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Case History

Quadrasperse® Quadpolymer Solves High-Temperature Fouling Problems at Gulf Coast Chemical Plant

BACKGROUND

A Gulf Coast chemical plant was experiencing severe fouling in a critical product cooler of a high temperature production unit. The product cooler is a vertical exchanger with shell side cooling and extremely high exit water temperatures. Normal exit water temperatures are between 160°F and 176°F. During an automated defrost cycle used to maintain process side heat transfer efficiency, exit water temperatures are periodically raised to greater than 195° F.

The corrosion and deposit control program utilized in the high-temperature system was a stabilized phosphate program using 10 ppm active amps/acrylate copolymer for phosphate stabilization, along with 7.5 ppm polyacrylate for mineral dispersancy. The open recirculating system had historically been treated with chrome-zinc and because of the extremely high temperatures had only in recent years converted to the non-chrome phosphate program.

Three separate vertical, shell side product coolers are serviced by the cooling system. Product coolers #1 and #2 remained clean with the phosphate based program, however, product cooler #3 with the highest operating temperatures would progressively foul. Excessive temperatures were due to a problematic design which incorporated counter-current and co-current flows in the same exchanger.

PROBLEM

Fouling and deposition in critical product cooler #3 required the exchanger to be acid cleaned once every 2 to 3 months. With the previous metal based program, acid cleaning frequency was 2 to 3 times per year.

SOLUTION

Due to the outstanding high-temperature stability of the new Quadrasperse® quadpolymer, it was recommended that Quadrasperse® be evaluated as a means of preventing fouling in the critical product cooler. It was felt that Quadrasperse® would provide significant benefits in this challenging application.

RESULTS

Use of Quadrasperse® dramatically reduced fouling in the high temperature system. Acid cleaning frequency was decreased from once every 2 to 3 months to only once in the 12 months following conversion to Quadrasperse®.

The figure on the next page shows cooling water flowrates from the critical product cooler prior to and during the evaluation of Quadrasperse®. By monitoring exchanger water flows, plant personnel could continuously monitor waterside fouling in the product cooler.

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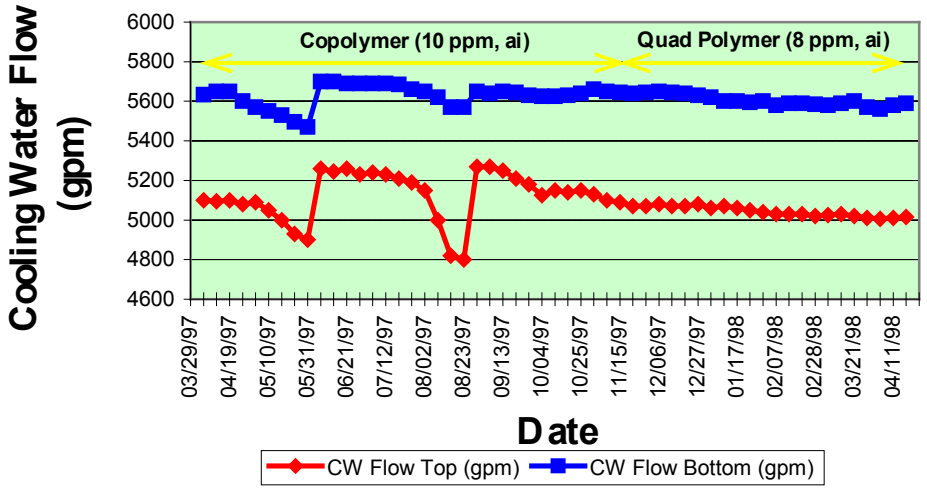

As shown in the figure, on two occasions prior to the introduction of Quadrasperse®, waterside fouling had increased to unacceptable levels, requiring the system to be acid cleaned. Once the treatment was converted to the new quadpolymer, continued rapid deterioration in heat exchanger fouling was eliminated. The system operated for a total of 6 additional months with only minor subsequent fouling observed.

RESULTS, CONTINUED

In addition to improved performance, the level of polymer required to treat the system was also significantly reduced.

Quadrasperse® dosage averaged 8 ppm, a 20% reduction over copolymer. Polyacrylate dosage averaged 4.0 ppm, a 47% reduction in usage. During the evaluation, system water samples were routinely sent to the Ashland R&D laboratory for determination of Quadrasperse® polymer residuals. Measuring and knowing polymer levels in the system made it possible to continually optimize dispersant dosage and be confident that program performance was being improved and not compromised.

SUMMARY

The trial evaluating Quadrasperse® ended after six months during a scheduled plant turnaround. Following the turnaround, Quadrasperse® was incorporated as the standard calcium phosphate polymer in the treatment program. The process unit continues to use Quadrasperse® with excellent results.

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