

Title: The New Madrid SCR Retrofit Project

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Summary:

Associated Electric Cooperative, Inc. (AECI) has retrofitted a selective catalytic reduction (SCR) system to Unit 2 of the New Madrid Station. The SCR system began operation during February 2000. AECI is using this SCR system to achieve system-wide compliance with the Clean Air Act Amendment's Title IV, Phase 2 NO_x emission limitations.

AECI awarded the Unit 2 turnkey SCR project to the joint venture of Black & Veatch Construction, Inc. (BVCI) and J. S. Alberici Construction Company, Inc. (JSA). Subsequently, AECI has also exercised an option for installing SCR on Unit 1. Units 1 and 2 are nominally rated 600 MW cyclone fired boilers burning 100% Powder River Basin (PRB) subbituminous coal. The project constitutes the world's first application of SCR to a 100% PRB coal fired boiler. In addition to the unique characteristics of the fuel, the project also requires high NO_x removal efficiency (93%) while maintaining low ammonia slip (3 ppmvdc).

The SCR design being implemented is based on the lessons learned by STEAG, a German independent power producer. STEAG has SCR design experience exceeding 12,000 MW and SCR O&M experience developed over a 10-year period. In addition to targeting aggressive NO_x reduction, Black & Veatch competitively configured the New Madrid SCR project to improve boiler heat rate and fan draft margins. These objectives were accomplished by incorporating a new regenerative "SCR ready" air heater to replace the existing tubular air heaters. By developing a very low pressure drop design and by replacing the tubular air heater with a new regenerative air heater it was possible to completely avoid any fan upgrades or replacements.

Unit 2's SCR construction is complete. The Unit 2 SCR system startup took less than 5 days, including full AIG tuning for 93% NO_x removal. The paper provides details related to this startup and tuning effort. However, an excellent tuning result was achieved. The tested ammonia to NO_x distribution is less than 3%.

Additionally, a recent opportunity to inspect the catalyst during an outage (after 850 hours of SCR operation) indicated catalyst surfaces are free and clear of dust deposits. There is also no evidence of air heater fouling by ammonium bisulfate deposits. During this outage catalyst elements were taken from all three layers of the reactor and tested to determine activity. The results of this testing indicated no significant deactivation of the catalyst in any of the three layers.

Unit 1 construction is in progress and the SCR system on that unit will begin operation in late 2001. The Unit 1 SCR is being constructed to meet the anticipated NO_x emission requirements of the NO_x SIP Call.