ChemTreat
Case History

FlexPro® Arrests Corrosion and Restores Productivity at Northeast Biomass Power Producer

Background

A Northeast Biomass Power Producer struggled to meet their power production targets because of severe condenser steel corrosion caused by improper lay-up and lack of start-up passivation. The steel condenser ends were left covered in a humid environment for approximately 12 months prior to installation, and the previous water treatment supplier failed to advocate for cleaning and passivation prior to operation. When placed into service, the condenser's 3/8-inch rifled ferrous tubes fouled with corrosion products quickly, limiting plant cooling and power plant production.

ChemTreat successfully cleaned the system using a combination of chemicals (CT38 and CN5600) and a mechanical cleaning. The system makeup water contained 189 ppm of chlorides, 173 ppm of calcium, and regularly cycled above 700 ppm chlorides. The power plant also discharged directly to a stream, so phosphorous and zinc were not allowed in the discharge. ChemTreat now successfully treats the system using FlexPro® technologies.

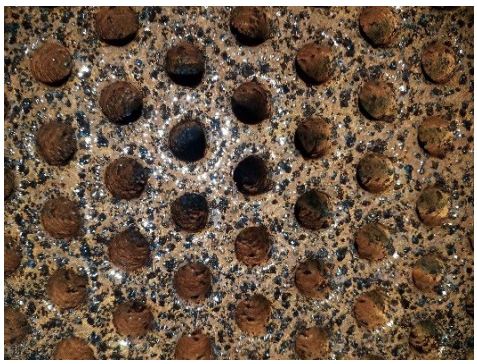

Figure 1: Photo of tube sheet after cleaning and before treatment optimization. The photo shows the extent of the previous damage and signs of additional corrosion resulting from inadequate anodic protection.

Solution

The system was cleaned with a combination of neutral pH cleaner CT38 and FlexPro® CN5600. The treatment program was further improved through regular monitoring of the system flow, heat exchanger performance, corrosion coupon rates, and iron. ChemTreat optimized the alkalinity control point and fed supplemental corrosion inhibitors (FlexPro® CL5737 as a supplemental anodic inhibitor with FlexPro® CL5688 and separate halogen stable azole feed using ChemTreat CL4132) until the demand was satisfied.

A minimum 120 ppm 'M' alkalinity was required to achieve the desired coupon results, and higher levels dramatically reduced corrosion. The optimum dose for economic performance was supplemental corrosion inhibitor shot fed on a periodic basis.

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Results

The system now maintains consistent flow through the condenser, and power production is maintained near design levels. The latest corrosion rates dropped dramatically to 0.4 mpy for mild steel, less than 0.1 mpy for 304 stainless steel, and less than 0.1 mpy for copper. These are excellent results considering over 700 ppm chlorides are present in the cycled water.

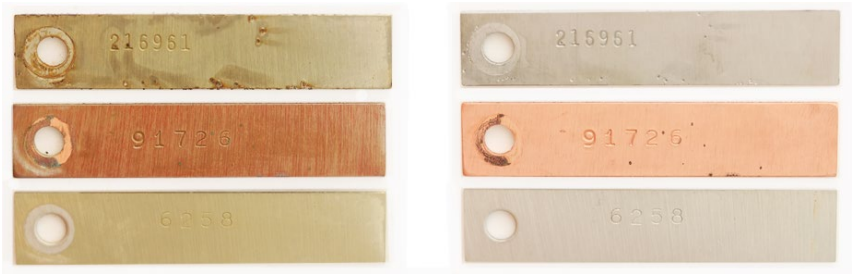


Figure 2:
Recent coupons before and after cleaning. The mild steel corrosion rate is 0.4 mpy after optimization.

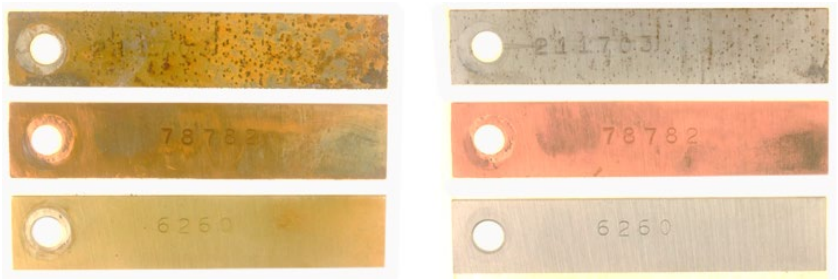
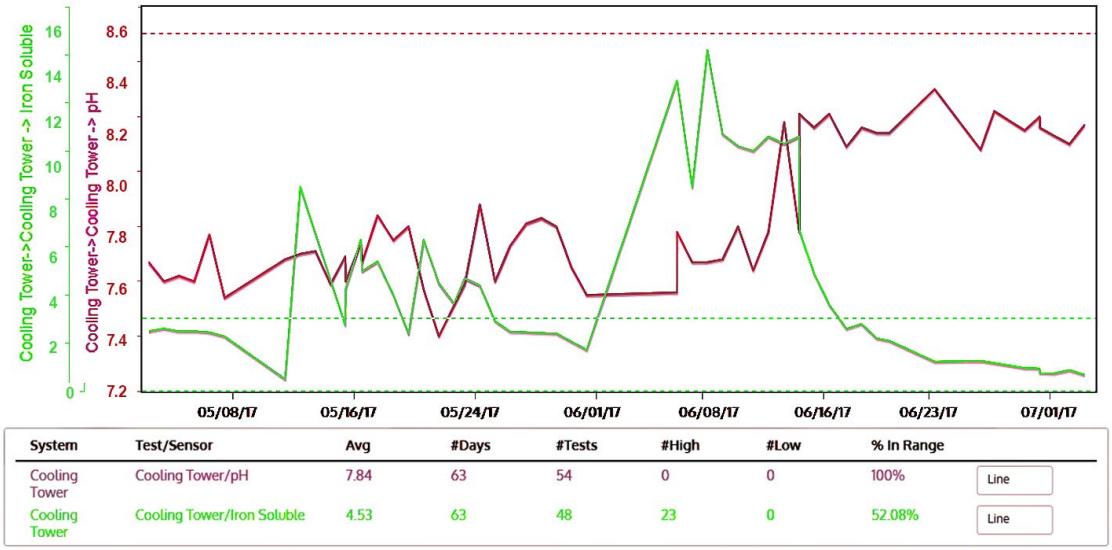


Figure 3:
Coupons before program optimization showing pitting from inadequate anodic protection. The mild steel corrosion rate is 5.4 mpy.



System	Test/Sensor	Avg	#Days	#Tests	#High	#Low	% In Range	
Cooling Tower	Cooling Tower/pH	7.84	63	54	0	0	100%	Line
Cooling Tower	Cooling Tower/Iron Soluble	4.53	63	48	23	0	52.08%	Line

Figure 4: CTVista®+ graph plotting iron against the pH. Note the dramatic drop in iron levels once the 'M' alkalinity threshold is maintained.

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