Nalco Demonstrates Mercury Control for Both Emissions and Wastewater Discharge

NALCO
An Ecolab Company

CASE STUDY - AIR PROTECTION TECHNOLOGIES

CH-1052

Total MW (full load): 195

Type of Plant: A Pulverized Coal, Tangentially Fired

Coal Type: High Chlorine Bituminous

Air Quality Control Devices: Selective Catalytic Reduction, Cold-Side Electrostatic Precipitator (CS-ESP), wet Flue Gas Desulphurization (w-FGD)

Mercury Compliance Required: 90% Mercury Reduction

Federal mercury emission regulations are expected to soon impact all coal-fired boilers in the United States. Currently, nearly half of the United States have some form of current or pending mercury emission regulation, with more stringent requirements imminent. With scientific evidence supporting the adverse health effects related to mercury emissions, it is clear that coal-fired boilers will need a workable mercury capture strategy going forward.

Given the dynamic conditions of mercury legislations, coal-fired utilities are looking for mercury control technologies that can expand to meet not only current but future regulations. Critical in a utility's decision process, is the relationship between regulatory compliance and capital required. The Nalco solution focus on meeting or exceeding emission requirements while minimizing investment in capital.

The basis of our approach starts with the patented application of MerControl® 7895 technology. MerControl 7895 technology is a stable, water-based product specifically designed to augment oxidation of mercury released during coal combustion, e.g. bituminous, sub-bituminous, and lignite. MerControl 7895 technology is activated at high temperatures releasing molecular halogen and alkaline solids to promote mercury oxidation and capture.

Increased capture rates from application of MerControl 7895 technology results in increased mercury loading across wastewater treatment process of the w-FGD discharge. The Nalco NALMET® 1689 technology effectively treats wastewater to meet mercury discharge limitations. It's a polymeric, organic chelant with a high affinity for mercury, specifically, and forms large insoluble precipitates. The result: more effective mercury removal. Nalco's goal is to optimize a program to meet your needs for both water and air in a cost effective manner.

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Project Goal:

Achieve 90% mercury reduction with the application of MerControl 7895 technology alone.

Implementation:

Nalco Mobotec mobilized, installed and operated a temporary injection system for storage, transfer and injection of MerControl 7895 technology at the coal feeders prior to the pulverizers.

Sampling:

Continuous Mercury Monitors (CMM) were installed at the outlet of the Air Heater and at the stack to provide real-time feedback during optimization. Method 30B carbon trap sampling and Ontario Hydro measurements were also performed at both locations to verify the accuracy of total and speciated Hg data at the CMMs. Coal, and fly ash samples were taken and analyzed to verify the performance of MerControl 7895 technology.

Project Challenges:

MerControl 7895 technology is a patented application for increasing mercury capture from coal-fired flue gas. At this site, high levels of mercury oxidation were anticipated due to high levels of chlorine (1600 ppm in coal) and the presence of an SCR. Oxidized mercury is readily removed via w-FGD operation, while elemental mercury is not and is released into the atmosphere. Yet the high levels of mercury oxidation produced a native mercury capture of only about 67%. The application of MerControl 7895 technology was planned to increase mercury oxidation and thereby increase the w-FGD mercury capture efficiency.

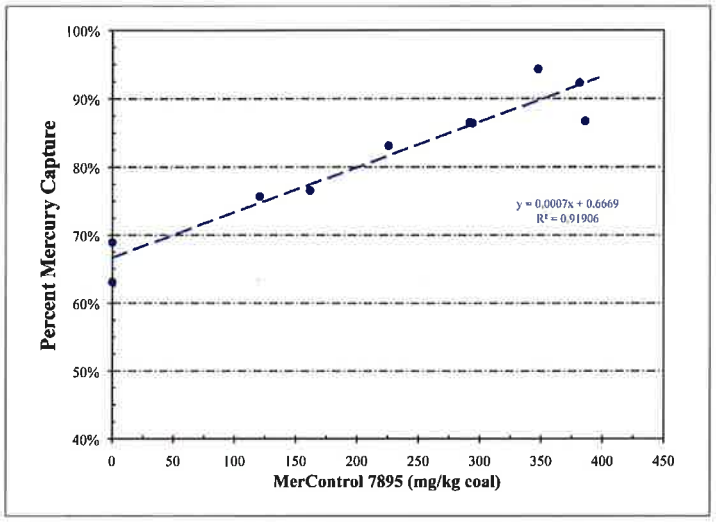

Figure 1 - Gas-Phase Mercury Removal performance Curve

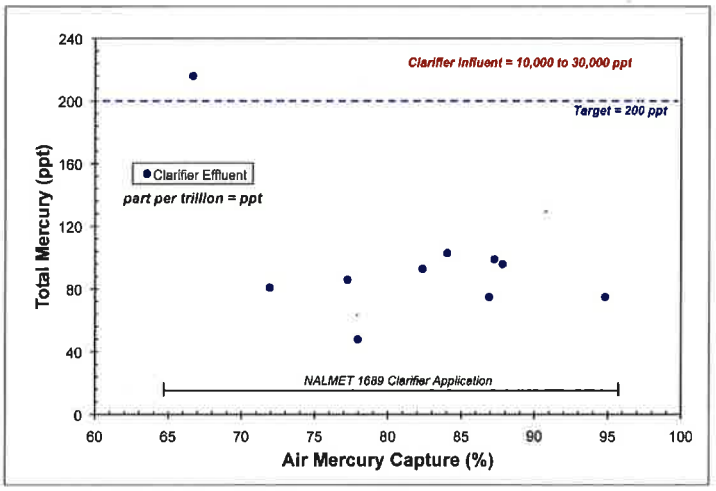

Figure 2 - NALMET 1689 Control of Wastewater Mercury Concentrations

Results and Conclusions:

Examination of baseline conditions at the host site suggested that native mercury removal was near 67%. With the application of MerControl 7895 technology, mercury removal rates increased to above 90% (see Figure 1) at about 375 ppm (wt, product in coal) with mercury removal occurring across the w-FGD. Activated carbon injection was not required.

As mercury removal increased across the w-FGD, so did the mercury concentration in the w-FGD effluent prior to treatment. The Nalco NALMET 1689 technology was applied during the wastewater treatment process to reduce mercury concentrations to below permitted levels (Figure 2). The injection of the 7895 technology resulted in removal of ionic mercury across the w-FGD, with subsequent increase in clarifier sludge mercury as a result of Nalmet 1689 flocculation/coagulation properties. The Nalco solution provides solutions for both water and air regulations.

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