LONG-TERM CARBON INJECTION FIELD TEST FOR 90% MERCURY REMOVAL IN A PRB UNIT WITH AN SCR, SPRAY DRYER AND FABRIC FILTER

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Abstract:

The power industry in the U.S. is faced with meeting new regulations to reduce the emissions of mercury compounds from coal-fired plants. Injecting a sorbent such as powdered activated carbon into the flue gas represents one of the simplest and most mature approaches to controlling mercury emissions from coal-fired boilers. ADA-ES and Rocky Mountain Power are currently conducting a program through the DOE NETL Phase III mercury control program, DOE Award Number DE-FC26-06NT42774, to evaluate the long-term mercury removal capability, long-term mercury emissions variability, and O&M costs on a plant configuration that is representative of many new plant designs. The host site is Rocky Mountain Power's Hardin Station in Hardin, Montana. The 121-MW Hardin Station fires a PRB coal and is configured with an SCR for NO_x control, an SDA for SO_2 control, and a fabric filter for particulate control. A commercial-grade activated carbon injection system and Thermo Fisher Mercury CEMS were installed at Hardin to support this test program.

The goal of this project is to economically and effectively achieve 90% mercury removal for a period of 10 to 12 months. Preliminary testing included baseline, coal blending, coal additive, the synergistic impacts of other pollution control equipment, and parametric tests. These tests were completed in June 2007. Initial results indicate very low native removal except at low load when native mercury removal can be as high as high as 50%. Two western bituminous coals were tested during the coal blending period: West Elk and Bull Mountain. Blending with 14% West Elk coal increased the native mercury removal up to 51%. Blending with Bull Mountain coal showed only marginal increases in mercury removal. Adding a bromine-based coal additive resulted in up to 85% mercury removal. Parametric sorbent injection tests included Calgon's FLUEPAC™-MC PLUS and Norit's DARCO® Hg-LH. Results indicate that both FLUEPAC™-MC PLUS and DARCO® Hg-LH and can achieve 90% mercury removal over longer test periods (48 hours).

Long-term testing began September 26, 2007 using DARCO® Hg-LH. Initial results indicate that 90% mercury removal can be maintained at a carbon injection concentration of 2 lb/MMacf or less. Feedback from the stack CEM is currently being

integrated with the carbon injection system controls to allow automatic control of the sorbent feedrate to achieve a target mercury emission level.

This presentation will focus on the results of the parametric tests, including coal blending of PRB coal with two western bituminous coals, one coal additive, and two sorbents. An update of the status and results of long-term mercury removal testing will also be addressed.