

First Year's Operating Experience with SCR on 600 MW PRB-Fired Boiler

The New Madrid SCR Retrofit Project

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Associated Electric Cooperative Inc. (AECI) contracted a joint venture of Black & Veatch and J.S. Alberici (BVCI/JSA) to provide a High Dust Selective Catalytic Reduction (SCR) system for their 640 MW New Madrid cyclone fired Units 1 & 2. Subsequently, BVCI/JSA subcontracted for catalyst supply from Cormetech. 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 project also incorporated equipment that improved the overall thermal efficiency of the units.

The presentation will highlight the construction phase and first year's operating experience on the first retrofit unit, Unit 2. This presentation will summarize the SCR system configuration and design performance requirements, and the SCR system components including the SCR reactor construction (including catalyst loading), the air heater, and the ammonia storage, vaporization system, and the ammonia injection grid. The reactor arrangement and the physical flow modeling will be presented in relationship to initial startup tuning of the ammonia injection grid and test measurement results. Finally, general operational information related to sootblowing, APH performance, and the control system will be discussed.

The design performance for New Madrid is 93% from an inlet of 1.5 lb/MMBtu with a maximum of 3 ppmvdc ammonia slip for a minimum of 20,000 operating hours. In order to achieve the stated performance and assure that there is limited impact on downstream equipment, both the system and catalyst design efforts were integrated. Key components of the system include flues and hoppers, turning vanes and flow distribution devices, Ammonia Injection Grid (AIG), and Air Preheater (APH).

- The SCR systems for AECI's New Madrid Units 1 & 2 have been designed for high NO_x removal efficiency with low ammonia slip while firing 100% PRB fuel. To date, Unit 2 catalyst has met its NO_x reduction performance requirements and no significant catalyst deactivation has occurred. Unit 1 is currently under construction.
- The integration of system and catalyst design was crucial to assuring long term successful operation. Fine tuning of the ammonia injection grid to achieve a low level Ammonia:NO_x distribution is critical to assuring performance above 90%.
- The total system design/BOP must be considered when retrofitting SCR to a given application. Careful consideration of fully integrated equipment upgrades and/or replacements can greatly reduce the life cycle cost for retrofitting SCR.