PHASE III – MERCURY CONTROL TECHNOLOGIES FOR UTILITIES BURNING LIGNITE COAL

John Pavlish,* Jeff Thompson, Lucinda Hamre
University of North Dakota Energy & Environmental Research Center
15 North 23rd Street, Stop 9018, Grand Forks, ND 58202-9018
*Presenter and corresponding author, jpavlish@undeerc.org

Dave Smith
SaskPower, Operations Support
2901 Powerhouse Drive, Regina, SK S4V 0L5, CANADA
dsmith@saskpower.com

Pierina Noceti
U.S. Department of Energy, National Energy Technology Laboratory
626 Cochrans Mill Road, MS 922-273C, Pittsburgh, PA 15236-1940
Pierina.Noceti@NETL.DOE.GOV

A consortia-based program led by the Energy & Environmental Research Center (EERC) has been under way for the last 5 years. The team, consisting of the EERC, SaskPower, the U.S. Department of Energy National Energy Technology Laboratory (DOE NETL), and North Dakota utilities through the North Dakota Industrial Commission, has undertaken a project to evaluate long-term balance-of-plant (BOP) effects related to the use of activated carbon injection (ACI) for control of mercury at SaskPower's Poplar River Unit 2.

The project encompasses approximately an 18-month period of performance, of which approximately 12 months will be dedicated toward full-scale testing using a commercial-scale ACI system to deliver AC upstream of the electrostatic precipitator (ESP) at Poplar River Unit 2. The Phase III research is focused on evaluating long-term BOP effects when using ACI for mercury control on a full-scale unit. Despite several field evaluations of ACI, no full-scale lignite tests of ACI exceeding 2 months have been conducted. This limited duration has prevented a thorough evaluation of these potential BOP issues in an ESP-only configuration. This project will provide data to assist in the evaluation of the long-term implications of ACI use on plant operations for lignite-fired units and the resulting mercury and trace metal removal, as well as a comparison to economics obtained under Phase II testing.

The objectives of the project are designed to provide data to evaluate potential long-term BOP impacts (including erosion and corrosion) resulting from ACI throughout the test period. To document plant conditions, a thorough inspection of the ductwork, ESP components, and air heaters was completed during the early summer of 2007. These data, along with documentation of ongoing plant data and a follow-up inspection, will be used to assess the impact of ACI on ESP operation (increased sparking, buildup on plates, rapping frequency and effectiveness, outlet emissions, etc.) and opacity. Specially designed probes with coupons will be placed in the duct during long-term ACI injection to provide data for evaluation of corrosion/deposition. These data

will be used in conjunction with plant data to assess the impact of ACI on ESP hoppers, downstream ductwork, fans, and stack.

As part of the effort, data will be collected to evaluate long-term mercury removal using ACI upstream of an ESP-only configuration. Mercury analyses of coal and ash along with measured mercury concentrations in the flue gas obtained via a continuous mercury monitor, as well as the Ontario Hydro method, will be compared to determine mercury capture and the fate of mercury across the unit.

Data from this project will be used to complete a preliminary economic evaluation of using ACI upstream of an ESP for mercury control including the observed BOP impacts, long-term operability of an ACI system and equipment, impacts associated with ACI transport and handling, and impacts of ACI on ash handling and disposal practices.