United States Department of the Interior
NATIONAL PARK SERVICE
Air Resources Division
P.O. Box 25287
Denver, CO 80225

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:

N3615 (2350)

March 26, 2012

Keith Rose
EPA Region 10
Office of Air, Waste, and Toxics
AWT-107
1200 Sixth Avenue, Suite 900
Seattle, Washington 98101

Dear Mr. Rose:

The National Park Service appreciates the opportunity to review and comment on the Environmental Protection Agency (EPA)'s "Approval and Promulgation of Implementation Plans; State of Alaska; Regional Haze State Implementation Plan." The Alaska Department of Environmental Conservation (ADEC) has delivered a credible, but limited, evaluation of source contributions to visibility impairment in Class I areas in Alaska. Because the available emissions inventory and meteorological data were not sufficient to support photochemical air quality modeling, ADEC used the Weighted Emissions Potential (WEP) analyses to project the state's progress in improving visibility by 2018. ADEC concluded that the WEP analysis falls within the bounds of the 2018 uniform rate of progress. While informative, the WEP analysis is not sufficiently robust to conclude that Alaska Class I areas will meet the uniform rate of progress, and that no additional controls beyond those required for Best Available Retrofit Technology (BART) are reasonable to require in this State Implementation Plan (SIP). We believe additional controls are reasonable to consider.

The ADEC's SIP as submitted does not include the planned emissions increase from Golden Valley Electric Association (GVEA)'s Healy Power Plant Unit 2 in its WEP analysis, reasonable progress goals, or long-term strategy. Increased nitrogen oxide (NO_x), and sulfur dioxide (SO_2) emissions will cause greater visibility impairment in Denali National Park and Preserve (DNPP) than what is assumed in the ADEC SIP. Healy Unit 1 is subject to BART and will be required to reduce NO_x emissions; we address concerns with the proposed BART below and in the enclosures. After submitting the Regional Haze SIP to EPA on April 4, 2011, however, ADEC on April 26, 2011 determined that Prevention of Significant Deterioration (PSD) was not applicable to the Title V permit renewal to restart of Healy Unit 2. Healy Unit 1 is a 25 MW coal-fired boiler; Healy Unit 2 is a 50 MW coal-fired boiler with higher Title V permitted emissions limits than Unit 1.

Healy Unit 1

We encourage EPA to reconsider its proposal to approve the BART determination for Healy Unit 1. ADEC initially proposed addition of SCR with 72% NO_x control (0.07 lb/mmBtu annual average emissions limit) as BART, but in its final BART determination cited a remaining useful life of eight years (assuming 2024 shutdown) to change the BART requirement to Selective Non-Catalytic Reduction (SNCR) with 29% NO_x control (0.20 lb/mmBtu 30-day rolling average emissions limit). As stated in our March 2010 comments to ADEC, because the remaining useful life affected the BART determination, the BART guidelines (40 CFR 51, Appendix Y, Section iv.d.4.k.2) require the shutdown date to be a federal or state enforceable permit condition. EPA is proposing to approve ADEC's BART determination without the required enforceable permit condition.

NPS continues to conclude that, absent an enforceable shut-down date, SCR should be determined to be BART for Healy Unit 1 with a 30-day rolling average NO_x emissions limit of 0.06 lb/mmBtu. If there is an enforceable shut-down date, then we recommend ROFA® and Rotomix® with an annual emissions limit of 0.11-0.14 lb/mmBtu. This technology has only slightly higher costs and significantly greater visibility improvement than ADEC and EPA's proposed BART determination of SNCR.

In our enclosed comments we resubmit our analysis demonstrating that ADEC and its consultant, Enviroplan, overestimated the costs and underestimated the benefits of SCR. EPA, relying on ADEC analyses, concluded that SCR was not cost effective on a dollar per ton basis. Yet even using Enviroplan estimates, the cost-effectiveness based on visibility benefit ($4.7 million per deciview) is well below the average $/deciview of $14 to $21 million/dv that is being accepted as BART across the country.

For SO_2, we recommend that EPA require GVEA to evaluate addition of a spray dryer with plume reheat and to test whether the efficiency of the existing dry sorbent injection system can be increased to improve SO_2 controls.

Healy Unit 2

We are very concerned that ADEC did not consider the restart of Unit 2 as part of the reasonable progress analysis. Subsequent to submitting their regional haze SIP for EPA review, ADEC issued a Title V permit that will allow Unit 2 to restart, without going through Prevention of Significant Deterioration analysis and permitting. As a consequence, the Healy Power Plant's projected emissions will increase by 2018 beyond what is assumed in the proposed SIP.

Emissions from Healy Unit 2 were not included in the 2002 and 2018 emissions inventories or the WEP analysis. In its SIP, ADEC noted that if the Unit 2 emissions had been included in the WEP analysis, SO_x and NO_x emissions from the Denali sector would be 2.8 and 4.0 times greater, respectively, than what was ultimately presented. ADEC concluded, however, that a four factor analysis to evaluate emissions controls for reasonable progress was not required for Unit 2 because it was not operating at the time of the analysis. We urge that ADEC address visibility impacts from Unit 2 in DNPP through either the regional haze SIP, or through the Title V renewal process (i.e., the PSD

applicability analysis). To date, the issue has not been addressed through either regulatory approach.

NPS recognizes that the restart of Unit 2 is complex in terms of determining PSD applicability. Nuanced and extenuating details on such restarts have led EPA to make these determinations on a case-by-case basis. During the agency's 45-day review period of the Title V permitting action, EPA tacitly approved ADEC's PSD applicability analysis regarding the restart of Unit 2. It is imperative that if Unit 2 will not undergo a PSD analysis, then EPA and ADEC proactively address Unit 2 emissions in this current regional haze action. This analysis should not be delayed until after the Unit is restarted. The emissions limits in the Title V permit for Unit 2 do not require post-combustion controls and allow Unit 2 to control less than the proposed BART for Unit 1. Net emissions from Healy Power Plant will increase once Unit 2 is restarted. An analysis of the potential visibility impacts from Unit 2 is necessary before EPA and ADEC can conclude that reasonable progress in improving visibility at DNPP will be made by 2018. If Healy Unit 2 had been included in the WEP analysis, the emissions trends would not support a conclusion that emissions reductions by 2018 are consistent with the uniform rate of progress. We recommend that EPA and ADEC set emissions limits for both Unit 2 and Unit 1 at the lowest level of NO_x emissions that are reasonable.

IMPROVE Monitoring to demonstrate progress in improving visibility

The IMPROVE monitor at DNPP Headquarters has operated since 1988 while the Trapper Creek site was added in 2001, more than twenty miles outside the park boundary, to represent pollution transported into the park from the south. NPS appreciates the value of both sites in understanding air quality in DNPP. NPS requests that EPA correct the Federal Register notice to accurately indicate that the Denali Headquarters site, not the Trapper Creek site, is the official IMPROVE monitor.

We appreciate the opportunity to work closely with ADEC and EPA Region 10 to improve visibility in our Class I areas. For further information regarding our comments, please contact Pat Brewer at (303) 969-2153.

Sincerely,

Susan Johnson
Chief, Policy, Planning and Permit Review Branch

Enclosures

cc: Alice Edwards, Director
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National Park Service (NPS) Comments on EPA's Proposed Approval of Alaska Department of Environmental Conservation (ADEC)'s Final Best Available Retrofit Technology (BART) Determination for Golden Valley Electric Association (GVEA), Healy Power Plant, Unit 1 March 26, 2012

Description and Background

Healy Unit 1 is a 25-MW unit located in Healy, Alaska, approximately six kilometers from Denali National Park and Preserve (DNPP), a Class I area administered by the NPS. The Healy plant is operated by Golden Valley Electric Association (GVEA). Unit 1 is a wall-fired, wet-bottom boiler manufactured by Foster Wheeler. Low NOx burners (LNB) and over-fired air (OFA) ports were installed in 1996. Particulate emissions are collected by a reverse gas baghouse installed in the early 1970s. Sulfur oxides are controlled by a Dry Sorbent Injection (DSI) system installed in 1999. At the present time sodium bicarbonate is the sorbent which is injected into the flue gas after the air heater.

ADEC contracted with Enviroplan Consulting to review the BART control analysis submitted in July 2008 by GVEA. ADEC published a preliminary BART determination on May 12, 2009, that proposed Selective Catalytic Reduction (SCR) technology as BART for nitrogen oxide (NO_x) emissions controls for Healy Unit 1. ADEC proposed the existing dry sorbent injection system for sulfur dioxide (SO_2) controls and the existing reverse gas baghouse system for particulate matter (PM_{10}) controls as BART for Unit 1. During public comment on the preliminary BART determination, the NPS supported SCR and recommended additional evaluation of SO_2 controls. Following public comment, ADEC revised the BART determination for NO_x controls at Healy Unit 1 to be Selective Non-Catalytic Reduction (SNCR) technology rather than SCR. This decision was documented in ADEC's "Final BART Determination Report" dated January 19, 2010.

NPS submitted comments to ADEC dated March 11, 2010. Among our Conclusions and Recommendations were the following:

- It is essential that any evaluation that is contingent upon shutdown of Healy Unit 1 by a specific date must contain an enforceable condition to validate that evaluation.
- SCR can achieve a lower NO_x emission rate than evaluated by ADEC. As a result, ADEC has underestimated the benefits of adding SCR.
- ADEC has not fully explained, or justified, and, in some cases, has overestimated the costs associated with adding SCR. We continue to believe that the $874/kW cost estimate provided by ADEC/Enviroplan is overestimated. Industry data cited [in our comments] continues to indicate that capital costs greater than $200/kW are very unusual. We recognize that the size and location of Healy Unit 1 would likely result in unusually high SCR costs, but we continue to question the high capital costs estimated by ADEC.

- All of the NO_x control options evaluated result in cost/deciview values that are well below the $13 - $20 million average $/dV costs that are being proposed as BART by other sources and states. Therefore, all of the NO_x control options evaluated represent reasonable alternatives for BART.
- Because the OFA w/ROFA® option is only marginally more expensive (on a $/ton basis) that the proposed SNCR, and because the $/dV is still well below the national average, we requested that ADEC provide information on how those costs were derived and re-evaluate this option using the 7% interest rate recommend by the EPA Control Cost manual. In conducting that re-evaluation, we ask that ADEC provide information on the amount of time necessary to install this option.
- ADEC has underestimated the benefits of adding SO_2 scrubbers and overestimated their costs.
- It is likely that visibility improvements greater than those predicted by GVEA would be found if a more-refined, receptor-by-receptor analysis is conducted throughout DNPP. This would result in an even lower cost/deciview.

Following ADEC's receipt of our comments, Enviroplan completed a final report on June 1, 2010.

In its February 24, 2012 Federal Register Notice proposing to approve Alaska's State Implementation Plan for Regional Haze, EPA proposes to approve:

- The State's determination that an emission limit of 0.20 lbs/mmBtu for NO_X is BART for Healy Unit 1.
- The SO_2 emission limit achievable by the current DSI control technology, 0.30 lb/ mmBtu, as BART for Healy Unit 1.
- The PM emission limit achievable by the current reverse-gas baghouse control technology, 0.015 lb/mmBtu, as BART for Healy Unit #1.

We have several concerns with this proposal, as discussed in detail below.

SCR Control Effectiveness

NPS continues to believe that SCR can achieve at least 90% NO_x control and reduce emissions to 0.05 lb/mmBtu or lower on an annual basis. In all of the EPA, ADEC, Enviroplan, GVEA, and Fuel Tech documents, the 0.07 lb/mmBtu value is presented in the context of an emission limit, usually a 30-day rolling average limit. On the other hand, when conducting the economic analysis, it is critical to use the expected annual average emission rate because the annual costs and annual emission reductions are calculated, not short-term costs and emission reductions. In addition to the updated emissions data from EPA's Clean Air Markets Database we are including (Please see Appendix A.), which shows data for 20 coal-fired units with SCR meeting 0.05 lb/mmBtu or lower on an annual average in 2011, EPA has recognized the control

effectiveness of SCR Regarding SCR as BART at the San Juan Generating Station, EPA recently said[1]:

- We propose that NO_X BART for all the units of the SJGS is SCR with a 30 day rolling average of 0.05 lbs/ mmBtu.
- We note the NO_X design basis was 0.05 lbs/mmBtu for the SCR retrofit for the nearby Navajo Generating Station, a facility of a similar age that burns a similar coal, with a more constrained site. As explained elsewhere in our response to comments, we present data that demonstrates that retrofit SCR installations are capable of achieving a NO_X limit of 0.05 lbs/mmBtu on a continuous basis. Therefore, we believe the statement that a retrofit SCR would only be capable of achieving 0.07 lb/mmBtu on a continuous basis, is factually incorrect.
- We agree with the NPS that PNM has underestimated the ability of SCR to reduce emissions. As discussed elsewhere in our response to comments, we are requiring that the units of the SJGS meet an emission limit of 0.05 lbs/mmBtu on the basis of a 30 day rolling average.

Additionally, for its Montana FIP proposal,[2] EPA said it is "Assuming that an annual emission rate of 0.05 lb/MMBtu is achievable with SCR..."

Federally- or State-enforceable permit condition for shutdown of Healy Unit 1

NPS continues to believe that the assumed remaining useful life affected ADEC's BART determination for NO_x controls for Healy Unit 1. The BART guidelines require ADEC, if it is assuming the unit to be shutdown in 2024 as a basis for an eight-year amortization period, to include this shutdown date as a federally or State enforceable permit condition. The provision (40 CFR 51, Appendix Y, Section IV.D.4.k.2) states:

> For purposes of these guidelines, the remaining useful life is the difference between:
>
> (1) The date that controls will be put in place . . . .; and
> (2) The date the facility permanently stops operations. *Where this affects the BART determination, this date should be assured by a federally- or State-enforceable restriction preventing further operation.* (emphasis added)

In this FR Notice, EPA states:

> In the case of the Healy Unit #1, EPA recognizes that the 2024 shutdown date relied on in the cost effectiveness calculation described above is not enforceable. However, the BART Guidelines provide that the methods specified in EPA's Control Cost Manual used to calculate annualized costs should reflect the specified time period for amortization that varies depending on the type of control. Therefore, *based on our review*, EPA considers 15 years to be a reasonable estimated remaining useful lifetime for the particular control

[1] EPA-R06-OAR-2010-0846 http://www.gpo.gov/fdsys/pkg/FR-2011-08-22/pdf/2011-20682.pdf
[2] http://www.epa.gov/region8/air/ProposedActionMT_RegionalHazeFIP_Mar2012.pdf

technologies under consideration for NO_X or SO_2 control technologies for Healy Unit #1.

EPA has presented no justification for its assumed 15-year life for NO_X controls.

We believe that the time needed to implement a control strategy and the remaining useful life of that control are critical elements of the BART determination. EPA's engineering review notes that:

- All BART determinations and analyses in the Enviroplan report are based on a remaining useful life for the Healy Unit 1 boiler of 8 years.
- With regard to NO_x controls, the EPA Cost Manual uses 20 years as the useful life for both SCR and SNCR.
- SCR is not cost effective for this facility regardless of whether a remaining useful life of 8, 15, or 20 years is used in the calculations.
- The projected 2024 closure is not federally or state-enforceable, and therefore should not form the basis for remaining useful life under BART.
- The Enviroplan analysis allocates the maximum time allowed under BART (5 years) for GVEA to come into compliance with the BART emission limits. However, the control options forming the basis for the BART emission limits that are technically achievable and cost-effective[3] with respect to NO_x and SO_2 would not normally require the full 5 years for implementation. For example, SNCR installations typically require between 8 months and one year between bid evaluation and equipment startup ((CAC, 2006). Installation of rotating opposed fire air (ROFA®) and/or Rotamix®, which are variations on OFA and SNCR should not require a significantly longer time period. Control of SO_2 via optimization of the existing dry sorbent injection system (additional sorbent injection equipment) should require less time than the NO_x retrofit work... It seems reasonable that the actual time necessary for implementation determine the applicability date of the BART emission limits rather than the maximum time allowed under the rule. I estimate the time necessary not to exceed 2 years following final SIP approval, allowing for reasonable contingencies.

We agree with EPA that the NO_X control options evaluated could be implemented sooner than the five years assumed by Enviroplan, in which case, a 2024 assumed shut-down date may affect the economic component of the BART determination. We disagree with EPA that "SCR is not cost effective for this facility regardless of whether a remaining useful life of 8, 15, or 20 years is used in the calculations."

Re-evaluate NO_X Control Costs

NPS continues to believe that Enviroplan for ADEC, and EPA using Enviroplan's analyses, overestimated costs and underestimated benefits of SCR at Healy Unit 1.

[3] Necessary timeframe for selective catalytic reduction (SCR) installation was not researched because SCR is not cost-effective under any of the facility remaining useful life scenarios evaluated.

During the June 2009 comment period, GVEA provided a refined cost analysis for the SCR retrofit option that was prepared by Fuel Tech, a consulting company that specializes in SNCR and SCR application. On June 10, 2009, Fuel Tech provided a SCR Direct Capital Cost Estimate Total of $13.3 million. GVEA then added $8.6 million in Indirect Capital Costs to the Fuel Tech estimate.

Following is EPA's engineering evaluation of SCR costs:

> As described in the Enviroplan document, GVEA commissioned a site-specific cost analysis for the installation of SCR from Fuel Tech. The Fuel Tech report was obtained from the ADEC website and found to be generally in accord with the EPA Control Cost Manual. Site specific vendor quotes take precedence over cost estimates prepared using general cost estimation tools such as the EPA Control Cost Manual or CUECost because they are considered to more accurately represent actual site conditions. The Fuel Tech cost analysis resulted in cost-effectiveness values for control of NOx via SCR of $10,708/ton (20-year life), $11,765/ton (15-year life), and $15,762/ton (8-year life). Based on the Fuel Tech analysis, I agree that SCR is not cost-effective as BART for NOx at this facility.

We are concerned with the EPA analysis for several reasons. The Fuel Tech report was never intended to be "in accord with the EPA Control Cost Manual." The Fuel Tech report is simply an estimate of direct capital cost only the Enviroplan report is based upon the GVEA revisions of the Fuel Tech report. The GVEA revisions are contrary to the Control Cost Manual for the following reasons:

- GVEA added $8.6 million in indirect capital costs to the Fuel Tech estimate. The total capital investment is 164% of the direct capital cost estimate provided by Fuel Tech and exceeds 141% of the direct capital cost as estimated by the Cost Manual.[4] No justification is provided for the extra $3 million (in the $8.8 million indirect capital costs), and $1.25 million of the GVEA costs added are "owner's costs" not allowed by the Cost Manual. GVEA has not shown why the outage to install the SCR could not be done during a routine outage, and $1.9 million cost for taking the unit off-line is not justified.[5]
- The amortization periods are shorter than the 20-year life assumed by the Cost Manual in the absence of a federally-enforceable shut-down requirement.
- GVEA used an 8% interest rate instead of the 7% rate specified by the Cost Manual.
- GVEA's annual O&M estimate is more than double the Cost Manual estimate and more than three-times the IPM estimate. (Please see Appendix B.)
- GVEA has underestimated the NO_X emissions reduction that could be achieved with SCR.

[4] The EPA OAQPS Control Cost Manual estimates will be discussed later.

[5] EPA also rejected this cost in its FR Notice: "This cost effectiveness value does not include the cost to replace lost electricity generation during installation of SCR because there is insufficient evidence that the cost is a necessary consequence of SCR installation."

All of these issues with the GVEA revisions either increase costs or decrease benefits. Because Enviroplan based its cost analysis on the GVEA revisions to the Fuel Tech report, it has overestimated the costs of SCR and underestimated the benefits. EPA based its cost estimates on Enviroplan's estimate for SCR (amortized over eight years), and therefore also overestimated costs and underestimated benefits.

In January 2009, we provided a summary of SCR retrofit capital investment costs for BART-eligible boilers in the range of $80/kW to $270/kW. We recognize that the size and location of Healy #1 would likely result in higher SCR costs, but we continue to believe that the $874/kW cost estimate provided by ADEC is overestimated.

ADEC estimates the average annual cost-effectiveness for NO_x control on Healy Unit 1, based on eight-year amortization of capital costs, ranges from $47/ton for the optimization of the current LNB+OFA system to over $15,700 for existing combustion controls plus SCR on Healy Unit 1. Using the ADEC estimates for capital and certain O&M costs, and assuming that SCR would reduce NO_x emissions to 0.05 lb/mmBtu (annual average) and a remaining useful life of 20 years, our application of the EPA Cost Manual yielded $6,665/ton for LNB + OFA + SCR at Healy Unit 1. (Please see Appendix B.) While $6,665/ton may appear high, EPA recently stated in BART determination for Four Corners Power Plant (FCCP):[6]

> 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.

Healy Unit1 is about one-tenth of the distance to DNPP compared to FCPP and Mesa Verde National Park, so it is reasonable to assume that reductions at Healy would be even more "valuable."

NO_X Visibility Impacts

EPA based its determination on a 0.605 dv[7] improvement from optimized combustion controls plus SNCR at 0.20 lb/mmBtu versus a 0.786 dv improvement for SCR resulting from a 0.07 lb/mmBtu emission rate. It is likely that visibility improvements greater than those predicted by GVEA would be found if a more-refined, receptor-by-receptor analysis is conducted throughout DNPP.

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[6] ENVIRONMENTAL PROTECTION AGENCY 40 CFR Part 49 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

[7] Because Visibility improvement from SNCR at 0.20 lb/MMBTU was not evaluated by Enviroplan, the result was interpolated from December 8, 2011 Reply to Attn Of: 0EA-095 MEMORANDUM SUBJECT: Review of the ADEC BART Determination Support Document for Golden Valley Electric Association (GVEA) -- Healy Unit 1 Power Plant FROM: Zach Hedgpeth Environmental Engineer, ESU, OEA TO: Keith Rose, Environmental Scientist

EPA states that, "Installation of the ROFA® technology alone (without Rotamix®) is cost effective, and could achieve an emission rate of 0.15 lb/ mmBtu according to the vendor quote, but would only result in a visibility improvement of approximately 0.05 dv beyond the improvement achievable using SNCR." It is difficult to evaluate this statement because EPA did not provide visibility results for the emission limit it is proposing to approve for SNCR as BART. Interpolation of the modeling results presented in EPA's engineering analysis[8] leads to an estimate that SNCR at EPA's proposed 0.20 lb/mmBtu emission rate would yield an improvement of 0.605 dv, which represents a 0.045 dv improvement versus the baseline condition. Compared to that value, the 0.671 dv improvement attributed to ROFA® represents a 0.66 dv incremental improvement, which is greater than the 0.045 dv incremental improvement proposed by EPA. EPA cannot dismiss a cost-effective improvement greater than the improvement it proposes to accept.

NO_X BART Determination

NPS continues to conclude that, absent an enforceable shut-down date, SCR should be determined to be BART for Healy Unit 1.[9] BART is not necessarily the most cost-effective control option as there are four other factors to consider. And, as cautioned by EPA's BART Guidelines, EPA should avoid an over-reliance on incremental costs. We commend EPA for its use of the cost of improving visibility versus the actual amount of improvement, expressed in $/dv. However, where EPA arrived at $4.7 million/dv, our lower capital and annual cost estimates result in $2.9 million/dv. Both analyses result in cost/deciview values that are well below the $14 - $21 million average $/dV costs that are being proposed as BART by other sources and states.[10]

We recognize that other NO_X control options exist that may also be reasonable and less capital-intensive for a potentially short-lived unit like Healy Unit 1. In its FR Notice, EPA stated that, "...the following NO_X control technologies were considered cost effective: SNCR at $3,125/ton, ROFA® at $3,476/ton, and ROFA with Rotamix® at $4,325/ton." EPA then eliminated ROFA with Rotamix® due to "...some risk of increased emissions of carbon monoxide (CO), carbon dioxide (CO2), and "loss-on-ignition" (un-burnt carbon particulate matter)." However, in its FR Notice for the Nevada Regional Haze SIP,[11] EPA Region 9 stated that "NDEP determined that for all units at Reid Gardner, BART controls for NO_X are rotating opposed fire air (ROFA) with Rotamix" and "EPA is proposing to approve these BART determinations for NO_X based

[8] December 8, 2011 Reply to Attn Of: 0EA-095 MEMORANDUM SUBJECT: Review of the ADEC BART Determination Support Document for Golden Valley Electric Association (GVEA) -- Healy Unit 1 Power Plant FROM: Zach Hedgpeth Environmental Engineer, ESU, OEA TO: Keith *Rose,* Environmental Scientist

[9] Even if the remaining useful life of Healy #1 is shortened to ten years, the SCR cost/dv is only $4 million.

[10] Our most recent compilation of BART projects was sent to ADEC recently.

[11] ENVIRONMENTAL PROTECTION AGENCY 40 CFR Part 51 Approval and Promulgation of Air Quality Implementation Plans; State of Nevada; Regional Haze State Implementation Plan AGENCY: Environmental Protection Agency (EPA). ACTION: Proposed rule. Federal Register / Vol. 76, No. 120 / Wednesday, June 22, 2011

on NDEP's approach." Neither EPA nor NDEP made any mention of the CO, CO_2, or un-burnt carbon issues in that determination.

EPA states that their "review did not identify a facility utilizing ROFA® with Rotamix® that was subject to an emission limit near 0.11 lb/mmBtu, the level quoted by the vendor for ROFA® with Rotamix® for Healy Unit #1." The report[12] from which this statement appears to have been derived provides an informative context for that statement:

> A review of facilities employing ROFA® with Rotamix® for NO_X control revealed emission limits above 0.20 lb/MMBTU for older projects, with the most recent project identified subject to an emission limit of 0.14 lb/MMBTU (MPCA, 2006). Research did not identify a facility utilizing ROFA® with Rotamix® that was subject to an emission limit near 0.11 lb/mmBtu, so the relationship between NO_X and CO/CO_2/PM emissions under these circumstances remains unclear."

The facility permitted for 0.14 lb/mmBtu is Minnesota Power's Taconite Harbor Energy Center. The three tangentially-fired coal boilers (75 MW each) at the facility were originally designed to operate on bituminous coal, but began burning sub-bituminous coal in the early 1990s. Minnesota Power was asked by the state to perform a BART analysis for Unit 3. Minnesota Power proposed to install Mobotec multi-pollutant control technology[13] on each of the three 75 MW boilers to reduce SO_2 (by 65% to 0.24 lb/mmBtu), NO_X (by 64% to 0.14 lb/mmBtu), and mercury (by 90% to 0.0000049 lb/mmBtu). EPA Region 5 proposed approval of this BART determination in its "Federal Register / Vol. 77, No. 16 / Wednesday, January 25, 2012 / Proposed Rules."

We conclude that EPA Region 10 has improperly rejected ROFA with Rotamix® based upon an "unclear relationship between NO_X and CO/CO_2/PM emissions" while EPA Regions 5 and 9 have proposed approval of the same technology without raising any of these concerns. We recommend that EPA determine that ROFA with Rotamix® at 0.11 - 0.14 lb/mmBtu (30-day rolling average) be determined to be BART if EPA determines that SCR is not BART.

We recommend that EPA determine that ROFA® at 0.15 lb/mmBtu be determined to be BART if EPA determines that higher levels of control are not BART.

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[12] December 8, 2011 Reply to Attn Of: 0EA-095 MEMORANDUM SUBJECT: Review of the ADEC BART Determination Support Document for Golden Valley Electric Association (GVEA) -- Healy Unit 1 Power Plant FROM: Zach Hedgpeth Environmental Engineer, ESU, OEA TO: Keith *Rose*, Environmental Scientist

[13] Mobotec is comprised of Rotating Opposed Fired Air ('ROFA') and ROTAMIX selective non-catalytic reduction (SNCR) with furnace urea injection for NO_X control. In addition, the system includes a Furnace Sorbent Injection ('FSI') system for injection of a calcium alkaline reagent (limestone) for SO2 control, and a system to inject a clay-based sorbent (MinPlus) to adsorb and chemically bind vaporized elemental mercury.

SO_2 BART Determination

For SO_2, despite the "significant reductions in $S0_2$ emissions resulting from wet control technologies" cited by EPA, controls were rejected because "modeling would likely indicate increased visibility impacts near to the stack due to decreased plume dispersion." However, the effectiveness of the Lime Spray Dryer (LSD) option was underestimated at Healy. For example, EPA assumed that LSD could achieve 0.06 lb/mmBtu at the Gerald Gentleman Station (GGS) instead of the 0.15 lb/mmBtu (75% control) assumed for the same technology at Healy.[14] We recommend that EPA require GVEA evaluate the LSD option with plume reheat and to test whether the efficiency of the existing dry sorbent injection system can be increased to improve SO_2 controls. We also recommend that a more-refined, receptor-by-receptor analysis be conducted throughout DNPP to determine if visibility improvements greater than those predicted by GVEA would be found.

With respect to the current SO_2 controls, according to EPA:

> For SO2, EPA found that optimizing the existing Dry Sorbent Injection (DSI) system to achieve an emission limit of 0.18 lb/mmBtu, by increasing the sorbent injection rate, is cost effective at $3,578/ton. However, increased sorbent injection rate carries the risk of a ''brown plume'' effect. Brown plume refers to the oxidation of nitrogen oxide (NO) to nitrogen dioxide (NO_2) prior to discharge from the stack. NO_2 is brown in color, while NO is colorless; the two together form NO_X. Combustion emissions are initially NO, and oxidize in the atmosphere to NO_2. High sorbent injection rates can increase the potential for this oxidation to occur prior to discharge, potentially resulting in a visible brown plume from the exhaust stack. Due to the proximity of Healy Unit #1 to Denali National Park, a brown plume may result in increased visibility impairment in the sections of the Park closest to Healy Unit #1, even though overall visibility impairment would be reduced. Two other SO_2 control options, a spray dryer, and wet limestone flue gas desulfurization, were considered not to be cost effective at $7,198/ton and $7,763/ton, respectively. Therefore, EPA proposes to approve the SO2 emission limit achievable by the current DSI control technology, 0.30 lb/ mmBtu, as BART for Healy Unit #1.

In our comments to ADEC we suggested that, "The brown plume potential is not known, but can be tested by increasing the sorbent injection rate using the existing equipment." EPA's engineering analysis[15] appears to have reached the same conclusion:

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[14] "However, dry scrubbers are capable of much greater control efficiencies than the 80 percent level that GGS assumes. Therefore, for the purpose of calculating the cost effectiveness of dry scrubbers at the GGS, we also analyzed an SO_2 emission limit of 0.06 lbs/MMBtu, which results in a scrubber efficiency of approximately 89.4%." ENVIRONMENTAL PROTECTION AGENCY 40 CFR Part 52 [EPA–R07–OAR–2012–0158; FRL–9639–6] Approval, Disapproval and Promulgation of Implementation Plans; Nebraska; Regional Haze State Implementation Plan; Federal Implementation Plan for Best Available Retrofit Technology Determination AGENCY: Environmental Protection Agency (EPA). ACTION: Proposed rule.Federal Register / Vol. 77, No. 42 / Friday, March 2, 2012

[15] December 8, 2011 Reply to Attn Of: 0EA-095 MEMORANDUM SUBJECT: Review of the ADEC BART Determination Support Document for Golden Valley Electric Association (GVEA) -- Healy Unit 1

> Unfortunately, the potential for brown plume events may result in under-utilization of DSI systems in achieving the maximum possible SO2 removal. Since Healy Unit 1 is already equipped with a DSI system capable of the necessary increased sorbent injection rate (although not continuously, due to lack of redundancy), good potential exists for a pilot study to evaluate the potential S02 reductions and brown plume risk without substantial expenditures. Pursuing such a pilot study may be complex in the BART context, and would likely require further technical work.

We recommend that such a short-term pilot study be made part of the Reasonable Progress component of the Alaska SIP, with particular attention given to the relationships of mercury and SO_2 emissions to sorbent injection rates. If mercury emissions increase, we request that we be consulted regarding the effectiveness and consequences of increasing the sorbent injection rate before any final decision is made.

We ask that EPA consider an alternative, comprehensive approach to BART for Healy Unit 1. As noted above, Minnesota Power is installing a multi-pollutant control system on 75 MW coal-fired boilers that will reduce SO_2 to 0.24 lb/mmBtu, NO_X to 0.14 lb/mmBtu (and mercury to 0.0000049 lb/mmBtu). Those controls have been proposed for approval by EPA and we see no reason why Healy Unit 1, which is much closer to a Class I area than the Minnesota boilers, could not achieve the same limits.

Power Plant FROM: Zach Hedgpeth Environmental Engineer, ESU, OEA TO: Keith *Rose,* Environmental Scientist