$PM_{2.5}$ Characterization for Low-NOx Coal Combustion

Ralph T. Bailey, Senior Principal Engineer**
E-mail: rtbailey@mcdermott.com; Telephone:330-829-7353; fax 330-829-7283

Hamid Sarv, Principal Engineer
E-mail: hsarv@mcdermott.com; Telephone: 330-829-7585; fax 330-829-7283)

James J. Warchol, Senior Principal Engineer
E-mail: jjwarchol@mcdermott.com; Telephone: 330-829-7708, fax 330-829-7283)

Deborah Madden Yurchison, Senior Research Engineer
E-mail: dayurchison@mcdermott.com; Telephone: 330-829-7839, fax 330-829-7283)

McDermott Technology, Inc.,1562 Beeson Street, Alliance, Ohio 44601

Summary

In response to the serious challenge facing coal-fired electric utilities with regards to curbing their NO_x and fine particulate emissions, Babcock & Wilcox and McDermott Technology, Inc. conducted a project entitled, "Particulate Characterization and Ultra Low-NO_x Burner for the Control of NO_x and $PM_{2.5}$ for Coal Fired Boilers." The project included pilot-scale demonstration and characterization of technologies for removal of NO_x and primary $PM_{2.5}$ emissions. Size classified fly ash samples representative of commercial low-NO_x and ultra low-NO_x combustion of Pittsburgh 8 coal were collected at the inlet and outlet of the ESP in B&W's Clean Environment Development Facility for chemical analysis.

For all test conditions the particulate removal efficiency of the ESP exceeded 99.3% and emissions were less than the NSPS limits of ~48 mg/dscm. The emission of $PM_{2.5}$ from the ESP did not change significantly as a result of the change in combustion conditions. Most of the increase in emissions was in the size fraction greater than 2.5 microns, indicating particle re-entrainment. These results may be specific to the coal tested in this program. In general, the concentration of inorganic elements and trace species in the fly ash at the ESP inlet was dependent on the particle size fraction. The smallest particles tended to have higher concentrations of trace species than larger particles. The concentration of most elements by particle size range was independent of combustion condition and the concentration of soluble ions in the fly ash showed little change with combustion condition when evaluated on a carbon free basis.

This presentation will address the particulate emissions results for the project.

**Principal presenter – please send all correspondence to Mr. Bailey.