



Jeremiah W. (Jay) Nixon, Governor • Sara Parker Pauley, Director

## DEPARTMENT OF NATURAL RESOURCES

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CERTIFIED MAIL: 7004135000314153304  
RETURN RECEIPT REQUESTED

Mr. Todd Tolbert  
Senior Environmental Analyst  
Associated Electric Cooperative, Inc.  
P.O. Box 754  
Springfield, MO 65801

RE: New Source Review Temporary Permit Request - Project Number: 2012-01-026  
Installation ID Number: 143-0004  
Temporary Permit Number: **022012-015**  
Expiration Date: July 1, 2012

Dear Mr. Tolbert:

The Missouri Department of Natural Resources' Air Pollution Control Program has completed a review of your request to run a trial of dry sorbent injection (DSI) at Associated Electric Cooperative, Inc. - New Madrid Power Plant, located in Marston, Missouri. The Air Pollution Control Program is hereby granting your request to conduct this temporary operation at this location in accordance with Missouri State Rule 10 CSR 10-6.060(3).

The purpose of the 90 day trial is to test the feasibility of injecting sodium bicarbonate (SBC), its affect upon sulfur and acid gas emissions, and its affect upon electrostatic precipitator (ESP) performance at this plant.

SBC will be delivered via enclosed railcars and pneumatically transferred to enclosed semi-trailers. The SBC will be trucked over approximately 900 feet of unpaved haul road and pneumatically loaded into a silo. Empty semis will return to the railcar loading via approximately 1,100 feet of unpaved haul road. The as-delivered SBC will be milled to a smaller diameter, optimized for the flue gas reaction. The mill is enclosed and inline with the silo and injection. Milled SBC will be injected into the flue of Unit 2 downstream of the boiler and upstream of the existing ESP.

The most conservative approach for calculating carbon dioxide emissions from the project includes two chemical reactions. The milled SBC will undergo a calcination reaction yielding sodium carbonate (SC), water vapor, and carbon dioxide (CO<sub>2</sub>). CO<sub>2</sub> will be emitted from the stack. The SC will react with available sulfur oxides (SO<sub>x</sub>) and acid gases such as hydrogen chloride and hydrogen fluoride, producing various salt byproducts, water vapor, and CO<sub>2</sub>.

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CO<sub>2</sub> will be emitted from the stack. The ESP will collect the solid byproducts and cause an increase in throughput at the existing silo/paddle mixer and subsequent fly ash handling and disposal activities. The project will not affect bottom ash production.

Potential emissions for pneumatic transfer of the SBC were calculated using controlled emission factors for pneumatic cement unloading (Source Classification Code (SCC) 3-05-011-07) from the Environmental Protection Agency (EPA) document AP-42, *Compilation of Air Pollutant Emission Factors*, Fifth Edition, Section 11.12, *Concrete Batching*, June 2006. Particulate matter less than 2.5 microns in diameter (PM<sub>2.5</sub>) emission factors are not available in AP-42 for this SCC. PM<sub>2.5</sub> emission factors were calculated using an approximate cement average PM<sub>2.5</sub> particle size distribution of 25 percent of total particulate matter. Emissions were calculated based upon the SBC injection rate of 5 tons per hour.

Assuming stoichiometric reactions, the SBC will yield approximately 3.15 tons of SC per hour as a reactant towards the FGD process and emit 1.31 tons of CO<sub>2</sub> per hour. The most prevalent pollutant being controlled by the FGD process is sulfur dioxide (SO<sub>2</sub>). Potential SO<sub>2</sub> emissions of 1.44 tons per hour were calculated using extrapolated actual emissions from the emissions inventory questionnaire and coal usage. With SO<sub>2</sub> as the limiting reactant, approximately 3.97 tons of unreacted SC and FGD byproduct and 0.99 tons of CO<sub>2</sub> are produced per hour. The unreacted SC and FGD byproduct move downstream to the ESP. The CO<sub>2</sub> is emitted from the stack. Potential CO<sub>2</sub> emissions as a result of this project are 2.30 tons per hour. Even though an increase in particulate matter loading is occurring at the ESP, the electrical properties of the SC and byproduct are expected to improve the performance of the ESP. No increase in particulate matter emissions at the stack is expected from this project. However, this will be verified through testing.

Potential emissions from the increase in material handling (3.97 tons throughput per hour) at the existing silo/paddle mixer (EP-07), fly ash truck loading (EP-11), and dumping at the landfill (FE-03) were calculated using AP-42 Section 13.2.4, *Aggregate Handling and Storage Piles*, November 2006. The material is wetted at the silo/paddle mixer to approximately 12 percent moisture using existing equipment. The one-way length of the unpaved disposal haul road is approximately 2.4 miles. Potential emissions from disposal activity dirt work and wind erosion were permitted in 082006-011 and are not expected to increase as a result of this project. Potential emissions from these processes are not dependent upon hourly disposal throughputs when using AP-42 Section 11.9, *Western Surface Coal Mining*, Tables 11.9-1 and 11.9-4, October 1998. Potential emissions from the haul roads were calculated using AP-42 Section 13.2.2, *Unpaved Roads*, November 2006. All unpaved haul roads shall be watered whenever conditions exist which would cause visible fugitive emissions to enter the ambient air beyond the property boundary. Potential emissions of the project are summarized in Table 1.

Table 1: Emissions Summary

<sup>1</sup> Pollutant	<sup>2</sup> Insignificance Level (lb/hr)	Unconditioned Potential Emissions of the Project (lb/hr)	De Minimis Level (tpy)	<sup>4</sup> Unconditioned Potential Emissions of the Project (tpy)
PM	N/A	3.63	25.0	15.13
PM <sub>10</sub>	1.0	<sup>3</sup> 1.95	15.0	4.08
PM <sub>2.5</sub>	N/A	0.10	10.0	0.42
<sup>5</sup> GHG (mass)	N/A	4,600.25	0/100/250	20,149.09
GHG (CO <sub>2</sub> e)	N/A	4,600.25	75,000/100,000	20,149.09

N/A = Not Applicable

<sup>1</sup> Potential emissions of pollutants other than those listed in Table 1 are either not affected by the project or not increasing due to the project.

<sup>2</sup> Insignificance level according to 10 CSR 10-6.061(3)(A)3.A.

<sup>3</sup> Unconditioned potential emissions of PM<sub>10</sub> including undocumented watering of unpaved haul roads is 0.98 pounds per hour.

<sup>4</sup> Unconditioned potential emissions of the project based upon 8,760 hours of operation a year are less than the respective de minimis level for criteria pollutants and do not meet applicability for greenhouse gas (GHG) prevention of significant deterioration (PSD).

<sup>5</sup> For this project the only GHG is CO<sub>2</sub>.

No later than 90 days following the expiration of this permit, AECI New Madrid shall submit a project report to the Air Pollution Control Program. At a minimum, the report shall include:

1. Identification of the emission units (boilers) and control devices (ESPs) evaluated for this project.
2. Locations of the injection and sampling sites.
3. Injection rates and unit load for each stack test run.
4. The date, time, and duration of each stack test run.
5. DSI controlled emission rates in pounds per million British thermal units (lb/MMBtu) heat input of total particulates, filterable particulates, SO<sub>2</sub>, SO<sub>3</sub>, hydrogen chloride, and hydrogen fluoride.
6. Uncontrolled emission rates in lb/MMBtu heat input of total particulates, filterable particulates, SO<sub>2</sub>, SO<sub>3</sub>, hydrogen chloride, and hydrogen fluoride. This test may occur prior to the beginning or after the completion of the project, but it shall not delay the timely submittal of the project report.
7. Higher heating value, moisture, ash, sulfur, chlorine, and fluorine content of the coal for each stack test run.
8. The six minute average opacity data collected during each stack test run and for a 24-hour period before and after each stack test run.
9. Conclusions reached concerning the emissions reduction effectiveness of the testing project.

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You are still obligated to meet all applicable air pollution control rules, Department of Natural Resources' rules, or any other applicable federal, state, or local agency regulations. Specifically, you should avoid violating 10 CSR 10-6.220, *Restriction of Emission of Visible Air Contaminants*, 10 CSR 10-6.165 *Restriction of Emission of Odors*, 10 CSR 10-6.170 *Restriction of Particulate Matter to the Ambient Air Beyond the Premises of Origin*, and 10 CSR 10-6.405 *Restriction of Particulate Matter Emissions From Fuel Burning Equipment Used For Indirect Heating*.

A copy of this letter should be kept with the unit and be made available to Department of Natural Resources' personnel upon verbal request. If you have any questions regarding this determination, please do not hesitate to contact David Little at the department's Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102, or by telephone at (573) 751-4817. Thank you for your time and attention to this matter.

Sincerely,

AIR POLLUTION CONTROL PROGRAM



Kyra L. Moore  
Director

KLM:dll

c: PAMS File: 2012-01-026  
Southeast Regional Office