

Findings of Fact  
Supplemental NO<sub>x</sub> BART Determination  
Coal Creek Station



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North Dakota Department of Health  
Division of Air Quality  
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Bismarck, ND 58501

**Findings of Fact**  
**Supplemental NO<sub>x</sub> BART Determination**  
**Coal Creek Station**

The North Dakota Department of Health makes this supplemental Best Available Retrofit Technology (BART) Determination for nitrogen oxides (NO<sub>x</sub>) pursuant to the North Dakota Century Code Chapter 23-25, the North Dakota Administrative Code Chapter 33-15-25, the federal Clean Air Act §169A, 40 CFR 51.308 and 40 CFR Part 51, Appendix Y. Having considered Great River Energy's (GRE's) submittal, the comments made and other information entered into the administrative record, and hereby incorporating its Preliminary Determination and its Response to Comments into these proceedings, the Department makes the following Findings and Conclusions.

**I. Introduction**

**A. Background**

Great River Energy operates the Coal Creek Station (CCS) near Underwood, ND. CCS consists of two tangentially fired units, each rated at 550+ megawatts. Existing air pollution control equipment on each unit consists of an electrostatic precipitation for the control of particulate matter and a lime wet scrubber for the control of sulfur dioxide emissions. Combustion controls for reducing the formation of NO<sub>x</sub> includes low NO<sub>x</sub> burners and a form of overfire air. Unit 1 went on line in 1979 while Unit 2 started operation in 1980.

The combustion of lignite coal creates fly ash at CCS. GRE currently markets the fly ash collected at CCS as a substitute for Portland cement in the production of concrete. This beneficial reuse of the fly ash removes the need to landfill the fly ash. GRE and its partners have invested over 31 million dollars in equipment used for the management and sale of the CCS fly ash.

**B. History of BART Analysis and Determination**

On August 17, 2006, GRE submitted its initial BART analysis to the Department. The Department reviewed the document and on December 1, 2006 provided comments to GRE. GRE subsequently updated the analysis in February 2007 based on the Department's comments. As the Department's review continued, GRE's BART analysis was updated in July, September and December of 2007. In March of 2010, the Department made its BART determination and submitted it to EPA as part of the State of North Dakota's Regional Haze State Implementation Plan (SIP).

EPA, during their review of the North Dakota Regional Haze SIP, discovered that GRE had used a value for ash sales based on the total sales price instead of the amount GRE would receive from the sales (see 76 FR58603, 58604, 58619). After the discrepancy was discovered, the Department requested that GRE submit

a revised BART cost estimate to the Department. Before GRE provided the Department, or EPA, with all of the necessary cost data, EPA finalized a Federal Implementation Plan (FIP) which established a BART limit of 0.13 lb/10<sup>6</sup> Btu based on the use of selective non-catalytic reduction (SNCR). The following is the Department's understanding of the chronology of events associated with GRE's submission of its revised cost estimates:

<b>Date</b>	<b>Item</b>
July 15, 2011	GRE submits revised cost estimate for SNCR
September 21, 2011	EPA proposes to approve in part and disapprove in part North Dakota's Regional Haze SIP and proposes FIP
November 3, 2011	Department letter to GRE asking that revised analysis be provided by December 21, 2011
November 14, 2011	Department informs EPA by letter that it will reevaluate the Coal Creek Station BART determination
November 21, 2011	GRE submits revised BART analysis to the Department
December 7, 2011	Department letter to EPA advising it of GRE's submittal and Department's review
January 10, 2012	Conference call with GRE to discuss comments on November 21, 2011 submittal
January 19, 2012	Department letter to GRE with comments to the November 21, 2011 submittal
February 10, 2012	GRE submits revised analysis
February 28, 2012	Department letter to GRE with comments on February 10, 2012 submittal
April 5, 2012	GRE submits revised analysis in response to Department's February 10, 2012 comments
April 6, 2012	EPA publishes final FIP
April 11, 2012	GRE submits revised analysis which updated visibility impact tables
May 21, 2012	Conference call with GRE where Department indicated it did not agree with a baseline of 0.153 lb/10 <sup>6</sup> Btu for Unit 2 and there was an error in the Unit 1 cost effectiveness analysis
June 6, 2012	GRE submits revised calculations of cost effectiveness and incremental cost for both units based on the May 21, 2012 comments
August 6 - September 12, 2012	Consultation with FLMs and EPA on Preliminary Supplemental Evaluation BART NO <sub>x</sub> determination for CCS (Supplemental Determination)
September 15, 2012	Department completes evaluation of GRE's analysis
September 15, 2012	Notice provided to FLMs and EPA of Supplemental

	Evaluation for public comment of the Supplemental Determination
October 1-30, 2012	Public Comment Period to the Supplemental Determination
November 28, 2012	GRE provides response to public comments to the Supplemental Determination
December 14, 2012	Department response to public comments to the Supplemental Determination

C. Requirements for NO<sub>x</sub> BART Analysis and Determination

The Clean Air Act §169A(b)(2) requires each state to include in their Regional Haze SIP BART requirements for each major stationary source which was in existence on the date of enactment of the section of the Act (August 7, 1977) and those that had been in operation no more than fifteen years prior to such date (August 7, 1962). CAA §169A(b)(2) goes on to state that “in the case of fossil-fired generating power plants having a generating capacity in excess of 750 megawatts, the [BART] emission limitations” must be determined pursuant to guidelines promulgated by the EPA Administrator, which guidelines are known as the BART Guidelines.

EPA’s BART Guidelines are established in 40 CFR Part 51, Appendix Y, Guidelines for BART Determination Under the Regional Haze Rule. CAA §169A(g)(2) establishes the factors that must be considered when determining BART. These include:

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

Pursuant to NDAC Chapter 33-15-25, the Department has required any owner or operator of any existing stationary facility (as defined in 40 CFR § 51.301) that contributes significantly to visibility improvement in a Class I Federal area to submit a BART analysis to the Department. NDAC § 33-15-25-03 requires the owner or operator of a fossil-fuel fired steam electric plant with a generating capacity greater than 750 megawatts of electricity (MWe) to comply with the

guidance in 40 CFR Part 51, Appendix Y. Since the Coal Creek Station has a capacity greater than 750 MWe (1100<sup>+</sup> MWe), GRE was required to follow the BART Guidelines in the preparation of their BART analysis. However, nothing in the North Dakota rules or the BART Guidelines prevent the owner or operator from supplying additional information beyond that required by the BART Guidelines.

In establishing BART, the five statutory factors must be considered. However, the Department has flexibility in its evaluation of the five factors. The preamble to EPA's BART Guidelines clearly acknowledges that "However, we believe the States have flexibility in setting absolute thresholds, target levels of improvement, or de minimus levels since the deciview improvement must be weighed among the five factors, and States are free to determine the weight and significance to be assigned to each factor". (70 FR 39,130)

## II. Supplemental NO<sub>x</sub> BART Determination

With regard to control technologies for reduction of NO<sub>x</sub> emissions at the Coal Creek Station, the Department makes the following findings and conclusions:

- 1) High dust SCR (HDSCR) is not technically feasible at Coal Creek Station. The high concentration of soluble sodium and potassium in the flue gas will poison, blind and plug the SCR catalyst (see ND SIP Appendix B5).
- 2) The cost of low dust SCR (LDSCR) is excessive. The Department's analysis indicated a cost effectiveness of \$13,101 per ton and an incremental cost effectiveness of \$20,678 per ton (see ND SIP Appendix B.2, page 16). The high cost is primarily due to the cost of reheating the flue gas and the operation and maintenance costs associated with an SCR system on a North Dakota lignite-fired boiler. The cost effectiveness and incremental cost of SCR are both well above the values the Department determined to be reasonable for BART (see Appendix E of the Supplemental Evaluation). The cost of tail-end SCR (TESCR) is expected to be as much or more than LDSCR because of the additional reheating of the flue gas that is required. The cost of TESCR is also excessive.
- 3) In its partial Federal Implementation Plan for North Dakota, EPA determined that SCR is not required as BART due to the high cost and small visibility improvement (77 FR 20,899, 76 FR 58,622-58,623).
- 4) Ammonia, from the application of SNCR, will likely contaminate some of the fly ash produced at Coal Creek Station to the point it is not marketable for making concrete or other uses. The amount of ash sales that will be lost cannot be determined. GRE has suggested that as much as 100% of ash sales could be lost.
- 5) Since the amount of ash sales cannot be determined, the cost effectiveness and incremental cost of SNCR cannot be determined precisely. The Department has

evaluated three scenarios: a) no ash sales are lost, b) 30% of ash sales are lost; and c) 100% of ash sales are lost. If 30% or 100% of the fly ash are lost, the Department considers the cost (cost effectiveness and/or incremental cost) of SNCR + LNSC3+ and SNCR alone to be excessive. If no fly ash sales are lost, the incremental cost of SNCR alone would be considered excessive. However, because of the relatively large emissions reductions achieved by LNC3+ at minimal cost, the cost of SNCR + LNC3+ is not considered excessive if no ash sales are lost.

- 6) The amount of visibility improvement from the use of SNCR is very small. The maximum improvement (98<sup>th</sup> percentile) would be 0.106 deciviews, which is not humanly perceptible. The average improvement at North Dakota's four Class I Federal Areas is 0.056 deciviews. A source is considered to "contribute to visibility impairment" if it contributes 0.500 deciviews or more of impairment (NDAC 33-15-25-01.2). The small amount of visibility improvement from the use of SNCR does not warrant the use of SNCR as BART.
- 7) The use of SNCR has the potential for adverse environmental effects. For example, if ash sales are lost, the fly ash must be landfilled which eliminates useful land. Ammonia slip from the SNCR system can result in ammonia being emitted to the atmosphere. Ammonia is considered a hazardous air pollutant by the Department (*see* Policy for the Control of Hazardous Air Pollutants Emissions in North Dakota). In addition, there will be an increase in greenhouse gas emissions from Portland cement manufacturing to replace the fly ash which cannot be used in concrete production.
- 8) The recycling of fly ash and keeping it out of a landfill is an important environmental issue to the State. Landfilling fly ash can lead to adverse environmental impacts. Over 31 million dollars has been invested at CCS for the management and sale of fly ash. The recycling of fly ash as a Portland cement substitute in concrete eliminates the potential adverse environmental effects from landfilling fly ash.
- 9) The cost of SNCR cannot be determined exactly since it cannot be determined how much of the fly ash sales will be lost. The Department expects that more than likely a material portion of the fly ash sales will be lost. Because the cost of SNCR cannot be determined precisely, the Department has chosen to weigh the degree of visibility improvement heavily in this BART determination. The amount of visibility improvement is not affected by the amount of lost fly ash sales. The small amount of visibility improvement and the potential for adverse environmental effects from SNCR indicate that it is not required as BART.
- 10) The U.S. Environmental Protection Agency has established presumptive BART emission limits for various types of boilers based on controls that EPA considers to be cost effective and expected to provide significant visibility improvement. For tangentially fired boilers, like the Coal Creek Station boilers, the presumptive

limits are based on combustion controls like LNC3+. (70 FR 39132-39136). Presumptive BART for CCS is 0.17 lb/10<sup>6</sup> Btu (40 CFR Part 51, Appendix Y, Table 1). The Department has established the NO<sub>x</sub> BART emission limit at a level equal to EPA's presumptive BART emission limit. The Department has determined such an emission limitation to be both reasonable and rationally supported by the information before the Department.

## II. **BART Selection**

After having considered the five statutory factors and all information and data made available to it, the Department exercises its legal authority and discretion and affirms its original NO<sub>x</sub> BART determination that BART for CCS is represented by combustion controls (LNC3+) and an emission limit of 0.17 lb/10<sup>6</sup> Btu (30-day rolling average). GRE is allowed to average emissions between the two units as indicated in GRE's BART Permit to Construct (ND State Implementation Plan for Regional Haze, Appendix D.2).