

# Case Study

## Comprehensive Cooling System Protection in a Critical Data Center, 2009



Shortly after the mechanical start-up at a large corporate data center, significant bacteria growth was discovered in the thermal storage tank. Some of the flow sensors were fouled, and biofilm had the potential of impeding heat transfer, which would raise energy costs. US Water Services was asked to assess the problem and find a solution.

Representatives from US Water Services collected a representative sample from the thermal storage tank. An analysis of this sample revealed large amounts of solids, primarily bacteria, in the water. Due to the extent of the problem, filtration would not be possible. The only effective solution was to empty the large volume of water out of the tank so it could be thoroughly cleaned.

Prior to start-up, a molybdate corrosion inhibitor was introduced to the system. Due to recent changes to the city's policies, water containing molybdate is no longer allowed to be discharged to the municipal sewer system. Doing so would cost approximately \$250,000 in fines. As a result, all of the water had to be hauled off-site for disposal. Once the tank was emptied, the inside of the tank was physically cleaned and sterilized.

In addition to the large volume of water in the thermal storage tank, the system had water in the chilled loop that could not be dumped or purged because it also contained molybdate. In order to remove the molybdate, ion exchange units were brought in. During this process, the molybdate concentration went from 72 ppm to 0.1 ppm. Once completed, the ion exchange units were brought off-site for proper disposal.

A silicate corrosion inhibitor was introduced to the system by US Water Services as an environmentally friendly alternative to molybdate. This green technology helped the facility obtain points towards LEED-EB Certification. Silicate requires the water to be softened to at least 50 ppm. US Water Services softened the water in this facility down to 20 ppm before the silicate was introduced.

To keep the system running efficiently and prevent bacteria growth, several steps were taken. Biocides were added to the water to kill any bacteria

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throughout the system. A web based electronic water treatment controller was installed on the chilled loop to monitor pH, ORP, temperature, and conductivity. Next, to prevent stagnation, an automation system was designed to keep water moving by automatically opening valves on a timed schedule. The facility also uses US Water Services' Corrosion Coupon program to prevent maintenance problems. This program uses copper, mild steel and fouling corrosion coupons to analyze potential corrosion in the system.

Scheduled maintenance and testing is important to keep such a system operating efficiently. Facility operators and US Water Services representatives test the loop once per week for silica, pH, TDS, iron, hardness and three different types of bacteria. All data is recorded, tracked and monitored on US Water Reports, a web-based monitoring software program. In addition, a representative sample is obtained from the tank quarterly for further analysis, and a biocide efficacy test is performed once per year by US Water Services' Analytical Services Team. This powerful tool determines the best biocide to use in the system for maximum bacteria prevention.

This project was completed in Fall 2008, and due to the preventative measures that have been taken, the facility has been running smoothly since. This program is just one example of how US Water Services can extend equipment life and increase energy efficiency in a data center facility.

