

Case study: Southeast Texas

LIFESHIELD program reduced cooling water corrosion rates by 70%

A petrochemical manufacturer in Southeast Texas observed high levels of corrosion within the cooling water heat exchangers of its plant, resulting in poor reliability and performance of the units. Carbon steel corrosion rates averaged between 2 and 3 mpy, outside the customer's optimum range of <1.0 mpy.

The manufacturer partnered with Baker Hughes to troubleshoot the system, and the team determined that three factors were raising the corrosion rates:

- The occasional lamella solids carryover with the makeup water
- The supplemented, unfiltered firewater being used as makeup water
- The corrosive chloride content in the makeup water used in the cooling tower negatively impacted the tower's performance

Baker Hughes worked with the plant manager to implement a **TOTAL SYSTEMS APPROACH™ process** which would help plant personnel to improve oversight of the cooling tower program. The team started with a cooling water basics training course for the plant operations team, with a focus on best practices for lamella management.

To address the cooling tower's out-of-spec corrosion rates, Baker Hughes recommended a trial of the **LIFESHIELD™ NP non-phosphorous corrosion inhibitor**. The LIFESHIELD program was applied over a 5-month period, replacing the existing phosphorus-based corrosion program.

A custom single-drum feed system was chosen for the new treatment, which provided a cost-efficient delivery method for the plant.

The Baker Hughes **VIVID™ automated smart controller** with online analyzer was installed to measure the chemical levels and provide continuous monitoring of the system, alerting when problems arose. During the trial, the controller's active monitoring enabled the team to respond more quickly to system upsets. The monitoring also optimized response and control of the chemical treatment.

The LIFESHIELD inhibitor trial results showed that carbon steel corrosion rates in the plant's cooling tower averaged 0.75—25% less than the required 1-mpy spec, with readings as low as 0.5 mpy. On average, the LIFESHIELD inhibitor program reduced corrosion rates by 70% compared with the manufacturer's prior corrosion inhibition program.

The customer was pleased with the results of the trial and with the thorough evaluation process used by Baker Hughes. The effective TOTAL SYSTEMS APPROACH process, combined with Baker Hughes's expertise and knowledge of both process and water systems, enabled a comprehensive and cost-efficient integrity solution that enhanced the cooling tower's performance and satisfactorily resolved the corrosion issues.

Challenges

Reduce corrosion rates to less than 1 mpy under variable, stressed cooling water conditions

Results

- Reduced average carbon steel corrosion rates by 70%, resulting in an average 0.75 mpy
- Controlled corrosion even under stressed conditions with high chlorides and iron in the circulating water

