Chlorine Dioxide Decreases Plant Operating Costs and Improves Heat Exchanger Efficiency

Challenge

This Midwestern power utility produces 200 megawatts of electricity from one 2400 psig coal-fired boiler. The plant can sell all of the power it generates. It is critical that the heat exchangers are kept free of any heat-transfer limiting biofilm. The process is cooled using a once-through system utilizing 170,000 gallons per minute. Microbiological control of this cooling system had historically been a problem due to wastewater discharges from a food processing plant upstream of the plant, discharging wastewater with a high microbiological nutrient loading. Chlorine gas fed continuously was required to maintain control of the system. Up to 10, one ton cylinders were kept on site at any one time. De-chlorination was necessary to meet NPDES discharge limits. Normal operating backpressure on the turbine was 2 mm Hg. If this increased to 6-8 mm Hg, the plant was unable to produce power at capacity and was derated.

Solution

A full system survey was completed. A recommendation to treat the process water with chlorine dioxide intermittently at 0.5 mg/L was made. Optimization of the system was attained by varying the frequency and duration of chlorine dioxide. During the summer months, the feed rate of chlorine dioxide was for 4, 30-minute periods. This was reduced during the winter to meet lower system demand. Microbiological control was successfully achieved

Results

This program resulted in operating cost savings of over $700,000 during a three-year period. The heat exchangers operated clear of biofilm and the plant was able to run at capacity.

Courtsey by : Siemens

Chlorine Dioxide Controls Zebra Mussels and Improves Heat Transfer

Challenge

This Northern electrical utility operates a fossil fuel plant on the Mississippi River and uses 250-300 million gallons per day of water for once through cooling. Over time, this facility became progressively infested with zebra mussels. Although no restrictions in the water flow had been measured, plant personnel took a proactive approach to prevent further infestation.

Solution

A comprehensive chemical and microbiological survey of the water system was performed to establish the most efficient treatment program. Infestation had occurred in the following areas:

- The inlet bays
- The fire water bay
- The service water system

A recommendation was made to treat the system with chlorine dioxide at low concentrations. Chlorine dioxide is an effective molluscicide for both batch and continuous treatment. An 8,000-pounds per day capacity, three-chemical chlorine dioxide generator was hard piped into the inlet bays. A solution of chlorine dioxide was generated and injected into the inlet water stream. An average treatment level sufficient to remove the zebra mussels was maintained. Precursors for the generator were supplied from bermed portable tanks. An extensive header and valve system was installed to insure thorough treatment of the inlet bays. Chlorine dioxide was fed at low concentrations for 72 hours.