

Nalco Demonstrates Concrete Friendly Solution to Meeting 90% Mercury Emission Reduction



CASE STUDY - AIR PROTECTION TECHNOLOGIES

CH-980



Goal of Demonstration:

Achieve 90% mercury reduction and maintain fly ash quality for use in concrete applications

Location:

USA

Full Load [MWe]:

600

Type of Plant:

A Pulverized Coal, Opposed-Wall Firing Configuration

Coal Type:

Powder River Basin
Subbituminous

Air Quality Control Devices:

Low NOx Burners, Boiler
Over-Fired Air, Cold-Side Electrostatic Precipitator

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 condition of mercury legislation, 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. Nalco's solutions 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. MerControl 7895 technology is a stable, water-based solution 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 to promote mercury oxidation and alkaline solids to facilitate its capture.

Oxidized mercury is readily captured downstream by wet Flue Gas Desulfurization (FGD) units. When used with activated carbon injection (ACI), the MerControl System commonly requires far less activated carbon than standard halogenated carbon offerings. Lower carbon usage reduces the load on particulate control devices, decreases concerns with opacity and preserves fly ash quality for concrete use. MerControl 7895 injection is designed to provide a low capital solution to meet complex mercury regulations.

PROJECT GOAL:

Achieve 90% mercury reduction and maintain fly ash quality for use in concrete applications

(Continued on Reverse Side)

IMPLEMENTATION:

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

SAMPLING:

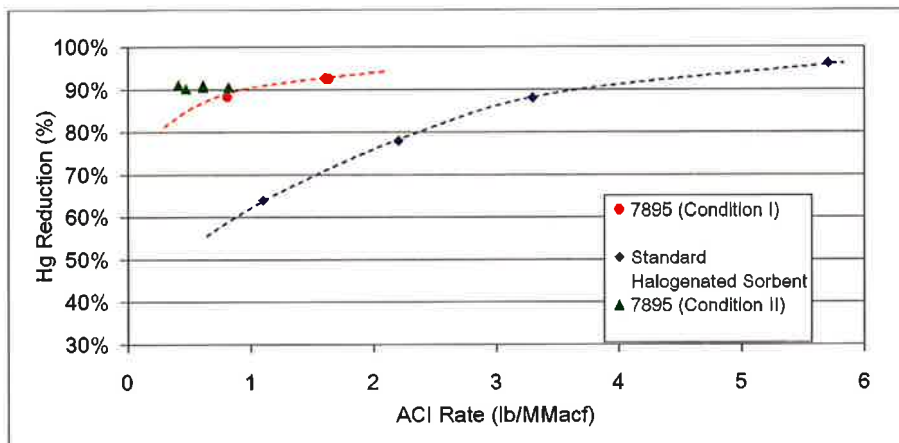
MerControl 7895 performance was verified by using inlet and outlet Continuous Mercury Monitors (CMMs). CMMs were installed at the inlet and outlet of the Air Heater and at the stack to provide real-time feedback during optimization. Method 30B carbon trap sampling was also performed at all three locations to verify the accuracy of CMM measurements. Coal, and fly ash samples were taken but have not been analyzed at this time.

PROJECT CHALLENGES:

Activated carbon (AC) injection is commonly used as a mercury control solution. However, the addition of AC reduces the quality of the fly ash and may prevent sales as a concrete feedstock. The addition of large amounts of AC can make the ash unsuitable for concrete applications, destroying a previous revenue stream, and adding disposal costs to yearly O&M Budgets. It is assumed that at or below 2 lb/MMacf AC injection rates, the fly ash would qualify for use in concrete manufacture.

Conditions Examined:

Condition I: MerControl 7895 applied at 1.0X rate, injection of non-halogenated AC post Air Heater, (Note: Standard Halogenated Carbon depicted in Figure 1 was also injected post Air Heater.)



Condition II: MerControl 7895 applied at 0.4X flow rate, injection of non-halogenated AC pre Air Heater,

RESULTS AND CONCLUSIONS:

The addition of MerControl 7895 at 1.0X in combination with non-halogenated activated carbon was able to reach 90% mercury reduction at 1.6 lb/MMacf (**Condition I**). "Standard" Halogenated carbons failed to achieve 90% mercury capture at 3.3 lb/MMacf. The Nalco MerControl System exceeded the project goal of 90% mercury capture at less than half the injection rate compared to a standard halogenated activated carbon.

Nalco also examined injection of activated carbon upstream of the Air Heater (**Condition II**). Injection upstream of the Air Heater reduced the usage rate of MerControl 7895 by more than half and further reduced the activated carbon injection rate to 0.41 lb/MMacf, while maintaining 90% mercury reduction. Essential expertise offered by Nalco, met and exceed project requirements.

ADDITIONAL COMPONENTS OF NALCO MerControl® SYSTEM

MerControl 6012:

MerControl 6012 technology is a patented, non-carbon and non-halogen mercury sorbent used in spray dry absorbers (SDA) and circulating dry scrubbers (CDS). MerControl 6012 works by oxidizing and capturing mercury from the flue gas. In conjunction with MerControl 7895 mercury oxidant, extended low levels of mercury emissions have been reached.

MerControl 8034:

Injection of MerControl 8034 is a method of decreasing mercury re-emission across wet Flue Gas Desulfurization (FGD) Units to increase overall mercury removal. Application of MerControl 8034 has also been shown to reduce mercury content in FGD by-products in some cases.

NALMET® 1689:

To meet FGD wastewater mercury discharge limitations, Nalco offers NALMET®1689. It is a polymeric chelant with a high affinity for mercury and other trace metals. NALMET 1689 forms precipitates that settle and are readily filterable during common water treatment practices, reducing effluent mercury concentrations.

Nalco Air Protection Technologies

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