



NALCO
Mobotec 

**Nalco Mobotec Demonstrates Total
Mercury Capture for Air and Water
for Coal-Fired Power Plants**

Nalco Mobotec Demonstrates Total Mercury Capture for Air and Water for Coal-Fired Power Plants

Excerpted from McIlvaine Company's "Reducing Mercury Emissions from the Entire Plant", *Precip Newsletter*, No. 426, July 2011.

Coal-fired power plants are under increasing regulatory pressure to control the release of Hazardous Air Pollutants (HAP) and contaminants in both flue gas and wastewater effluent. Mercury control strategies, therefore, must address both discharge requirements. Bruce A. Keiser, Nalco Co., with others at MEGA 2010, presented a paper that demonstrated a mercury control strategy to ensure compliance with regulations for both air and water, utilizing existing equipment.

A demonstration of Nalco and Nalco Mobotec technologies was carried out at a commercial coal-fired power plant boiler. Control strategies for mercury were investigated for both air and water regulations. The boiler is rated at 192 MW, burning a high chloride, bituminous coal. Equipment included an SCR, a cold-side ESP and a wet flue gas desulfurizer (wFGD). Prior to the application of the control strategy, mercury air emissions were 0.0200 to 0.0275 lb/GWh and the wastewater treatment inlet mercury levels were 10,000 to 30,000 parts per trillion (ppt). The aim of the project was reduction of mercury air emission levels to less than or equal to 0.008 lb/GWh and wastewater treatment effluent mercury content of less than 200 ppt. All additive rates reported are mg of product per kg of coal.

Since this boiler fires a bituminous coal, chloride in the coal was anticipated at high to moderate levels. The chloride content of the coal averaged 1400 ppm during testing. With this amount of chloride present and an induct SCR, a high relative content of oxidized mercury in the flue gas was anticipated. However, the top layer of catalyst in the SCR showed considerable loss of active element with increased ammonia slip. This contributed to lower than expected mercury oxidation in the flue gas. The measured oxidized mercury fraction in the flue gas at the SCR outlet was 80 and 84 percent of the total mercury at baseline.

The ash samples taken from the first hopper of the cold-side ESP were analyzed for mercury and carbon content. The unburned carbon content of the ash was relatively low at 0.31 percent and the mercury content was only 0.010 µg/g. This represented less than 2 percent of the total mercury per GWh in the coal, thus suggesting that essentially no mercury capture occurred in the ESP.

Baseline mercury capture was measured at about 68 percent. This seemed low, considering the chloride content of the fuel and the presence of an induct SCR. However, as indicated above, the reduced performance of the catalyst was expected to affect the measured mercury speciation. Tests showed that as MerControl 7895 addition increased, the percent mercury capture also increased, with mercury capture exceeding 90 percent. The sufficient usage rate of MerControl 7895 to reach the desired 0.008 lb/GWh emission rate would be about 270 ppm. Lower mercury emissions are not required at this time but are possible with additional MerControl 7895.

As noted, the scrubbing of the flue gas for acid gases has the added benefit of simultaneously scrubbing the flue gas for ionic mercury. Yet, removing the mercury from the flue gas does nothing to reduce the potential environmental impact if this captured mercury is then allowed to flow out of the plant in the wastewater. The mercury must be removed from the FGD liquor to insure it does not exit the plant, so consistent with the mercury air emission demonstration, Nalco demonstrated mercury reduction in the wastewater effluent. The target goal was to reduce clarifier effluent levels of mercury to at or below 200 ppt. Before the demonstration, the existing baseline for mercury in the wFGD blow down wastewater stream was 10,000 to 30,000 ppt. Lab testing had suggested an application dose at 50 ppm of NALMET 1689. The results demonstrated that NALMET 1689 at 50 ppm dose was indeed sufficient to reduce the clarifier effluent mercury content to less than 200 ppt.

Nalco Mobotec achieved:



air

90% reduction of mercury in air emissions to reach the 0.008 lb/GWh limit



water

98% Reduction of mercury in wastewater to less than 200 ppt



NALCO MOBOTEC Locations

North America: 1601 W. Diehl Rd • Naperville, IL 60563 • USA

Tel: Jeff Filipiski, NA Sales Director: 1 630 305 1076

Europe: Przemyslowa 55, 43-110 Tychy • Poland

Asia Pacific: 2702B Huaxia Bank Tower • No. 256 Pudong Road (S) • Shanghai 200120, China

www.nalcomobotec.com

Nalco and NALMET are Trademarks of Nalco Company

MERCONTROL, Nalco Mobotec, and the logo are Trademarks of Nalco Mobotec

©2011 Nalco Company All Rights Reserved 7/11

Reprint R-1026