

Case Study

Low Phosphorous Cooling Chemistry Development, 2008



A customer in Michigan was recently faced with permit restrictions concerning phosphate in their cooling system discharge water. US Water Services was asked to develop a low phosphorous treatment program, in order to allow the customer to meet these new tight discharge limits, while still providing excellent scale and corrosion control for their critical cooling system.

The R&D staff went to work developing and testing several different chemistries, trying to find the best approach to this difficult challenge. Phosphate and organic phosphonates have been used for decades for cooling water scale and corrosion control. They are very effective, and economical. Eliminating them from a treatment program is no easy task.

The final version of the treatment chemistry looked very impressive in bench testing and in our pilot cooling tower. Discharge concentration of total digested phosphorous (including all phosphates and organo-phosphonates) was less than 0.5ppm at the recommended usage dosages, which met our customers requirements.

Program validation testing was conducted at the plant site in Michigan. On-line test equipment was installed to monitor mild steel and copper corrosion rates in real time, as well as deposit rates. Conductivity

Conductivity, pH, ORP and temperature were also monitored and recorded. The field test results confirmed what had been found in the laboratory. Mild steel and copper corrosion rates were very low, and there was no indication of scale formation.

Still not completely satisfied with the amount of data collected, the product development team arranged for 100 gallons of cooling tower make-up water to be shipped back to the R&D laboratory in Cambridge, Minnesota. Here, the water was run on the pilot cooling tower under much more difficult conditions than found at the customer plant. This was done to see how the program would perform during possible upset conditions that would increase the scaling tendency of the water.

After running in these harsh conditions for over a week, no indication of scale formation was found, and corrosion control remained excellent. As a final test, water from the plant was run through a pilot tower with the treatment chemistry turned off, just to verify scaling potential. After only five hours, the pilot tower had to be shut down, because scale formation on the Deposit Monitor coupon was so severe there was potential to damage the testing equipment.

In This Case Study:

- Cooling Tower
- Corrosion
- Discharge Water
- Michigan
- Permit Restrictions
- Phosphate
- Scale

