CWT-CP-CH-N459-02.14

Oil and Gas

Solenis Control System Allows Refinery to Quickly Detect Process Leak, Minimizing Collateral Damage

OnGuard™ 2-plus Control System and Biosperse™ XD3899 Microbiocide

Customer Overview:

- Segment: Refinery
- Location: Gulf Coast, USA

Application Overview:

- Type: Cooling Water Treatment
- Capacity: 430,000 gallons
- Recirculation Rate: 30,250 gpm
- Blowdown: 45 gpm
- Delta T: 15 °F

Existing Treatment:

- Drew™ 11-760 cooling water treatment
- Drewsperse™ 6935 antiscalant
- Biosperse™ 550 microbiocide
- Sodium hypochlorite

Problem Summary:

One of the refinery's nine cooling towers experienced high iron levels (>2.0 ppm) and surface pitting of carbon steel. The cause of these two problems was identified as microbiologically influenced corrosion (MIC). This cooling water circuit contained heat exchangers with velocities that were below American Petroleum Institute (API) guidelines, which helped promote MIC. Carbon steel general corrosion rates in this circuit exceeded those for all other cooling systems in the refinery, with values periodically exceeding the upper specification limit of 2.0 mpy. Admiralty brass corrosion rates were also higher than desired. These corrosion concerns made this cooling system an ideal candidate for evaluating Solenis' proprietary OnGuard 2-plus control system and Biosperse XD3899 microbiocide.

Customer Objectives:

- Reduce corrosion and pitting rates to target levels
- Reduce frequency of shutdowns for exchanger maintenance
- Improve system cleanliness and heat transfer
- Maintain or reduce program costs

Solenis Solution:

Knowing the fouling and corrosion challenges associated with low flow heat exchangers, Solenis deployed their patented OnGuard 2-plus control system to model the operating conditions of an extremely challenged lean amine cooler in the Sulfur Recovery Unit. The OnGuard 2-plus technology provides exceptionally accurate simulation of the steady state conditions in plant heat exchangers while differentiating among various causes of fouling (e.g., sedimentation, scaling, microbiological, etc.). The OnGuard 2-plus control system uses a slip stream of cooling water which is routed through a heat exchanger simulation tube and over two linear polarization corrosion probes. Conductivity, pH, and ORP (oxidation reduction potential) are also measured.

To address the elevated pitting, the existing microbiological treatment program was replaced with Biosperse XD3899, a proprietary microbiocide,that has been proven to be efficacious towards biofilm at lower ORP than standard strong oxidizing programs. During the trial period, the OnGuard system detected accelerated corrosion and fouling. Co-currently, the ORP shifted downward from the 250 mV baseline common with XD3899 programs. These trends provided an early indication of a hydrocarbon contamination not otherwise detected by volatile hydrocarbon "sniffer" testing.

The extreme sensitivity of the simulation rod on the OnGuard analyzer began detecting biofouling while the Corrater* simultaneously identified increased corrosion. Deteriorating performance coupled with a declining trend in ORP pointed to a "sour" leak. Diligence by the utilities team in performing Total Organic Carbon (TOC) profiling of suspect heat exchangers identified the amine leak. Real-time detection mitigated collateral damage associated with cooling water contamination. The responsive monitoring system validated program recovery following the isolation of the leaking exchanger.

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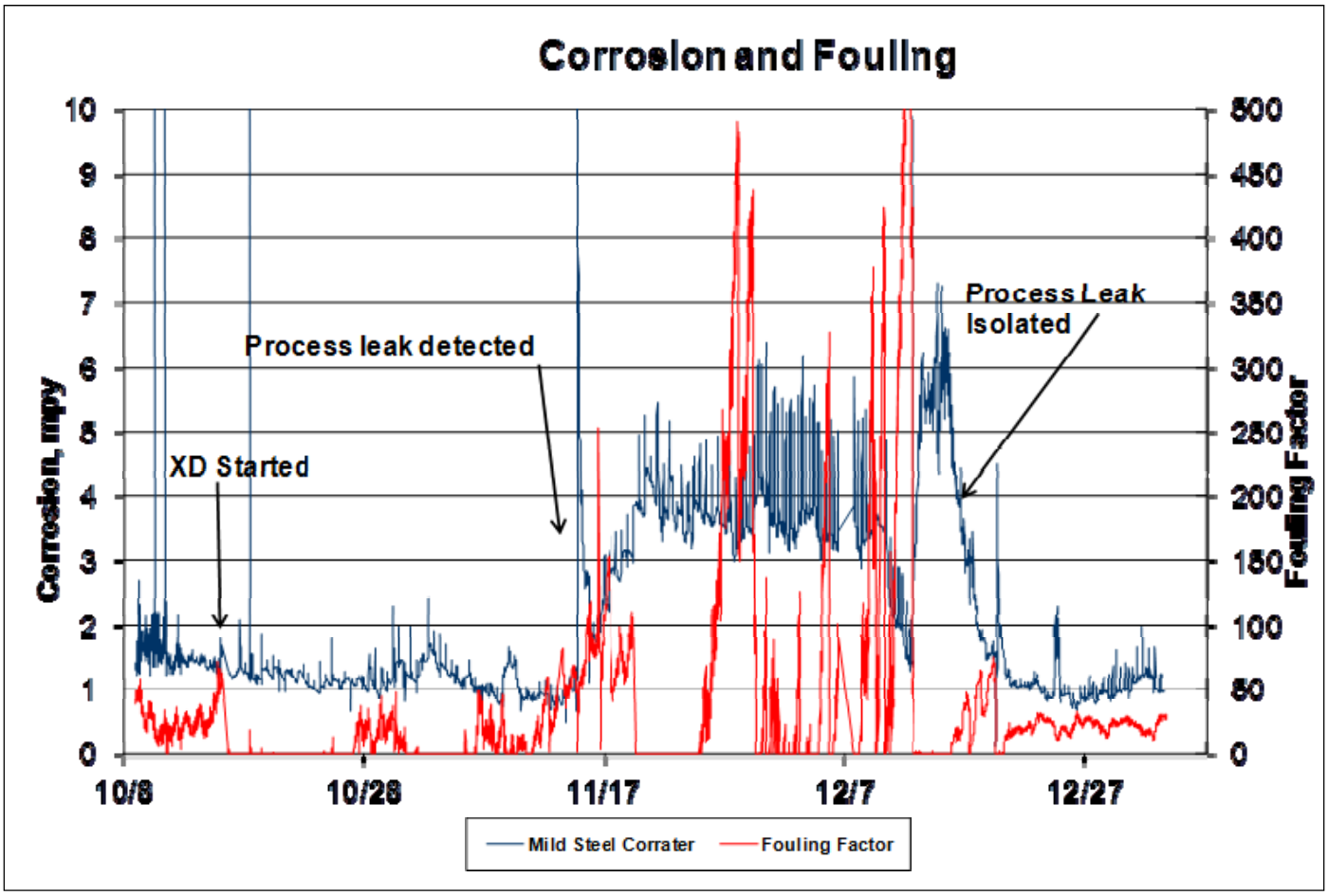
Customer Benefits:

- 66% reduction in carbon steel pitting
- 52% reduction in carbon steel general corrosion
- Extended bundle life by 30%
- Rapid detection of process leaks

Conclusion:

The use of the patented OnGuard™ 2-plus control system allowed the refinery to quickly detect a hydrocarbon process leak and quantify the effect of biological fouling as it began to occur. The application of Biosperse™ XD3899 microbiocide enabled the refinery to control biofouling to a manageable level and reduce corrosion, preventing an unscheduled shutdown.



Solenis' OnGuard 2-plus control system detected an increase in corrosion and biofouling caused by a then unknown hydrocarbon leak. Biofouling and corrosion were then controlled to acceptable levels with Biosperse XD3899 microbiocide until a scheduled shutdown could isolate and repair the process leak.