CASE STUDY

Combined Cycle Power Plant Reduces Condensate Cation Conductivity with Non-Amine Filming Technology

Background

A 2x1 combined cycle power plant in the Northeast US ceased base-load operation and began cycling because of fluctuating power prices. This resulted in varying periods of layups that could last up to two weeks, increasing corrosion potential in the steam and feedwater systems of their two heat recovery steam generators (HRSGs). The facility also saw an increase in iron transport during each startup.

The plant began feeding a traditional filming amine to manage steam system corrosion. While it helped in reducing iron transport, the product increased cation conductivity levels in the condensate system, potentially masking condenser tube failures and demineralizer leakage.

Non-amine filming technologies are known to maintain low cation conductivities while delivering the same corrosion performance as traditional filming amines. Efforts to reduce their cation conductivity levels led the plant to explore non-amine filming options.

Solution

ChemTreat recommended non-amine filming product BL9000, designed to reduce system cation conductivity levels while helping plants manage corrosion in their HRSGs during layup conditions by limiting the amount of iron transport through the system during startups.

BL9000 was applied to the feedwater of both HRSG units over a period of three months, during which the plant saw several periods of cycling and layup. The product was fed at a consistent dosage, with condensate cation conductivity levels monitored during plant operation. Additionally, iron levels were monitored during startups using Millipore filter tests.

At the end of the three-month period, the plant went into an outage, and the HRSG steam drums were inspected to evaluate the efficacy of the BL9000 treatment program.

Results are examples only. They are not guaranteed. Actual results may vary.

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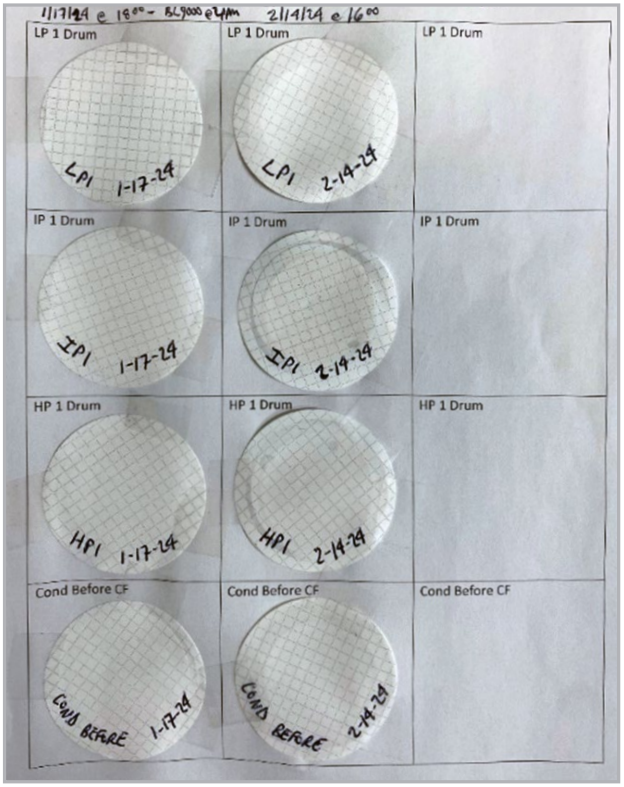
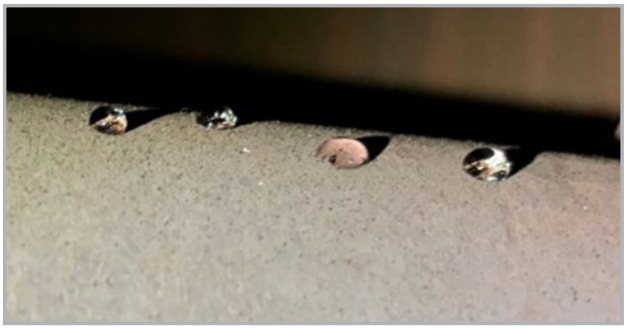
Results

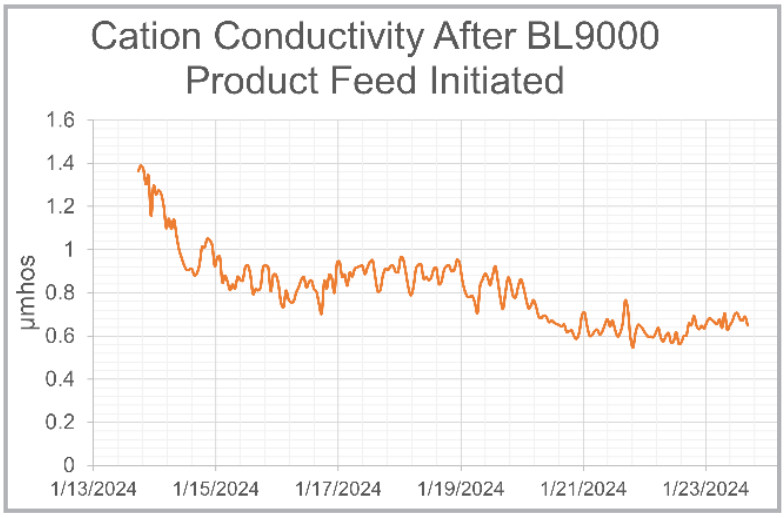
During the trial period, a significant decrease in cation conductivity (0.7–0.8 µmho) was observed, allowing the plant to better monitor for condenser leaks and evaluate the effectiveness of the new program.



Millipore filter test results showing <10 ppb iron for two consecutive plant startups



BL9000 protective film formation on the mild steel surface within the low-pressure steam drum.



0.7 µmho decrease in cation conductivity observed during the facility's longest run period at the time of the BL9000 trial.

Throughout the three-month trial period, Millipore filter tests conducted during plant startups consistently showed less than 10 ppb iron in the high-, intermediate-, and low-pressure drums as well as the condensate system.

As one of the key performance indicators (KPIs) for film-forming product effectiveness, this result demonstrates continued effectiveness in steam system corrosion protection during layups, which can decrease downtime associated with equipment failures.

The steam drum inspection showed that BL9000 had formed a protective film, causing water to bead on the mild steel surfaces within the steam drums, thus reducing iron corrosion.

Based on the significant reduction in cation conductivity and the continued low levels of iron detected during startups, the plant has elected to adopt BL9000 non-amine technology as their preferred treatment program for their HRSGs.

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