 exceed those that would have resulted from BART. Are the existing SO₂ controls in place at the Jim Bridger and Naughton plants at least equivalent to the control scenario used in the demonstration, i.e., are the existing controls needed to accomplish the “Better than BART” demonstration for Section 309? They also note that the 309 program sunsets in 2018 and added SO₂ controls may be needed for reasonable progress at that time.

Response – The State of Wyoming submitted a 309 SIP as is allowed by the Regional Haze Rule. Part of the SIP submittal is a “Better than BART” demonstration, required by rule, which does not require that each and every unit demonstrate emission controls that are “Better than BART”. The demonstration is a regional demonstration. The Division is aware that the 309 program only establishes milestones through 2018, and that following 2018 another strategy may be necessary to reduce visibility-impairing pollutants. Additional strategies will be addressed in future SIP revisions.

III. Analysis of Comments from EPA Region 8:

- III.1 **Background Ozone Concentration in CALPUFF** – EPA Region 8 commented that the Division’s visibility modeling used 44 ppb as a background ozone concentration as the default value for periods when measured data was missing. This value appears to be too low based on the average annual concentrations at sites near the facilities (Thunder Basin = 50-55 ppb, Jonah = 55-58 ppb). DEQ should provide an analysis of how higher ozone background concentrations would affect results.

Response – The default ozone background concentration is used by CALPUFF as a domain-wide substitute for any hour for which all measured ozone concentrations are missing. For the Division’s visibility modeling for BART, hourly ozone concentrations measured at seven monitoring stations spaced across the modeling domain were input to CALPUFF. A visual inspection of the ozone files that were input to CALPUFF reveals that at least one valid ozone observation was available for every hour of the modeled period (2001-2003), making it unnecessary for the model to use the default background of 44 ppb.

Although the model did not use the default background value for the BART analyses, the Division calculated annual average concentrations for recent years (2007-2008) and all available data for 2009 for many of the stations that were used for input to CALPUFF, including Thunder Basin, Jonah, Rocky Mountain National Park, Centennial, and Pinedale. Annual average values for these stations ranged from 35 ppb to 49 ppb, with an overall average of approximately 40 ppb. The Division is confident that the default background value of 44 ppb was appropriate for the BART modeling, and that there is no need for additional analyses to explore alternate background concentrations.

- III.2 **Weight of Visibility Modeling Results in BART Determinations** – EPA Region 8 commented that DEQ should provide an explanation of how modeled visibility improvements were weighed in making BART determinations.

Response – The Division’s BART determinations were based on consideration of all five statutory factors, as required by EPA’s Appendix Y BART guidance. The modeled visibility improvements for a given control strategy were one of the five factors that were considered. No single factor was weighted as being more important than another, because the Division looked at all five statutory factors in their entirety. EPA guidance did not provide a quantification of the amount of modeled visibility improvement that would be acceptable or significant. The Division used two metrics that were mentioned in the EPA BART guidance, the 98th percentile result for a given year and the level at which a source “contributes” to visibility degradation (0.5 Δ dv), to present the results of the BART visibility modeling. Also see the response to USDA Forest Service comment II.3.

- III.3 **Cumulative Modeled Impacts** – EPA Region 8 commented that cumulative, modeled Class I impacts from all units at a facility (or combined impacts from multiple facilities) should be presented in addition to the results for individual units.

Response – The visibility impacts from BART-eligible sources are to be modeled separately. As stated in the EPA’s Appendix Y guidance, relative to the use of the CALPUFF model for BART determinations, “We believe that CALPUFF is an appropriate application for States to use for the particular purposes of this rule, to determine if an individual source is reasonably anticipated to

cause or contribute to impairment of visibility in Class I areas, and to predict the degree of visibility improvement which could reasonably be anticipated to result from the use of retrofit technology at an individual source. We encourage States to use it for these purposes." [emphasis added]

- III.4 **Language from BART Determinations** – EPA Region 8 commented that the Division should clarify the statements of “3-year average visibility improvements”. Are dv improvements calculated for each Class I area added together? If so, what is the meaning of the number? Are three Class I areas sufficient to quantify cumulative impacts? Were all Class I areas within 300 km considered?

Response – To arrive at the “3-year average visibility improvements” that were reported in the Division’s BART analyses, the modeled 98th percentile dv change or the number of days above 0.5 dv predicted for a given year of meteorology was averaged with the similar result from the other two years of meteorology. These 3-year average values were determined for each modeled Class I area separately, and were devised to allow a straightforward, direct comparison of one control option to another. Regarding the sufficiency of the number of modeled Class I areas and the question of other Class I areas within 300 km, see response to USDA Forest Service comment II.1.

- III.5 **NO_x Controls** – EPA Region 8 commented that the most stringent emission control levels for NO_x controls have not been evaluated, resulting in inflated calculated cost effectiveness values. Lower emission limits should be evaluated for selective non-catalytic reduction (SNCR) and SCR.

Response – The Division has analyzed the most stringent levels for SNCR and SCR, and does not agree that the cost effectiveness numbers have been inflated. See response to USDA Forest Service comment II.4. Furthermore, the Division has deemed the costs associated with all analyzed BART NO_x control options, including SNCR and SCR, to be reasonable (see the conclusions listed under the section: **NO_x: EVALUATE IMPACTS AND DOCUMENT RESULTS** in each of the five BART Application Analyses).

- III.6 **PM Controls: Averaging Periods** – EPA Region 8 commented that the BART conclusions and the permit conditions should include associated averaging periods for all PM/PM₁₀ limits.

Response – The averaging periods for the PM/PM₁₀ limits are dictated by the performance test requirements in the BART permits. Compliance with the lb/MMBtu and lb/hr PM/PM₁₀ limits is based on the average of three 1-hour tests per 40 CFR 60.46.

- III.7 **PM Controls: Control Effectiveness** – EPA Region 8 commented that the Division should explain why 0.015 lb/MMBtu for baghouse/fabric filter control effectiveness is acceptable, when 0.012 lb/MMBtu has been approved by the Division for other permits and 0.010 lb/MMBtu was approved for the Desert Rock project. The BART determinations should include analyses of electrostatic precipitators (ESPs) and baghouses at lower control levels.

Response – Recent Prevention of Significant Deterioration (PSD) permits issued by the Division did include PM/PM₁₀ limits of 0.012 lb/MMBtu for fabric filter controls, but those limits (and PM/PM₁₀ limits established for the Desert Rock Project in New Mexico) were determined through Best Available Control Technology (BACT) analyses for new sources. The BART

process deals with retrofit controls on existing units, and therefore is not directly comparable to BACT determinations. Additionally, visibility modeling described in the Division's BART analysis for the Jim Bridger Plant showed that the addition of a fabric filter to replace an Electrostatic Precipitator (ESP) provided very little in the way of visibility improvement, with predicted cumulative improvements across three Class I areas of only 0.03 to 0.1 Δ dv for Units 1-4. These results indicate that requiring more stringent control levels for a fabric filter would not provide significant visibility improvement. As described on page 18 of the Division's BART analysis, ESP performance enhancements are already in use at the Laramie River Station.

- III.8 **PM Controls: Permit Exemption** – EPA Region 8 commented that Condition 5 in the proposed EGU BART permits contains an inappropriate exemption for startup. The exemption from the lb/MMBtu PM limit during startup should be removed or it may be appropriate to analyze the need for a startup BART limit.

Response – For each EGU subject to BART in Wyoming, only the BART limits for PM/PM₁₀ that are expressed in lb/MMBtu will not apply during startup. The BART limits for PM/PM₁₀ that are expressed in lb/hr and tpy (as based on the lb/MMBtu limits) will apply during all operating periods including startup.

The Division considers the BART limits expressed in terms of lb/hr and tpy to be appropriate limits for startup. For the four units at the Jim Bridger plant, PacifiCorp calculated that the particulate emissions from the startup fuel (fuel oil) would be no greater than 10.9 lb/hr per unit, conservatively assuming that the ESP controls had zero control efficiency during the startup process. As a comparison, the BART limit that would apply for each unit during startup is 180 lb/hr. Further, PacifiCorp has agreed to minimize startup emissions from the four units at the plant by placing the ESPs in service prior to the introduction of coal to the boilers, which is contrary to the manufacturer's recommendation to energize the ESP only after the unit is at full operating temperature and combustion of fuel oil has ceased.

Similarly for Unit 1 at Wyodak, particulates are controlled by an ESP and startup is accomplished with fuel oil. The maximum emissions estimated for startup (8.9 lb/hr) would be well below the BART limit of 71 lb/hr. The three units at LRS are also started on fuel oil and controlled with ESPs, and the particulate emissions during startup are expected to be well below the BART limits, which are set at 193 lb/hr to 198 lb/hr for the three units.

For units with baghouse controls for particulate matter such as Dave Johnston Units 3 and 4, emissions from fuel oil during the startup process are also estimated to be well below the allowable lb/hr BART limits.

In the case of the Naughton plant, particulate controls will include a mixture of ESPs (Units 1 and 2) and a fabric filter/baghouse (Unit 3). Natural gas is the startup fuel for each of these units, and particulate emissions during startup are expected to be well below the established lb/hr BART limits.

- III.9 **SO₂ Controls: Reasonable Progress** – EPA Region 8 commented that the Division must evaluate the visibility impacts of SO₂ controls and demonstrate reasonable progress for the Class I areas away from the Colorado Plateau.

Response – Wyoming, along with other 309 states in the WRAP region, evaluated the impact of the 309 program on all Class I areas in the west, even though the requirement by rule was to demonstrate improvement in Class I areas on the Colorado Plateau. The WRAP modeling for sulfates shows that all Class I areas in and around Wyoming are benefiting from the sulfur dioxide emission reductions instituted in the 309 program. Sulfate extinction levels show improvement on the 20% worst days and improvement or at least no degradation on the 20% best days. Furthermore, the Regional Haze rule allows a state to take full credit for strategies implemented under 309 when addressing Class I Areas away from the Colorado Plateau (51.309(g)(4)(i)).

- III.10 **FGC for PM Control at Laramie River Station** – EPA Region 8 commented that no additional PM controls were considered for Laramie River Station (LRS). The Division should evaluate if flue gas conditioning (FGC) would be a suitable low-cost option.

Response – The commenter was incorrect, because FGC was evaluated. Page 18 of the Division's BART analysis includes a description of FGC at the LRS. The Division concluded that FGC would not substantially reduce PM emissions, so FGC was eliminated from consideration in the BART review.

- III.11 **Control Levels for LNB, OFA, and LNB/OFA** – EPA Region 8 questions why separate evaluations of multiple potential NO_x controls for Units 1-3 at the Laramie River Station all arrived at the same control level (0.23 lb/MMBtu) for different technologies. LNB, OFA, and a LNB/OFA combo are all listed with the same controlled rate. Also, LNB/OFA cost is much higher than for PacifiCorp units, why?

Response – Computational Fluid Dynamics (CFD) modeling of the LRS boilers conducted for Basin Electric indicated that the addition of new LNB would not be capable of reducing NO_x emissions to levels any lower than could be achieved with the proposed OFA alone. However, the LRS boilers would benefit from new LNB because of the ability to operate the burners at the proper stoichiometric ratio and to maintain a stable flame. As described in a letter to the Division from Basin Electric dated September 10, 2009, LRS already is equipped with early versions of LNB. The burners were modified in the mid-1990's, which lowered NO_x emissions from about 0.45 lb/MMBtu to about 0.27 lb/MMBtu. Due to existing boiler geometries, the addition of OFA with the existing low NO_x burners has the potential of reducing NO_x emissions to 0.23 lb/MMBtu. This would only be possible with the existing burners if they were able to be staged down to a 0.90 stoichiometric ratio and have stable flames. New burners are primarily designed for the ability to stage down to a 0.90 stoichiometric ratio and to maintain stable flames.

Because the Division has deemed the costs associated with LNB/OFA to be reasonable for the LRS and for all of the PacifiCorp plants, an explanation for differences in cost estimates by Basin Electric and PacifiCorp is not relevant.

- III.12 **SCR for NO_x Control** – EPA Region 8 commented that the Division's BART analysis for LRS requires that add-on NO_x controls at or below 0.07 lb/MMBtu be installed on one of the LRS boilers by December 31, 2018, and on a second LRS unit by December 31, 2023. If such a limit is achievable at LRS, it should be required as BART. Also, greater levels of control should be examined for NO_x.

Response – The Division’s BART determinations for the Laramie River Station were based on consideration of all five statutory BART factors in their entirety, as required by EPA’s Appendix Y BART guidance. A BART determination does not rely on a single factor such as the level of control that can be achieved.

Regarding greater levels of NO_x control for SCR, a letter to the Division from Basin Electric dated September 10, 2009 states that an emission rate of 0.07 lb/MMBtu is the best performance that can be expected from retrofitting an SCR on the existing LRS boilers. These boilers, which were built in the late 1970’s, were not designed to accommodate the addition of an SCR between the reheat superheater and the air heater. Thus, the spacing and the temperature of flue gas are not optimum for an SCR. New power plants can be designed with a taller boiler and spacing appropriate for an SCR and with the specific temperature distribution through the boiler to provide more effective reduction of NO_x. The design of an SCR is much different for a retrofit than for a new facility. Also see response to USDA Forest Service Comment II.4.

IV. Analysis of Comments from PacifiCorp:

IV.1 **General Comments: Cost Metrics** – PacifiCorp commented that EPA’s Appendix Y BART guidance states that a proper BART evaluation should include “other cost-effectiveness measures (such as \$/deciview)”. Thus, any BART determination that is limited to use only cost effectiveness and incremental cost effectiveness may be unacceptably narrow.

Response – EPA’s Appendix Y BART guidance does mention that “dollars per deciview” (\$/dv) is a metric that could be used to evaluate the cost of BART compliance, but by no means identifies \$/dv as an essential or required metric. The Division considered capital cost, annual cost, cost effectiveness, and incremental cost effectiveness in the cost evaluation of each proposed BART control option. The Division chose not to use a hybrid metric such as \$/dv primarily because of the lack of historical precedent regarding reasonable/acceptable levels for such a metric. Additionally, the use of a hybrid cost metric such as \$/deciview can introduce uncertainty as to how the value was calculated. The value of “/deciview” could be based on the highest modeled value in a given area or the 98th percentile modeled value. It could be based on the 98th percentile value for any one modeled year or it could be an average for multiple years. It could even be based on an average modeled value across an entire Class I area or the sum of deciview changes across multiple areas. The Division has found that \$/dv values are often presented without explanation of the basis for the calculation. To avoid these confounding factors, the Division chose to evaluate and present the cost analyses and visibility analyses separately.

IV.2 **General Comments: Cost Effectiveness** – PacifiCorp commented that any BART determination requiring a source to install post-combustion controls like SCR or spend more than \$1,500 per ton of NO_x removed would be contrary to EPA Appendix Y BART guidance.

Response – The EPA’s Appendix Y guidance describes the EPA’s selection of presumptive NO_x limits for coal-fired EGUs, and provides approximate cost levels for meeting the presumptive limits with current combustion controls and a somewhat higher cost level for a subset of units that would require advanced combustion controls such as rotating opposed fire air (ROFA). The EPA guidance does not attempt to establish cost thresholds that would be considered unreasonable for a given control technology, nor does it present the approximate costs associated with the presumptive levels as absolute limits above which cost should be deemed unreasonable. The

guidance also states that states may in specific cases find that the use of SCR is appropriate. As stated previously, the Division established NO_x emission limits for BART based on consideration of all five statutory factors in their entirety, as required by the Appendix Y guidance.

- IV.3 **General Comments: Power Plants More Than 750 MW** – PacifiCorp commented that Appendix Y indicates that states must follow Appendix Y guidelines in making BART determinations on a source-by-source basis for 750 MW plants. Wyoming rules impose similar requirements for power plants greater than 750 MW.

Response – The Division followed EPA and State of Wyoming rules for the BART analyses. Specifically, the Division followed WAQSR Chapter 6, §9(c)(ii), which states that power plants with generating capacities greater than seven hundred fifty megawatts shall comply with EPA Appendix Y, and that Appendix Y should be used as guidance for preparing BART analyses for all other facilities.

- IV.4 **General Comments: Post-Combustion Controls** – PacifiCorp commented that EPA never contemplated the use of post-combustion controls to meet BART limits for tangentially-fired boilers, and that it is nearly impossible under Appendix Y guidance to show that anything other than combustion controls should be required as BART.

Response – See response to PacifiCorp comment IV.2.

- IV.5 **General Comments: Visibility Improvement** – PacifiCorp commented that a BART determination that only relied on the 98th percentile, three-year average results from CALPUFF may be too narrow to satisfy Appendix Y.

Response – The Division did not rely solely on the three-year average of the 98th percentile CALPUFF results to evaluate the expected visibility changes for the BART control options. The 98th percentile values and the number of days with predicted results above 0.5 dv were presented in the Division's BART analyses for each of three modeled years, for each Class I area, and for each control option. The three-year average of the 98th percentile results and the number of days above 0.5 dv were chosen for graphical representation and were mentioned prominently in the Division's conclusions because they offered the clearest comparison of one control option to another (see graphs in Appendix A).

- IV.6 **General Comments: Modeling** – PacifiCorp commented that visibility modeling contains inherent bias or exaggeration because it assumes that a particular source will operate at its maximum capacity 100% of the time and that each unit at a facility operates in the same way.

Response – The results from BART visibility modeling, as required by EPA guidance, are based on daily (24-hour) averages. Reported results for a given control scenario, expressed in units of deciviews, represent the predicted change in visibility as compared to natural background over the course of 24-hour periods of meteorology. The modeled emission rates for a given unit at a power plant should reflect the highest rate that could be achieved over a 24-hour period, and therefore the assumption that a given unit is operating at its maximum operating capacity is appropriate for each unit at a base-load power plant such as Jim Bridger or Laramie River Station. Additionally, the conclusions drawn from BART visibility modeling primarily involve comparisons between control scenarios for which the emissions are determined similarly.

- IV.7 **General Comments: NO_x Emissions** – PacifiCorp commented that emissions of NO_x during the 20% best and 20% worst days at Class I areas in Wyoming are not a significant contributor to regional haze as compared to other emissions, and therefore the Division should consider this before requiring extreme NO_x control measures such as SCR as BART.

Response – For the 20% worst days during the years 2000-2004 at the Bridger Wilderness Area, 6.21% of the total visibility degradation was attributable to nitrates. Source apportionment modeling provided by the WRAP showed that 19% of the nitrates come from Wyoming sources. The Division recognizes that pollutants other than nitrates contribute more toward the total visibility degradation at the Bridger Wilderness Area, but the Division has concluded that the contribution from Wyoming sources toward the formation of nitrates at the Bridger Wilderness Area and other Class I areas warrants a full consideration of prospective NO_x controls under the BART process.

- IV.8 **Perceptibility** – PacifiCorp commented that credible studies indicate that only changes in visibility as high as 1.5-2.0 dv are perceptible to the human eye. The Division should consider this while drawing conclusions based on the results of the visibility modeling and before requiring extreme NO_x control measures such as SCR.

Response – The Division did not attempt to endorse a particular threshold for human eye “perceptibility” since the level of perceptibility has long been disputed. Instead, the Division has relied on EPA’s Appendix Y BART guidance, which suggests a value of 0.5 dv as the level that a source “contributes” to visibility impairment. One of the metrics used by the Division to evaluate the relative benefit of a given BART control option was the number of days yielding a modeled impact of 0.5 dv or more.

V. **Analysis of Comments from the National Park Service:**

- V.1 **NO_x Step 1: Identify Available Retrofit Control Technologies** – The NPS commented that Basin Electric’s cost analysis is flawed because they omitted the most effective NO_x control technology (LNB-OFA-SCR).

Response – Basin Electric’s BART analysis did include the combination of OFA, new LNBS, and SCR. The performance of the SCR was based on installation after OFA/LNB.

- V.2 **NO_x Step 3: Evaluate Effectiveness of Remaining Control Technologies (SCR capabilities)** – The NPS commented that the Division underestimated the ability of SCR to reduce emissions. The proposed NO_x limit for SCR (0.07 lb/MMBtu) is not low enough. SCR can achieve greater reductions. NPS suggests 0.06 lb/MMBtu for 30-day limit, 0.05 lb/MMBtu or lower for an annual limit.

Response – See response to USDA Forest Service comment II.4.

- V.3 **NO_x Step 4: Evaluate Impacts and Document Results (SCR costs)** – The NPS commented that SCR costs were generally overestimated because the OAQPS Control Cost Manual was not used for cost estimates.

Response – Basin Electric developed cost estimates for SCR control using a combination of Coal Utility Environmental Cost (CUECost) estimates, vendor-obtained cost data, and estimates from

previous in-house design/build projects. The degree to which the SCR costs may have been overestimated does not require further review because the Division has concluded that the estimated costs are reasonable and that costs alone would not preclude the use of SCR.

- V.4 **NO_x Step 4: Evaluate Impacts and Document Results (incremental costs for SCR)** – The NPS commented that the Division over-emphasized the incremental costs for the addition of SCR in the BART determinations. The Division should consider the average costs calculated for combustion controls plus SCR.

Response – See response to PacifiCorp comment IV.1 and NPS comment V.3.

- V.5 **NO_x Step 4: Evaluate Impacts and Document Results (basis for costs)** – The NPS commented that cost estimates should be documented by vendor or by the EPA Control Cost Manual.

Response – See response to NPS comment V.3.

- V.6 **NO_x Step 5: Visibility Improvement Determination (Class I Areas Modeled)** – The NPS commented that the Division should consider visibility impacts at all Class I areas within 300 kilometers (km) of a source.

Response – See response to USDA Forest Service comment II.1.

- V.7 **NO_x Step 5: Visibility Improvement Determination (incremental benefits of SCR)** – The NPS commented that the Division placed too much emphasis on the incremental improvement in visibility that was predicted for the addition of SCR. The total predicted visibility improvement resulting from a combination of control options should have been presented.

Response – The incremental improvement in modeled visibility with the addition of SCR was mentioned prominently in the summary of the Division's BART conclusions, but all visibility modeling results were considered. For more information on the presentation of the visibility modeling results in the Division's BART analyses, see the response to EPA Region 8 comment III.2 and PacifiCorp's comment IV.5.

- V.8 **BART Conclusions for NO_x Controls: \$/dv** – The NPS commented that the Division should use \$/dv as an additional metric for evaluating BART controls.

Response – See response to PacifiCorp response IV.1.

- V.9 **BART Conclusions for NO_x Controls: Cost Benchmarks** – The NPS commented that the Division determined that the costs for SCR were reasonable, yet rejected SCR for BART control. DEQ should explain why and provide the cost benchmarks used to determine reasonable costs.

Response – The Division established NO_x emission limits for BART based on consideration of all five statutory factors (as required by EPA's Appendix Y BART guidance) and not merely based on cost. The Division relied on past experience with BACT determinations for similar sources/control options to determine the range of control costs that were reasonable.

- V.10 **BART Conclusions for NO_x Controls: Non-Air Quality Impacts** – The NPS commented that the Division mentioned non-air quality impacts as reasons to reject SCR for BART controls. Recent PSD permits issued by DEQ and requiring SCR did not mention such impacts. Why were such impacts mentioned in these particular cases? SCR has been used at many facilities with minimal problems with transport and storage of ammonia, why would this be a particular problem for SCR as BART control?

Response – The Division's BART determinations were based on consideration of the five statutory factors, including the cost of compliance and the energy and non-air quality environmental impacts of compliance. Potential energy losses and environmental impacts from the operation of SNCR and SCR were mentioned in the Division's BART analysis, but were only part of the larger evaluation that considered all five statutory factors.

- V.11 **BART Conclusions for NO_x Controls: Non-Air Quality Impacts (continued)** – The NPS commented that the Division mentioned parasitic power loss in association with the operation of OFA and SCR. Parasitic power loss associated with SCR has already been accounted for in the cost analysis for NO_x and should not be "double-counted" by using it to draw conclusions for BART control unless it would cause a power shortage. The NPS commented that the Division stated that the operation of SCR could impact the "salability" of fly ash. Evidence should be presented and the economic impact quantified. The NPS also commented that the Division stated that SCR could create "blue plume" if the ammonia injection rate is not well controlled. NPS states that it assumes that a plant operator can properly control the injection rate.

Response – See response to NPS comment V.10.

- V.12 **BART Conclusions for PM₁₀ Controls: Control Effectiveness** – The NPS commented that the Division should explain why 0.015 lb/MMBtu was acceptable to the Division as a control effectiveness for a ESP/polishing fabric filter combination, when 0.012 lb/MMBtu has been approved by the Division for other recent permits involving fabric filters and limits as low as 0.010 lb/MMBtu have recently been approved for fabric filters (e.g., Desert Rock Project).

Response – See response to EPA Region 8 comment III.7.

- V.13 **BART Modeling: Baseline NO_x and SO₂ Emission Rates** – The NPS commented that the Division should provide confirmation of the basis for the modeled emission rates for the baseline scenario.

Response – As shown in Table 16 (page 32) of the Division's BART analysis for the Laramie River Station, NO_x and SO₂ emissions for the baseline modeling scenario were based on annual averages for 2001-2003. If the baseline emissions had been based on 24-hour maximum rates or permit limits, the modeled visibility impacts for baseline would have been higher, and the modeled visibility improvement with the BART controls chosen by the Division would have been more pronounced. The Division's BART determinations for the Laramie River Station were based on all five statutory factors in their entirety, and higher modeled visibility impacts for the baseline scenario would not have changed the determinations.

VI. Analysis of Comments from the Powder River Basin Resource Council:

- VI.1 **SCR as BART** – The Powder River Basin Resource Council commented that SCR is the best available retrofit technology and should be required as BART at all of the Wyoming power plants under consideration.

Response – The Division determined BART for the control of NO_x emissions from power plants in Wyoming based on a full consideration of all five statutory factors in their entirety, as required by EPA's Appendix Y BART guidance. The BART guidance does not dictate that a state require the control technology with the highest level of control in all cases.

VII. Analysis of Comments from the Powder River Basin Resource Council, et al.:

- VII.1 **Modeled Class I Areas** – The Powder River Basin Resource Council, et al. commented that all Class I areas within 300 km of a given source should be modeled for visibility impacts.

Response – See response to USDA Forest Service comment II.1.

- VII.2 **SCR as BART** – The Powder River Basin Resource Council, et al. commented that SCR is BART and must be required for all units at all coal-fired power plants.

Response – See response to USDA Forest Service comments and II.3.

- VII.3 **Section 309 Milestone Program** – The Powder River Basin Resource Council, et al. commented that DEQ should impose BART limits for SO₂ because participation in the Section 309 program only excuses DEQ from setting BART limits if the State's 309 SIP is approved by the EPA and if the 309 SIP demonstrates that emissions levels would result in greater visibility improvement than source-specific BART limits.

Response – The Regional Haze Rule allows the State of Wyoming to submit a 309 SIP in lieu of establishing BART limits for SO₂. The 309 SIP submittal includes a "Better than BART" demonstration. The entire submittal is currently undergoing EPA review and the State has no control over how long the EPA takes to review the SIP. The State, however, does not wait for EPA to complete its review before implementing a SIP. All of the 309 states have been participating in the 309 program, collecting SO₂ inventories, allowing independent audits of the information, comparing the regional totals to the milestones, and taking public comment on the regional figures and the comparisons with the milestone figures. The SO₂ levels have shown compliance with the milestones and continue to demonstrate declining SO₂ emissions levels. Also see responses to USDA Forest Service comment II.5 and EPA comment III.9.

- VII.4 **Reasonably Attributable Visibility Impairment** – The Powder River Basin Resource Council, et al. commented that because of the magnitude of modeled visibility impacts, DEQ should certify that Wyoming power plants are causing reasonably attributable visibility impairment, and establish more stringent BART controls. A single source that is responsible for a 1.0 deciview change or more should be considered to "cause" visibility impairment, according to WAQSR Chapter 6, §9(d)(i)(A). Because of the reasonably attributable visibility impairment, BART must be determined under WAQSR Chapter 9, §2(d)(ii) and 40 CFR §51.302(c)(4)(iii). These regulations provide that BART is presumed to be at least at NSPS levels. This would require at least 0.11 lb/MMBtu for NO_x limits, but SCR should be required at 0.07 lb/MMBtu.

Response – WAQSR Chapter 6, §9(d)(i)(A) applies to the determination of which sources in Wyoming are subject to BART under the regional haze program, and is not relevant to the determination of *reasonably attributable visibility impairment*. Since adoption of Wyoming's Visibility SIP and visibility regulations to address *reasonably attributable visibility impairment*, neither the Federal Land Managers of any Class I area nor the Division has certified that visibility impairment, attributable to a source or small group of sources, exists in any Wyoming Class I area pursuant to provisions in Chapter 9, Section 2 of the WAQSR. The provisions of Chapter 9, Section 2 of the WAQSR are therefore not relevant to the Division's BART analyses.

VII.5 **SCR for Long-Term Strategy** – The Powder River Basin Resource Council, et al. commented that the BART limits determined by the Division for the three units at the Laramie River Station (0.23 lb/MMBtu) meet presumptive BART, but further reductions are warranted to reduce Class I impacts. The Division will require SCR to be installed on two of the LRS units under Long-Term Strategy by 2023, but no explanation is given for the extension beyond the 5-year deadline for BART.

Response – The Division determined BART for NO_x control at the Laramie River Station based on consideration of all five statutory BART factors, as required by EPA's Appendix Y BART guidance. No single factor was weighted as being more important than another, because the Division looked at all five statutory factors in their entirety. The BART determination for NO_x control on all three units included low NO_x burners (LNB) with overfire air (OFA). The Division's BART analysis provides the basis for the BART determination of LNB with OFA as well as why SCR was not determined to be BART.

The BART permit conditions that are associated with Long-Term Strategy have been included in the August 25, 2009 draft of Wyoming's Regional Haze SIP without modification. The particular Long-Term Strategy requirements, in this case add-on NO_x controls for two units at the Laramie River Station, are established as enforceable on the source by the Division through inclusion in the BART permit.

VIII. **Analysis of Comments from the Sierra Club and Citizens Associated with the Sierra Club:**

VIII.1 **Air Quality Laws and Regulations** – The Sierra Club commented that it is important that air quality laws and regulations are strictly complied with to preserve park resources for present and future generations.

Response – The Division followed federal regulations and guidance as well as state regulations in assessing the BART applications and for making the BART determination for all sources eligible for BART in the State of Wyoming. The BART rules and guidance used by the Division included:

- Section 308 of the Regional Haze Rule [40 CFR 51.308(e)]
- *Guidelines for BART Determinations Under the Regional Haze Rule* [Appendix Y to part 51]
- Chapter 6, Section 9 of the Wyoming Air Quality Standards and Regulations (WAQSR), *Best Available Retrofit Technology*

VIII.2 **Regional Haze Rule** – The Sierra Club commented that the State of Wyoming can and should do more to protect air quality as the Regional Haze Rule is implemented.

Response – The Division’s BART determinations for Wyoming sources, as well as additional air pollution controls that will be required to further reduce regional haze, will be addressed in the Wyoming State Implementation Plan (SIP) for regional haze. The SIP incorporates the emissions reductions associated with the Long-Term Strategy for regional haze.

VIII.3 **Control of Nitrogen Oxide Emissions** – The Sierra Club commented that the State of Wyoming should require the coal plants to install devices that reduce nitrogen oxide emissions.

Response – All of the Division’s BART determinations for coal-fired power plants in the State of Wyoming include pollution control equipment that will substantially reduce nitrogen oxide emissions.

VIII.4 **20-Year Trend** – A commenter stated that the amount of air and water pollution has clearly escalated in the past 20 years, with little relief for citizens or for the health of forests and the environment.

Response – The Division’s BART determinations and other requirements under the regional haze program will result in large, state-wide emission reductions for three visibility-impairing pollutants; nitrogen oxides (NO_x), particulate matter (PM/PM₁₀), and sulfur dioxide (SO₂). As an example, BART controls at the Jim Bridger plant will result in a total annual reduction in potential NO_x emissions of approximately 13,500 tons per year.

VIII.5 **Wind Power** – A commenter stated that Wyoming can readily replace aging coal-fired power plants with wind power to protect public health and to protect our national parks and wilderness areas.

Response – The BART program is designed to assess Best Available Retrofit Technology on existing sources of air pollution, including the existing power plants in the State. The Division’s BART determinations will result in significant reductions in air pollutants from several power plants in Wyoming, but complete replacement of the power plants with an alternate source of energy is well beyond the scope of the BART program.

VIII.6 **Pollution Reduction from Power Plants** – A commenter stated that Wyoming has an obligation to protect treasured public spaces by adhering to federal air quality laws. The State must reduce air pollutants from the old coal plants that are federally required to utilize the most advanced technical developments in ensuring that air pollution is minimized.

Response – The Division determined BART controls based on the five statutory factors developed by the EPA. Various control technologies were evaluated for each source subject to BART, including the “most advanced technical developments”, but the ultimate BART determinations were made based on a full consideration of all five statutory factors in their entirety.

VIII.7 **SCR Controls** – Several commenters stated that BART for NO_x control should be SCR for all plants.

Response – See responses to USDA Forest Service comments II.3.

IX. Analysis of Public Comments:

IX.1 **SCR Controls** – Several commenters stated that BART for NO_x control should be SCR for all plants.

Response – See responses to USDA Forest Service comments II.3.

X. Analysis of Comments from Basin Electric Power Cooperative:

X.1 **Permit Condition 16** – Basin Electric requested that the Division revise BART Permit Condition 16 for the LRS to change the time for submitting a permit application for additional add-on NO_x control from six years prior to installation to two years prior to installation.


Response – The Division will make the requested change in the final BART permit for the LRS.

XI. Decision:

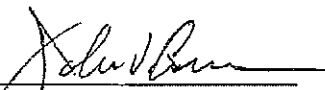
On the basis of comments received during the public comment period, an analysis of those comments, and representations made by Basin Electric, the Department of Environmental Quality has determined that the permit application filed by Basin Electric complies with all applicable Wyoming Air Quality Standards and Regulations and that a BART permit will be issued for the Laramie River Station. All of the conditions proposed in the Division's analysis will be included in the permit with the following changes (in bold):

16. Basin Electric shall submit permit applications for the installation of additional add-on NO_x control on two units at the Laramie River Station to the Division no later than **two (2) ~~six (6)~~** years prior to installation, under the Long-Term Strategy of the Wyoming §308 Regional Haze State Implementation Plan. It shall include an analysis of the four statutory factors and the associated visibility impacts from the application of each proposed NO_x control and resulting emission levels. This application shall address each add-on NO_x control as a system of continuous emissions reduction achieving the lowest viable NO_x emission, not to exceed a maximum of 0.07 lb/MMBtu on a 30-day rolling average as measured by a certified CEM. Additional add-on NO_x control shall be installed and operational on one (1) unit by December 31, 2018 and on a second unit by December 31, 2023.

Dated this 31st day of December, 2009.



David A. Finley
Administrator
Wyoming Air Quality Division



John V. Corra
Director
Wyoming Department of Environmental Quality

APPENDIX A

VISIBILITY MODELING RESULTS (Baseline vs. LNB and SCR)

Figure 1
Modeled BART Impacts in Bridger Wilderness Area
Naughton and Jim Bridger Power Plants: 98th Percentile (delta-dv)

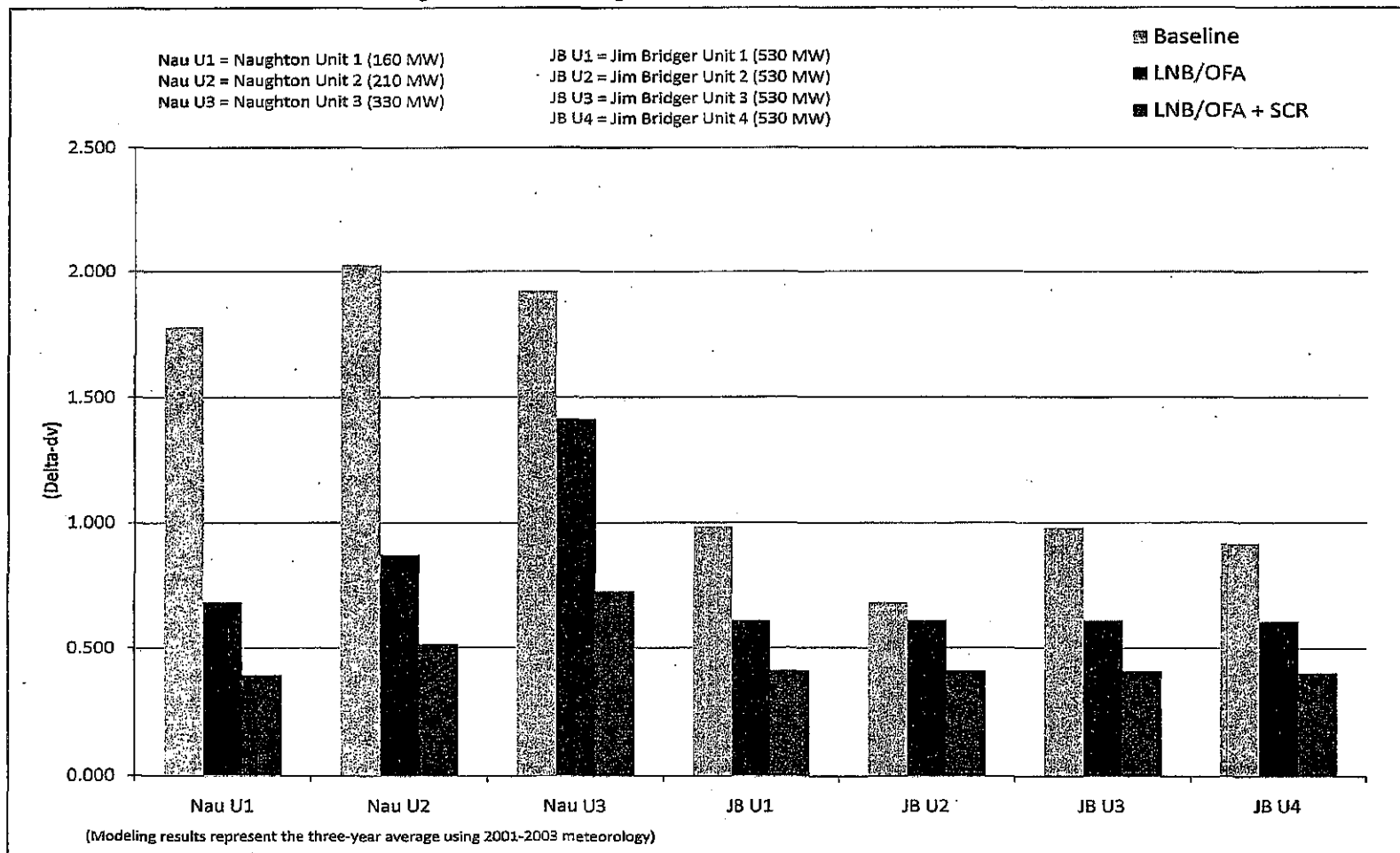


Figure 2
Modeled BART Impacts in Wind Cave National Park
Wyodak, Dave Johnston, and Laramie River Station Power Plants: 98th Percentile (delta-dv)

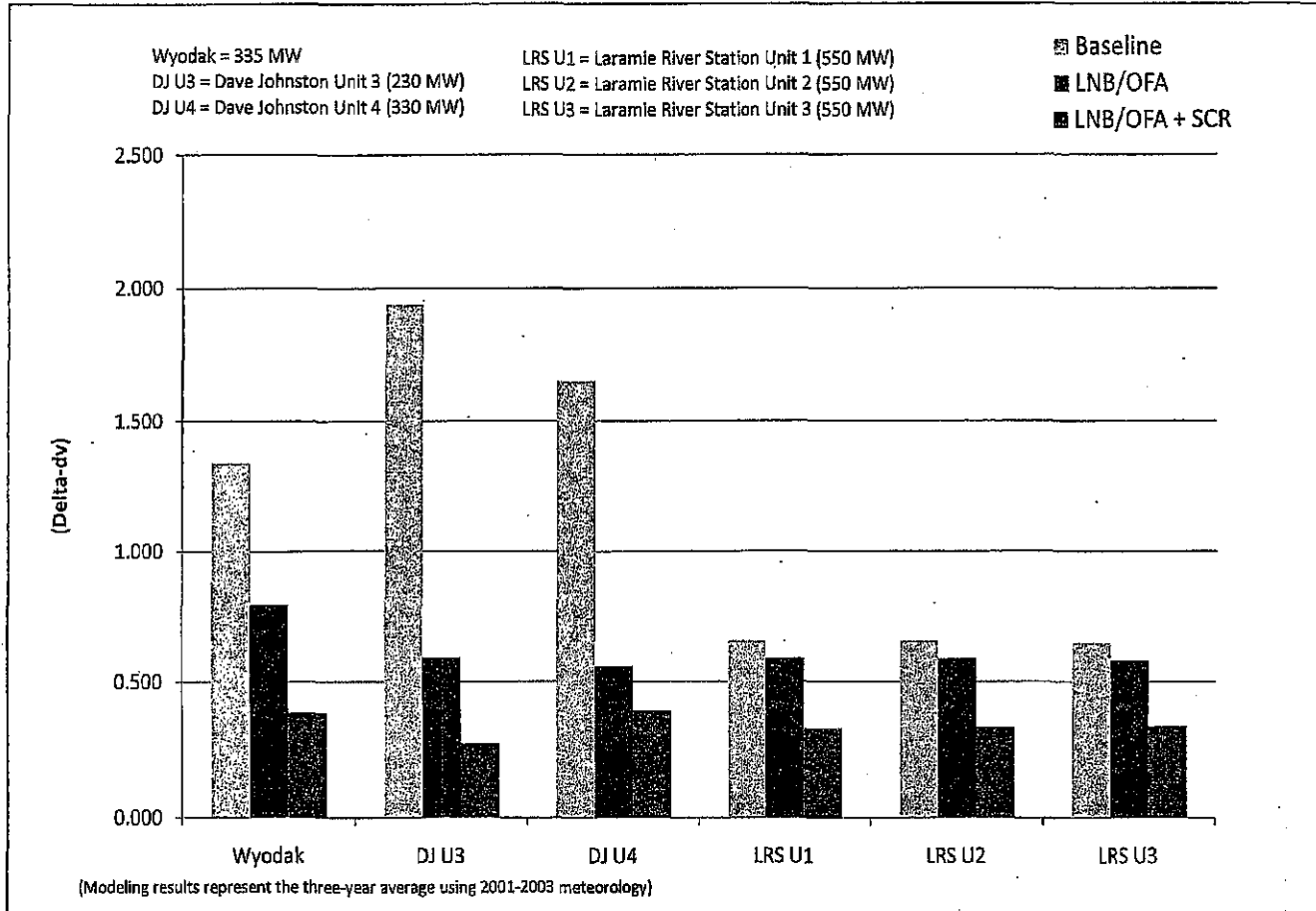


Figure 3
Modeled BART Impacts in Bridger Wilderness Area
Naughton and Jim Bridger Power Plants: # Days > 0.5 delta-dv

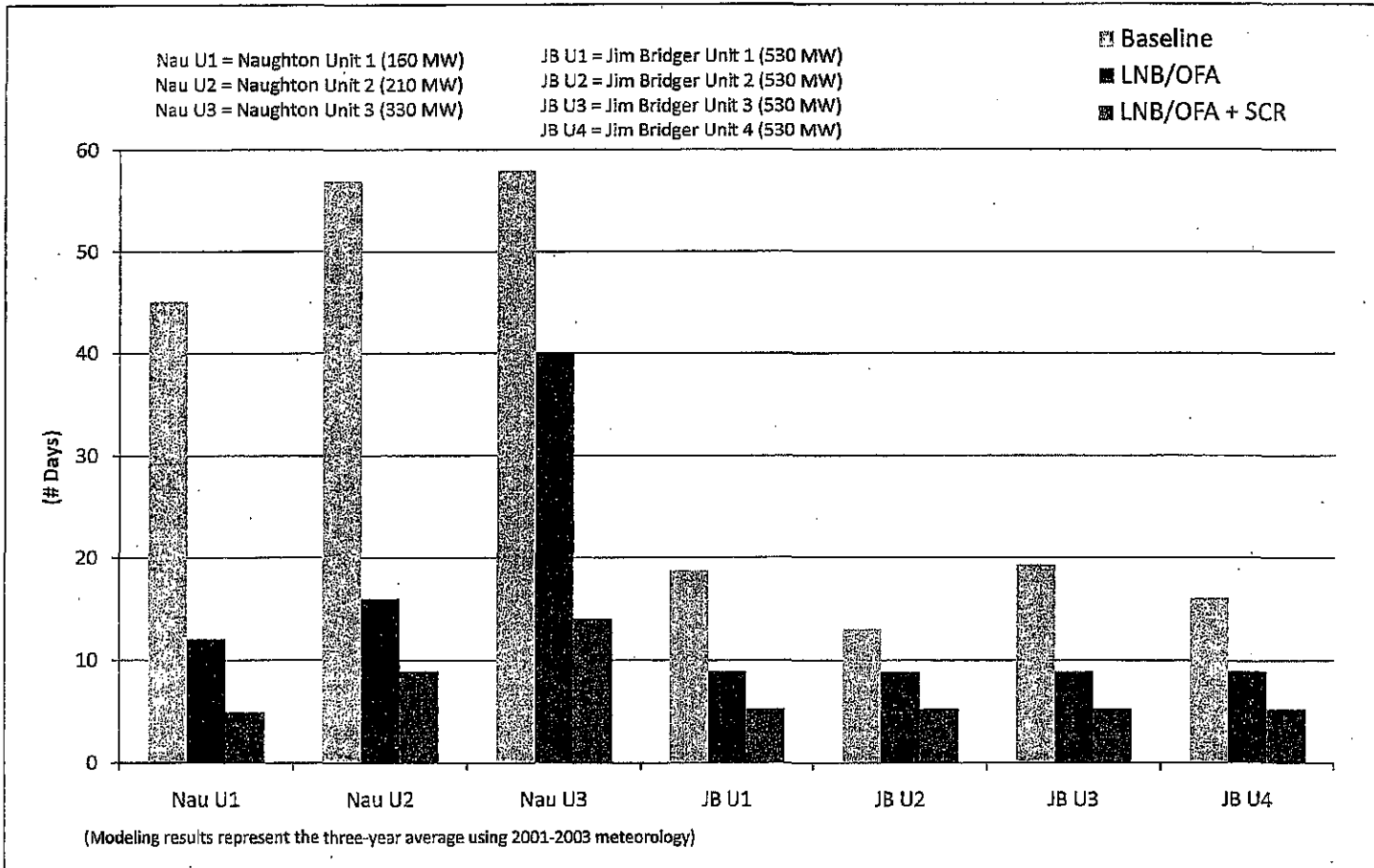


Figure 4
Modeled BART Impacts in Wind Cave National Park
Wyodak, Dave Johnston, and Laramie River Station Power Plants: # Days > 0.5 delta-dv

