



# Performance-based Monitoring and Control Enables Power Plant to Increase Production and Reduce Costs

## *OnGuard™ 2-plus Control System*

### Customer Overview:

- Segment: Power Generation
- Location: New England, USA

### Application Overview:

- Type: Cooling Water Treatment
- Equipment: Cooling Tower
- Capacity: 110,000 gallons with 11,500 gpm recirculation rate
- Other: Zero Liquid Discharge Side Stream Clarifier

### Existing Treatment:

- Alkaline treatment program
- TTA
- Bleach
- Bromine

### Problem Summary:

This zero liquid discharge power plant with 5 ppm iron in the make-up water was experiencing very high levels of condenser and tower fill fouling. The side stream clarifier, designed to reduce silica and suspended solids was not operating efficiently. The resultant high turbidity made chlorine testing unreliable so the plant discontinued halogen monitoring. The plant was shutting down for condenser cleanings 2 to 3 times yearly in order to maintain efficient power production.

### Customer Objectives:

- Maintain peak generation efficiency and heat transfer performance
- Reduce frequency of shutdowns for condenser cleanings
- Improve system cleanliness
- Clean-up of tower fill fouling
- Maintain or reduce program costs

### Solenis Solution:

Solenis recognized that condenser fouling was occurring as a result of two processes:

- Soluble iron in the well water reacting with silica in the cooling tower and forming iron silicate deposits in the condenser and tower fill
- Sessile biofilm formation acting as a matrix to capture the precipitated iron silicate clay thus forming an insulating barrier on heat transfer surfaces

The Solenis chemical, automation, and program application included:

- The use of Solenis' patented OnGuard 2-plus control system to provide performance-based monitoring and control of corrosion and fouling
- The use of a superior coagulant to improve silica removal at the side stream softener
- Chlorine injection to the make-up water to ensure full oxidation of the soluble iron before it could react with silica
- Relocating the tower chlorination point from the outlet to the inlet of the condenser
- Establishing an ORP target for halogen control instead of relying on bio-assay colony counts
- The replacement of the competitive alkaline treatment and TTA with Drew™ 2301 and Drew™ 11-166.

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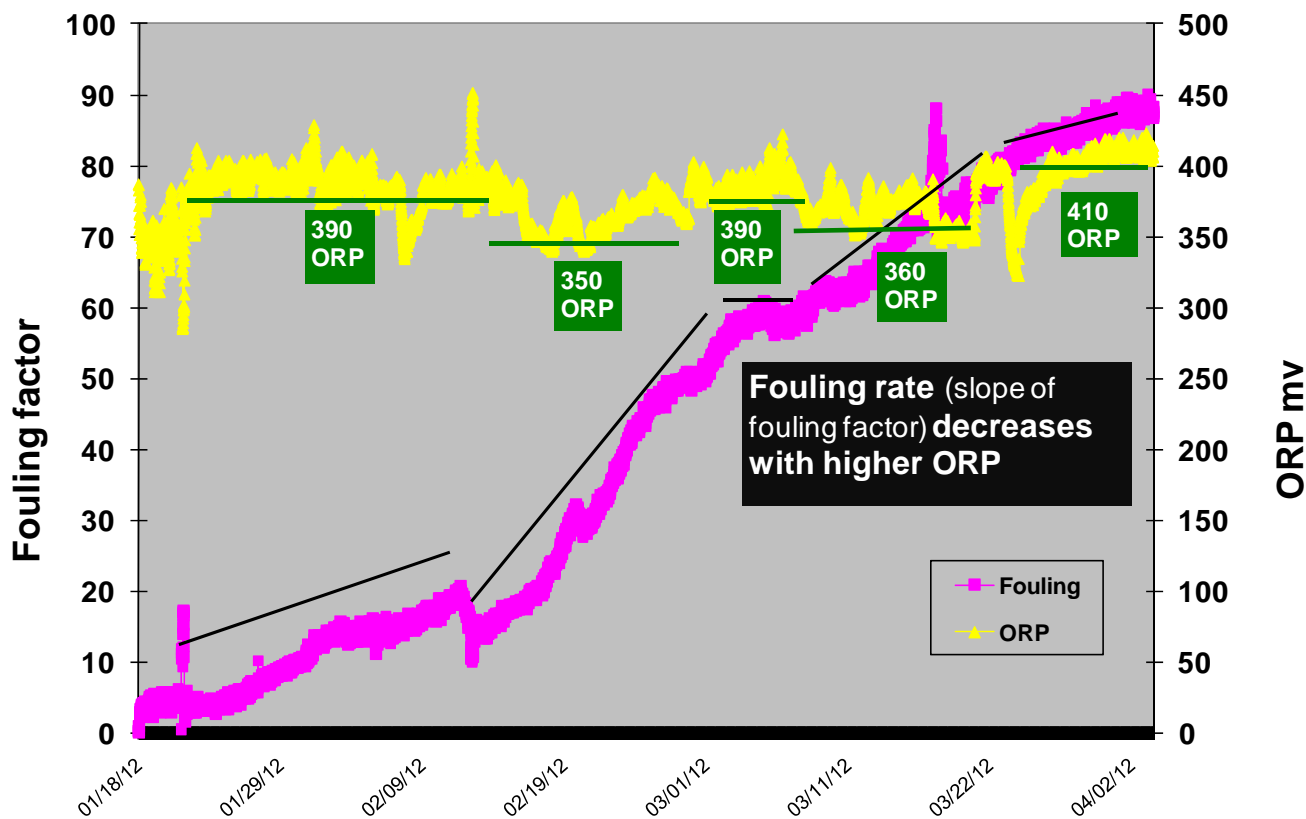
**Customer Benefits:**

- Increased power production \$300,000/yr due to reduced condenser fouling
- Reduced outages and maintenance associated with condenser cleanings
- Eliminated caustic addition to side stream filtration process
- Increased side-stream silica removal from 10% to 90% thereby reducing fouling tendency
- Reduced use of sulfuric acid by 50%
- Improved worker/workplace safety by eliminating caustic
- Improved environmental sustainability
- Optimized and verified chemical treatment through the OnGuard 2-plus control system

**Conclusion:**

Maintaining sufficient Oxidation Reduction Potential (ORP) to kill sessile bacteria is critical to preventing biofouling. The graph below illustrates how the OnGuard 2-plus control system was able to correlate ORP and fouling factor in order to optimize the halogen addition. Controlling the cooling system at 400 MV minimized the rate of fouling of the heat transfer surfaces thereby improving power production efficiency and eliminating condenser cleanings.

**ORP versus Fouling Factor**



**OnGuard™ 2-plus control system established a correlation between ORP and fouling factor in order to optimize the halogen addition.**