United States Department of the Interior

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N3615 (2350)

February 3, 2015

Michael B. Owens
Air Program (SPAR)
U.S. EPA, Region 8
1595 Wynkoop Street
Denver, CO 80202-1129

Dear Mr. Owens:

Thank you for this opportunity to comment on U.S. EPA's proposed actions to issue a Prevention of Significant Deterioration (PSD) correction permit No. PSD-U0-000004-2014.00 to regulate air pollution emissions from the Deseret Power Electric Cooperative's (Deseret) Bonanza Power Plant (BPP). There are 14 Class I areas within 300 km of BPP, five of which are administered by NPS. The closest NPS unit is Dinosaur National Monument, a Class II area about 40 km north of the plant.

Visibility in Arches and Canyonlands National Parks is currently impaired and our analyses described in the attachments demonstrate that the proposed permit will allow BPP to continue to contribute significantly to that impairment. In addition, NPS has significant concern about visibility impairment and nitrogen deposition at Dinosaur National Monument. We believe that additional measures must be taken to mitigate impacts upon these national treasures.

We have several concerns regarding EPA Region 8's (R8) proposal:

- R8's analyses that are based on its year 2000 "look-back" approach are contrary to established EPA policy and thus are invalid.
- R8 has overestimated the effectiveness of SNCR, and underestimated the effectiveness of SCR. R8 has overestimated the cost of SCR. Nevertheless, Both the R8 and NPS cost estimates for SCR at BPP appear cost-effective. An "affordability" argument is prohibited by EPA guidance.
- Deseret realized a major economic advantage for operating many years while avoiding the costs associated with complying with the Clean Air Act.

- BPP's excess emissions have significantly contributed to visibility impairment at multiple Class I areas as well causing visibility impairment and significant nitrogen deposition at Dinosaur National Monument. Our modeling analyses indicate that additional NO_X reductions should be considered. BACT for BPP is 0.05 lb NO_X/mmBtu on a 30-day rolling average. R8 must either limit heat input or mass emissions/time.

We look forward to discussing these issues with you. If you have questions, please contact Don Shepherd at 303-969-2153 or don_shepherd@nps.gov.

Sincerely,

Susan Johnson
Chief, Policy, Planning, and Permit Review Branch

Enclosure

NPS Comments on Deseret Power Electric Cooperative's Bonanza Power Plant NO_x BACT Analyses and Determinations

Facility Description

Deseret Power Electric Cooperative ("Deseret") owns and operates the 500 MW coal-fired steam electrical generating unit Bonanza Power Plant (BPP), near Bonanza, Utah, on the Uintah & Ouray Indian Reservation. There are 14 Class I areas within 300 km of BPP, five of which are administered by NPS. The closest NPS unit is Dinosaur National Monument, a Class II area about 40 km north of the plant. Although Dinosaur National Monument (DINO) is not a Class I area, our Organic Act of 1916 obligates us to protect it:

> The fundamental purpose of the parks is to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.

16 U.S.C. sec.1.The BPP consists of a single electric utility generating unit (EGU) known as Unit 1, which is dry-bottom, wall-fired, and fueled by washed bituminous coal from the company's Deserado mine, approximately 35 miles east of the plant. Emission controls for Unit 1 consist of a baghouse for PM/PM_{10}, a wet scrubber for SO_2, and low-NO_X burners for NO_X. Of 1,236 plants, EPA Clean Air Markets (CAM) data for 2013 rank the Bonanza facility #63 for NO_X at 7,896 tons.

EPA Region 8 (R8) issued the original Prevention of Significant Deterioration (PSD) permit to construct the plant on February 4, 1981. The plant began operating in 1985. Thereafter, Utah issued permits for various modifications to the plant in the 1980's and 1990's. The most recent of these was a permit in March of 1998 for a ruggedized rotor project, which was constructed in June of 2000. Utah issued the permit as a minor modification.

In September of 1999, R8 wrote to Deseret asserting New Source Review permitting jurisdiction over BPP. On February 2, 2001, R8 issued an updated PSD permit to Deseret that consolidated a number of requirements from various Clean Air Act (CAA) permits and regulations into one federally-enforceable permit. The 2001 PSD permit replaced various CAA permits that had been issued for BPP between 1981 and 2001, including the original 1981 PSD permit and all subsequent state-issued permits, including the March 1998 Utah permit for the ruggedized rotor project, which R8 said it "accepted."

In August of 2002, R8 sought public comment on an initial draft Federal CAA Title V operating permit for BPP, which incorporated R8's 2001 PSD permit. In that action, R8 received a comment from NPS that the June 2000 ruggedized rotor project at BPP may have caused a significant increase in actual emissions and that PSD permitting may have been triggered. R8 concluded that it erred in accepting Utah's permit terms, including the flawed analysis underlying them, without first conducting its own independent analysis. R8's subsequent analysis shows that the project did cause a significant increase in actual emissions of NO_X and therefore should have been subject to PSD permitting as a major modification.

In its December 2014 proposal, R8 stated:

> The purpose of this proposed permit action is to correct the erroneous incorporation of the NO_X requirements from the State minor construction approval for the ruggedized rotor project into the Federal PSD permit issued on February 2, 2001 for the Bonanza power plant. This permit action addresses the error by providing an independent analysis of the PSD applicability of that project and by proposing a NO_X emission limit which reflects Best Available Control Technology (BACT) for NO_X. The NO_X emissions limit proposed in this correction action reflects ***BACT as it would have been in 2000***, when EPA made available for public comment the draft Federal PSD permit that included requirements for the ruggedized rotor project and which contained EPA's error of accepting the State's permit terms, including the flawed PSD applicability analysis underlying them, without first conducting our own independent analysis. Since the proposed BACT limit will be more stringent than the current NO_X emission limit, the result of this permit action will be a reduction in allowed NO_X emissions at the Bonanza plant. (emphasis added)

We have reviewed R8's December 2014 BACT proposal and have the following comments.

R8 has made a fundamental error

R8 cannot base BACT on what "it would have been in 2000." According to EPA guidance,[1] "if a source violates NSR in 1995 (e.g., by constructing a major source without a major NSR permit) and finally applies for a permit in 1998, whatever technology is BACT or LAER in 1998 should be required in the NSR permit." This is consistent with a letter[2] from EPA R6 to Texas: "The reviewing authority should treat the press vents as new construction, and process the permit accordingly. These emissions should be treated as new emissions and permitted under **current BACT**." (emphasis added) Consequently, all of R8's analyses that are based on its year 2000 "look-back" approach are invalid, and we shall not comment upon them further. Instead, we shall base our comments on determining current BACT.

R8 has overestimated the effectiveness of Selective Non-Catalytic Reduction (SNCR), and underestimated the effectiveness of Selective Catalytic Reduction (SCR).

One of the fundamental principles of BACT is the "top down" approach that leads toward selection of the most-effective control option that is not eliminated for other specific

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[1] Guidance on the Appropriate Injunctive Relief for Violations of Major New Source Review Requirements (Memorandum), Signed November 17, 1998, MEMORANDUM, FROM: Eric V. Schaeffer, Director Office of Regulatory Enforcement

[2] RE: International Paper Nacogdoches, Nacogdoches Co., Texas PSD-TX-766M1, Permit Amendment, Jole C. Luehrs, Chief Air Permits Section (6PD-R), April 11, 1996

reasons. In applying this "top down" BACT approach, it is essential to correctly estimate the capabilities of the candidate control strategies, and R8 has erred in this respect. According to R8:

> SNCR NOx control effectiveness can vary between 25% and 75% depending on a number of factors, including inlet NOx concentration, flue gas temperature, residence time, and whether the SNCR is combined with combustion controls or enhancements (e.g., burner optimization, combustion tempering). For the purpose of EPA's Integrated Planning Model (IPM) 65 Base Case v.5.1366 it was assumed SNCR would achieve 25% NOx reduction for coal units, which is similar to assumptions used in recent agency actions and reports for EGUs that have assumed 30% up to a maximum of 35% control for SNCR. Based on these assumptions and the expected relatively low inlet NO_X concentration to any SNCR installed on Bonanza Unit 1 we believe it is appropriate to continue with this analysis assuming that SNCR would be able to achieve 35% reduction in NO_X.

However, the citation provided by R8 purported to support its assumption that SNCR can reduce NO_X emissions from BPP by 35% is not supported by its own record[3], which states:

> NO_X reduction with SNCR is known to be greater at higher NO_X emission rates than lower rates. Accordingly, EPA has estimated that the NO_X reduction from SNCR as 30% for initial NO_X greater than 0.25 lb/MMBtu, 25% for NO_X from 0.20 to 0.25 lb/MMBtu and 20% for NO_X less than 0.20 lb/MMBtu.[4]

Application of the criteria R8 used in Wyoming to determine SNCR control efficiency leads to an estimate of 30% NO_X reduction at BPP, not the 35% reduction used by R8 for BPP.

With respect to SCR effectiveness, according to R8:

> SCR systems have been widely employed on PC-fired boilers in the United States and have achieved emission rates as low as 0.05 lb/MMBtu on a 30-day basis…current SCR can achieve emission rates as low as 0.05 lb/MMBtu with corresponding NOx reductions varying, but as high as 90%.

We agree with R8 that "…current SCR can achieve emission rates as low as [or lower than] 0.05 lb/MMBtu with corresponding NOx reductions varying, but as high as 90%." For example, on July 31, 2008, EPA R9 issued a PSD permit to the coal-fired Desert Rock power plant that included a stipulation that "…SCR systems were designed to achieve a NOx emission rate of 0.035 lb/MMBtu on a rolling 365-day average." Our review of EPA's RACT/BACT/LAER Clearinghouse found seven examples of PSD

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[3] 78 FR 34748. Approval, Disapproval and Promulgation of Implementation Plans; State of Wyoming; Regional Haze State Implementation Plan; Federal Implementation Plan for Regional Haze; Proposed rule, June 10, 2013.

[4] *Review of Estimated Compliance Costs for Wyoming Electric Generating (EGUs)—Revision of Previous Memo,* memo from Jim Staudt, Andover Technology Partners, to Doug Grano, EC/R, Inc., February 7, 2013, page 7 (Staudt Memo).

permits[5] issued since 1/1/2000 for pulverized coal-fired boilers with SCR and annual NO_X limits of 0.05 lb/mmBtu. (Two of these permits were issued in Wyoming, a R8 state.)

EPA determined that NO_X Best Available Retrofit Technology (BART) at the San Juan Generating Station in NM is 0.05 lb/mmBtu on a 30-day rolling average, and implied that a similar limit would be achievable by addition of SCR at the Gerald Gentleman power plant in NE.[6] EPA recently finalized a 30-day rolling average limit of 0.055 lb/mmBtu at the Cholla power plant (and assumed 0.05 lb/mmBtu annual average at the Apache power plant) in AZ. In its August 2014 BART update submittal to R8, PacifiCorp noted that SCR can achieve 0.05 lb/mmBtu on an annual average basis, and UT DAQ assumed that these EGUs would meet 0.05 lb/mmBtu on an annual average. In its Wyoming FIP, R8 assumed that SCR would achieve 0.05 lb/mmBtu on all of the 15 EGUs it evaluated.[7] In its Montana FIP, R8 stated that "…SCR can achieve performance emission rates as low as 0.04–0.07 lb/MMBtu on an annual basis" and assumed 0.05 lb/mmBtu in its analyses.

Furthermore, at least seven[8] recent retrofits are meeting 0.04 lb/mmBtu (or lower) on an annual average basis. Considering that BPP is achieving 0.4 lb/mmBtu on an annual average, it is realistic to assume that addition of upgraded combustion controls plus SCR could reduce those emissions by 90% to not more than 0.04 lb/mmBtu (annual average).

Despite the overwhelming evidence and its own statements that SCR can achieve lower emissions, R8 based its BPP analysis on achieving only 0.07 lb/mmBtu on an annual average:

> In order to assess potential economic impacts and calculate the average cost effectiveness of SCR, the NOx reduction attributed to the control option must be calculated. Using the current baseline of 0.46 lb/MMBtu and a controlled emission rate of ***0.07 lb/MMBtu*** that can currently be achieved with LNB/OFA+SCR, the emission reduction attributable to this control option is calculated as follows:
> (0.46 lb/MMBtu – 0.07 lb/MMBtu) x (4,578 MMBtu/hr) x (8,760 hr/yr) (1 ton/2,000 lb) = 7,820 tons NOx reduced/year
>
> (emphasis added)

Not only did R8 err in by assuming that SCR could do no better than 0.07 lb/mmBtu, it also incorrectly used 30-day rolling average emission rates (0.46 lb/mmBtu and 0.07

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[5] John W. Turk Power Plant (AR), Karn Weadock Generating Complex (MI), Norborne Power Plant (MO), Hugo Generating Station (OK), Coleto Creek Unit 2 (TX), Tenaska Trailblazer Energy Center (TX), WYGEN 3 (WY), Dry Fork Station (WY)

[6] Gerald Gentleman was exempted from BART because NE is part of the Cross State Air Pollution Rule.

[7] ENVIRONMENTAL PROTECTION AGENCY, 40 CFR Part 52, [EPA–R08–OAR–2012–0026, FRL9905–42–R08], Approval, Disapproval and Promulgation of Implementation Plans; State of Wyoming; Regional Haze State Implementation Plan; Federal Implementation Plan for Regional Haze, ACTION: Final rule. Thursday, January 30, 2014

[8] Chesterfield Power Station Units #5 & #6, J K Spruce Unit #2, Morgantown Units #1 & #2, W A Parish Units #7 & #8

lb/mmBtu) to estimate annual emissions. Instead, we applied methods from EPA's Control Cost Manual (CCM) to estimate annual emissions before and after addition of SCR. CAM data for 2013 – 2014 shows annual average NO_X emissions of 7,477 tons at 0.39 lb/mmBtu. For the most recent 24-months of CAM data (1/01/2013 – 12/31/2014), the highest 30-day rolling average NO_X rate was 0.470 lb/mmBtu. In order to achieve the 0.26 lb/mmBtu 30-day rolling average limit proposed by R8, NO_X would have to be reduced by 45%. We applied this 45% reduction to the annual average emission rate and estimate that it would be 0.21 lb/mmBtu if BPP were meeting R8's proposed limit. We assumed that addition of SCR would reduce these remaining emissions by a conservative 81% down to 0.04 lb/mmBtu. A total of 6,705 tons of NOx would be removed annually by the combination of improved combustion controls plus SCR.

There is much uncertainty in estimating the emission reductions that could be achieved at BPP. [9] Although BPP's Title V permit shows a heat input capacity of 4,758 mmBtu/hr, BPP has consistently exceeded this value. During 2013 – 2014, BPP exceeded its Title V heat input capacity on at least 282 days, with a maximum daily heat input of 5,373 mmBtu/hr.[10] Because the emission limits proposed by EPA are based solely upon heat input, if heat input is not limited (as appears to be the case), or there is no limit on mass emissions (e.g., lb/hr, tpy), then BPP's emissions are limited only by its capacity to inject coal into the boiler.

Cost-effectiveness of SCR

Real-World Industry Costs

SCR capital costs presented on a dollars per kilowatt ($/kW) basis reflect informed real-world industry costs and can provide a useful "reality-check." For EGUs the size of BPP, industry data[11] suggests SCR costs of $250 - $300/kW.

R8 has relied on the Integrated Planning Model (IPM) to develop cost estimates. R8 estimated the capital cost of $152,865,425 for SCR, which is $306/kW and just slightly above the expected range. (R8 should clarify whether these costs are in the 2012$ estimated by IPM, or represent costs adjusted to 2000 to be consistent with its "look back" approach to BACT.)

Rather than attempt to address the effect of each of R8's errors, we have, instead, provided cost estimates (in 2013$) based upon a straightforward application of the CCM, IPM, and a "hybrid" approach that is very similar to the approach used by R8 in its

[9] Our estimate of the tons removed by LNB/OFA+SCR is lower than R8's because we used actual annual uncontrolled emissions of 7,477 tons (instead of the 9,586 ton value used by R8) as our starting point before adding controls.
[10] Our calculations were based upon daily average heat input, not hourly.
[11] CURRENT CAPITAL COST AND COST-EFFECTIVENESS OF POWER PLANT EMISSIONS CONTROL TECHNOLOGIES, Prepared by J. Edward Cichanowicz, Prepared for Utility Air Regulatory Group, January 2010

Montana FIP[12] and uses IPM to estimate the Direct Capital Cost (DCC) of SCR and the CCM to estimate total capital investment, operating costs, and total annual cost.

- We estimate that the incremental total capital investment of adding SCR would be $133 million ($267/kW),
- The incremental total annual cost of adding SCR would be $16 million, and
- The total annual cost of adding LNB/OFA + SCR would be $17 million.

Our estimates are reasonable when compared to the $250 - $300/kW range of industry costs for this size EGU. (A description of our modeling analysis is contained in Appendix A.)

By comparison, R8 estimated:

- That the incremental total capital investment of adding SCR would be $153 million ($306/kW),
- The incremental total annual cost of adding SCR would be $21 million, and
- The total annual cost of adding LNB/OFA + SCR would be $22 million.

We conclude that R8 has overestimated the cost of SCR.

<u>Cost-per-Ton of NO_X Removed</u>

R8 estimated an average cost effectiveness for LNB/OFA+SCR of $2,804 per ton of NOx removed, and an incremental cost effectiveness of $4,992 per additional ton of NOx removed by SCR.

We estimate the average cost-effectiveness of LNB/OFA + SCR = $2,525/ton of NO_x removed, and the incremental cost of adding SCR to LNB/OFA = $4,840/ton. Our results are shown below.

[12] "We [EPA R8] relied on control costs developed for the IPM for direct capital costs for SCR. We then used methods in the CCM for the remainder of the SOFA+SCR analysis. Specifically, we used the methods in the CCM to calculate total capital investment, annual costs associated with operation and maintenance, to annualize the total capital investment using the CRF, and to sum the total annual costs." ENVIRONMENTAL PROTECTION AGENCY, 40 CFR Part 52, [EPA–R08–OAR–2011–0851; FRL–9655–7], Approval and Promulgation of Implementation Plans; State of Montana; State Implementation Plan and Regional Haze Federal Implementation Plan, ACTION: Proposed rule. April 20, 2012

Operating company	Deseret	Information Source
Facility	**Bonanza**	
Unit	1	
Boiler Type	Dry bottom wall-fired boiler	CAMD
Fuel	Bituminous	EIA report for 2014
Rating (MW Gross) each	500	T5 permit
Rating (mmBtu/hr)	5,373	mmBtu/hr CAMD 2013 - 2014
Plant Capacity Factor	82%	calculated for 2013 - 2014
Uncontrolled Emissions (tpy)	7,477	OAQPS Control Cost Manual
Uncontrolled Emissions (lb/mmBtu)	0.39	average for 2013-2014 from CAMD
Combustion Controls Cost-benefit Analysis		
Control Efficiency	45%	calculated
Controlled emissions (lb/mmBtu)	0.21	equivalent annual BACT limit
Controlled Emissions (tpy)	4,132	calculated
Emissions Reduction (tpy)	3,344	calculated
Capital Cost	$ 7,076,000	EPA R8 TSD
Capital Cost ($/kW)	$ 14	calculated
O&M Cost	$ 124,000	company report 6/2012
Annualized Cost	$ 667,924	calculated
Cost-Effectiveness ($/ton)	$ 200	calculated
SCR Cost-benefit Analysis		
Control Efficiency	81%	OAQPS Control Cost Manual
Controlled emissions (lb/mmBtu)	0.04	NPS assumption
Controlled Emissions (tpy)	772	calculated
Emissions Reduction (tpy)	3,360	OAQPS Control Cost Manual
Capital Cost	$ 132,811,577	calculated
Capital Cost ($/kW)	$ 266	calculated
O&M Cost	$ 3,727,222	OAQPS Control Cost Manual
Annualized Cost	$ 16,263,695	OAQPS Control Cost Manual
Cost-Effectiveness ($/ton)	$ 4,840	OAQPS Control Cost Manual
Combustion Controls + SCR Cost-benefit Analysis		
Control Efficiency	90%	calculated
Controlled emissions (lb/mmBtu)	0.04	calculated
Controlled Emissions (tpy)	772	calculated
Emissions Reduction (tpy)	6,705	calculated
Capital Cost	$ 139,887,577	calculated
Capital Cost ($/kW)	$ 280	calculated
O&M Cost	$ 3,851,222	calculated
Annualized Cost	$ 16,931,619	calculated
Cost-Effectiveness ($/ton)	$ 2,525	calculated

BACT Determination

BACT is not necessarily the most cost-effective solution. Instead, it represents a broad consideration of technical, economic, energy, and environmental factors. While there is relatively little data on what cost-per-ton represents BACT, this parameter has been

central to most determinations of what constitutes Best Available Retrofit Technology (BART). Because the BART top-down process is very similar to the BACT top-down process, we believe that a control technology that is deemed cost-effective to retrofit is very likely to also be considered cost-effective in the context of New Source Review. For example, the North Dakota Department of Health established a threshold of $4,100/ton for average cost-effectiveness, and $7,300 for incremental cost effectiveness.[13] Oregon DEQ established a cost/ton threshold of $7,300/ton based upon the premise that improving visibility in multiple Class I areas warrants a higher cost/ton than where only one Class I area is affected. In their BART proposal for the San Juan Generating Station, New Mexico accepted a range of $5,946 - $7,398/ton, Colorado and New York used $5,500/ton, and Wisconsin used $7,000 - $10,000/ton as its BART threshold.[14]

In its proposed Federal Implementation Plan for Texas, EPA R6 noted that:

> Sensitivity analysis performed by CENRAP suggests to us that a threshold in the range of $4,000/ton to $5,000/ton would be reasonable for purposes of identifying potential cost-effective controls for further analysis.

In its proposed Federal Implementation Plan for Montana, EPA R8 determined that it was cost-effective to spend $4,659/ton to control SO_2 and $4,415/ton for NO_X at the J.E. Corette power plant.[15]

EPA R9 has determined that costs as high as $6,170/ton are cost-effective. In evaluating addition of SCR at the Four Corners Power Plant, EPA R9 stated:

> EPA considers its revised cost-effectiveness estimates of $2,515 - $3,163/ton of NOx removed to be more accurate and representative of the actual cost of compliance. However, even if EPA had decided to accept APS's worst-case cost estimates of $4,887 – $6,170/ton of NOx removed, EPA considers that estimate to be cost effective for the purpose of proposing an 80% reduction in NOx, achievable by installing and operating SCR as BART at FCPP. [16]

When comparing costs, the effect of inflation should be considered, so as to provide an "apples-to-apples" comparison. Nevertheless, taken at face value, from the information presented above, it appears that $4,000 - $8,000/ton represents the typical range of

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[13] "When the Department began the development of the Regional Haze program in 2006, a cost threshold was established for BART controls. Any cost effectiveness above $3,650/ton or incremental cost above $6,500/ton (2006 dollars) was considered excessive (see Appendix E). If these values are adjusted to 2011 dollars based on the Consumer Price Index, any cost effectiveness above $4,100/ton or incremental cost above $7,300/ton would be considered excessive." Supplemental Evaluation of NOx BART Determination for Coal Creek Station Units 1 and 2, September 2012

[14] "The Department used cost-per-ton reduced as the primary metric for determining the BART level of control. The upper limit for this metric was $7,000 to $10,000 per ton, which reflects historical low-end costs for controls required under BACT." BEST AVAILABLE RETROFIT TECHNOLOGY AT NON-EGU FACILITIES April 19, 2010, WISCONSIN DEPARTMENT OF NATURAL RESOURCES

[15] EPA R8 determined that the visibility benefits of those controls were not sufficient.

[16] ENVIRONMENTAL PROTECTION AGENCY 40 CFR Part 49 [EPA–R09–OAR–2010–0683; FRL–9213–7] Source Specific Federal Implementation Plan for Implementing Best Available Retrofit Technology for Four Corners Power Plant: Navajo Nation AGENCY: Environmental Protection Agency (EPA). ACTION: Proposed rule. Federal Register / Vol. 75, No. 201 / Tuesday, October 19, 2010

cost/ton thresholds for BART. In this context, both the R8 and NPS cost estimates for SCR at BPP appear cost-effective.

However, R8 concluded that the additional $21 million cost per year is too high to represent BACT for BPP. To support its decision, R8 revisits its "look back BACT" approach:

> To determine whether a control option should be eliminated based on economic impacts, EPA has generally tried to determine whether the costs associated with a control options for the facility under consideration are outside the range of costs borne in other recently-issued PSD permits for similar types of facilities. However, we don't think such an approach is warranted in this case, where EPA is undertaking the BACT analysis in a proposed PSD correction action today to address a PSD permitting error that occurred in a permit issued (and for a project completed) more than 14 years ago, because such comparisons have little relevance. Instead, EPA is using a more qualitative cost assessment, which the Agency has provided for in specific instances in which comparative cost information is lacking and overall costs are disproportionately high. In this case, given the gap in time from the 2000 analysis period to the present day permitting action, EPA was unable to compile and analyze specific past PSD permit information regarding the costs that permitting authorities considered to be economically feasible or infeasible in BACT determinations for this type of source in 2000. EPA has instead considered the overall capital cost of the control option under consideration given the specific facts of this case. Where, as here, the permitting authority is undertaking a permitting action to correct a permitting error made more than 14 years ago which will result in an **unplanned pollution control upgrade at Bonanza Unit 1**, we believe the capital cost of $152,865,425 for SCR – in addition to the $7,076,000 for the addition of OFA which computes to $21,021,000 of additional cost per year (Total Annualized Cost) – is too high to represent BACT for Bonanza Unit 1. Therefore, **in light of the unique nature and timing of the PSD correction permitting action and considering the cost to install and operate SCR on this specific facility at this time, EPA proposes to eliminate SCR as BACT for Bonanza Unit 1.** (emphasis added)

As noted earlier, R8's "look back BACT" approach is contrary to EPA policy and should not be a factor in a proper BACT determination. It also appears that R8 is inferring that Deseret may not be able to afford the cost of complying with the BACT requirement, and such an "affordability" argument is prohibited by EPA guidance in its New Source Review Workshop Manual. R8 appears to be placing great weight on its own errors in initially approving the ruggedized rotor project, but not recognizing that Deseret shares a responsibility to recognize when it is proposing a major modification and act in accordance with well-established statutes, rules, regulations, policies, and guidance. Deseret cannot simply avoid compliance, and, at the same time, realize a major economic advantage for operating many years while avoiding the costs associated with complying with the Clean Air Act. Finally, there is the matter of the environmental impact of many years of operation with excess emissions.

Impact on Air Quality

According to R8:

> Based on the existing air quality information and the fact that there will be a net reduction in NOx emissions for this facility under the proposed PSD correction permit, we conclude that after application of NOx BACT under the correction permit, the ruggedized rotor project will not cause or contribute to a NAAQS or increment violation, or have potentially adverse effects on ambient air. We also conclude, from our technical analysis, that dispersion modeling is not necessary for purposes of making this showing in the context of this PSD correction permit, because the proposed correction permit does not allow any increase in NOx emissions.

R8 has not addressed the impact of the proposed emissions and assumes that they will have no "potentially adverse effects on ambient air." Consequently, R8 is also not considering the reductions in impacts that would result from more stringent emission limits.

Visibility in Arches and Canyonlands is impaired, as illustrated in the table below.

Park Name	Measured Baseline and Estimated Natural Haze			
	20% Clearest Days (dv)		20% Haziest Days (dv)	
	Baseline[1]	Natural[2]	Baseline[1]	Natural[3]
Arches	3.8	1.0	11.2	6.5
Canyonlands	3.8	1.0	11.2	6.5

[1]2000-2004 measurements
[2]source: WRAP Technical Support System http://vista.cira.colostate.edu/tss/Results/HazePlanning.aspx
[3]source: Natural Conditions II, IMPROVE http://vista.cira.colostate.edu/IMPROVE/Publications/GrayLit/gray_literature.htm

In addition, NPS has significant concern about nitrogen deposition at Dinosaur National Monument.[17]

NPS modeled the visibility impacts of BPP's current emissions, as well as the emissions proposed by R8, and we found that, under both scenarios, BPP would contribute significantly to visibility impairment[18] and exceed our FLAG[19] threshold of concern[20] at

[17] **Dinosaur Condition:** Wet nitrogen deposition warrants significant concern. This condition is based on NPS Air Resources Division benchmarks and the 2008–2012 estimated wet nitrogen deposition of 1.4 kilograms per hectare per year (kg/ha/yr), a level that normally warrants moderate concern. However, the condition has been elevated to significant concern because ecosystems at Dinosaur NM may be very highly sensitive to nitrogen-enrichment effects relative to all Inventory & Monitoring parks (Sullivan et al. 2011c; Sullivan et al. 2011d). Nitrogen deposition may disrupt soil nutrient cycling and affect biodiversity of some plant communities, including arid and semi-arid, grassland and meadow, wetland.

[18] In its BART Guidelines, EPA advises that a source significantly contributes to visibility impairment if its 98th percentile impact is 0.5 deciview (or less). This is essentially equivalent to the 5% change in extinction that our Federal Land Managers' Air Quality Related Values Work Group (FLAG) has set as our "level of concern."

Arches and Canyonlands Class I areas. (Descriptions of our modeling analyses are contained in Appendix B.) For example, even with EPA's proposed reduction in NO_X emissions, our CALPUFF results show that Arches would experience 11 days per year and Canyonlands 12 days per year when impairment exceeds 0.5 dv, with 63% - 68% of the resulting 0.6 dv impact at these national parks attributed to nitrate; this indicates that additional NO_X reductions should be considered.

Because SCR is cost-effective, NPS modeled the resulting impacts at Arches and Canyonlands and found that visibility impairment was reduced by 0.6 dv[21] from current conditions at each Class I area, and the contribution of nitrate was reduced to 21% - 29%. (Sulfate became the dominant species at 53% in each park.)

Our VISCREEN Level 1 model results show that R8's BACT proposal would significantly exceed all plume perceptibility criteria inside Dinosaur NM.

VISCREEN Maximum Visual Impacts INSIDE Class I Area

Screening Criteria ARE Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10	155	70	14	2.00	43.361*	0.05	0.827*
SKY	140	155	70	14	2.00	11.045*	0.05	-0.321*
TERRAIN	10	84	40	84	2.00	41.935*	0.05	0.466*
TERRAIN	140	84	40	84	2.00	7.597*	0.05	0.066*

Our CALPUFF analysis for Dinosaur NM shows that, under both Current and EPA BACT scenarios, BPP would cause visibility impairment and significant nitrogen deposition. In fact, our analysis predicts the highest impact (7 dv with 258 days/year > 0.5 dv) of a single source (BPP Unit 1) on a single NPS unit (Dinosaur NM) that we have ever seen. Even with EPA's proposed reduction in NO_X emissions, the resulting 6 dv (with 247 days/year > 0.5 dv) is still higher than any other source/receptor we have modeled. Because 44% of the impact is attributed to nitrate and 8% to NO_2, (sulfate is 25%), additional NO_X reductions should be considered. NPS modeled the benefits of adding SCR to address visibility impacts at Dinosaur NM and found that visibility impairment was reduced by over 3 dv, and the contribution of nitrate was reduced to 14%. (Sulfate became the dominant species at 43 %.)

Our CALPUFF modeling of the R8 BACT proposal also predicts nitrogen deposition in excess of 0.117 kg/ha/yr, which is more than 23 times our Deposition Analysis Threshold (0.005 kg/ha/yr) for western states. Considering that we have significant concerns regarding nitrogen deposition at Dinosaur NM, it is imperative that nitrogen loading into

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[19] Federal Land Managers' Air Quality Related Values Work Group

[20] 5% change in extinction more than seven days in any year

[21] In its BART analyses, R8 typically used 0.5 dv improvement as its benchmark for the minimum amount of improvement that would justify SCR.

the Monument be reduced. Addition of SCR would reduce nitrogen deposition at Dinosaur NM by 81% down to 0.023 kg/ha/yr.

Conclusions & Recommendations

- R8's analyses that are based on its year 2000 "look-back" approach are contrary to established EPA policy and thus are invalid.
- R8 has overestimated the effectiveness of SNCR, and underestimated the effectiveness of SCR.
- R8 has overestimated the cost of SCR.
- Both the R8 and NPS cost estimates for SCR at BPP appear cost-effective.
- An "affordability" argument is prohibited by EPA guidance.
- Deseret realized a major economic advantage for operating many years while avoiding the costs associated with complying with the Clean Air Act.
- BPP's excess emissions have significantly contributed to visibility impairment at multiple Class I areas as well causing visibility impairment and significant nitrogen deposition at Dinosaur National Monument. Our modeling analyses indicate that additional NO_X reductions should be considered.
- BACT for BPP is 0.05 lb NO_X/mmBtu on a 30-day rolling average. R8 must either limit heat input or mass emissions/time.
- A 0.05 lb NO_X/mmBtu (30-day rolling average) NO_X limit yields more than R8's 0.5 dv BART improvement threshold.

Operating company	**Deseret**	
Facility	**Bonanza**	
Unit	1	
Boiler Type	Dry bottom wall-fired boiler	CAMD
Fuel	Bituminous	EIA report for 2014
Rating (MW Gross) each	500	T5 permit
Rating (mmBtu/hr)	5,373	mmBtu/hr CAMD 2013 - 2014
Plant Capacity Factor	82%	calcuated for 2013 - 2014
Uncontrolled Emissions (tpy)	7,477	OAQPS Control Cost Manual
Uncontrolled Emissions (lb/mmBtu)	0.39	average for 2013-2014 from CAMD
Combustion Controls Cost-benefit Analysis		
Control Efficiency	45%	calculated
Controlled emissions (lb/mmBtu)	0.21	equivalent annual BACT limit
Controlled Emissions (tpy)	4,132	calculated
Emissions Reduction (tpy)	3,344	calculated
Capital Cost	$ 7,076,000	EPA R8 TSD
Capital Cost ($/kW)	$ 14	calculated
O&M Cost	$ 124,000	company report 6/2012
Annualized Cost	$ 667,924	calculated
Cost-Effectiveness ($/ton)	$ 200	calculated
SCR Cost-benefit Analysis		
Control Efficiency	81%	OAQPS Control Cost Manual
Controlled emissions (lb/mmBtu)	0.04	NPS assumption
Controlled Emissions (tpy)	772	calculated
Emissions Reduction (tpy)	3,360	OAQPS Control Cost Manual
Capital Cost	$ 132,811,577	calculated
Capital Cost ($/kW)	$ 266	calculated
O&M Cost	$ 3,727,222	OAQPS Control Cost Manual
Annualized Cost	$ 16,263,695	OAQPS Control Cost Manual
Cost-Effectiveness ($/ton)	$ 4,840	OAQPS Control Cost Manual
Combustion Controls + SCR Cost-benefit Analysis		
Control Efficiency	90%	calculated
Controlled emissions (lb/mmBtu)	0.04	calculated
Controlled Emissions (tpy)	772	calculated
Emissions Reduction (tpy)	6,705	calculated
Capital Cost	$ 139,887,577	calculated
Capital Cost ($/kW)	$ 280	calculated
O&M Cost	$ 3,851,222	calculated
Annualized Cost	$ 16,931,619	calculated
Cost-Effectiveness ($/ton)	$ 2,525	calculated

DINOSAUR NM BONANZA NITROGEN DEPOSITION IMPACTS NPS BACT CASE FOR 2001,2002,2003(1/30/2015)
NPS GENERATED CALMET PER EPA OAQPS AUGUST 31, 2009 7 SPECIES EMITTED
RECEPTORS AT DINO (1825-1868)
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BONANZA 1 EPA BACT CASE ANALYSIS
SO2=829.0; SO4=57.7; NOx=284.0; ORGANIC=122.5; PM-COARSE=79.8; PM-FINE=76.8; EC=3.0; LB/HR 24-HOUR EMISSION RATES

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DINOSAUR NM
BONANZA 1 NPS BART CASE ANALYSIS KG/HA/YR

2001
RECEPTOR COORDINATES (km) TYPE PEAK (YEAR,DAY,START TIME) FOR RANK FOR AVERAGE PERIOD
1850 156.746 166.243 DISCRETE 0.036717 KG/HA/YR RANK 1 8712 HOUR

2002
RECEPTOR COORDINATES (km) TYPE PEAK (YEAR,DAY,START TIME) FOR RANK FOR AVERAGE PERIOD
1850 156.746 166.243 DISCRETE 0.029615 KG/HA/YR RANK 1 8712 HOUR

2003
RECEPTOR COORDINATES (km) TYPE PEAK (YEAR,DAY,START TIME) FOR RANK FOR AVERAGE PERIOD
1850 156.746 166.243 DISCRETE 0.030869 KG/HA/YR RANK 1 8712 HOUR