

The Benefit of Chemically Treating an Open Cooling System Part 2

In the first segment of this article, I stressed the importance of closely monitoring and properly treating the water in cooling towers by regulating the cycles of concentration (COC). A very close second to controlling the water's chemistry is controlling the biological activity in the towers. Of course, it wouldn't be good to have a tree growing in the sump or beavers swimming in the water, but it's really the *microbiological* activity we are most concerned with.

Cooling towers release heat from a system by raining water across a draft. In this process, they also act as air scrubbers, allowing contaminants in the air to enter the system. This includes bacteria, which are quite fond of the conditions in the typical cooling water: a fairly neutral pH, water that is saturated with air, and a temperature just the way they like it—usually around 70°F to 100°F. Without treatment, the bacteria multiply exponentially. Even lapses in a treated system can lead to serious problems. We find similar conditions in closed cooling water systems. However, in this case bacteria enter the system through the make-up water, and nitrite, an often-used corrosion inhibitor, becomes a source of “food” for them.

Non-existent or even poor treatment can allow bacteria to foul equipment and heat transfer surfaces. The bacteria can also accelerate corrosion rates with the substances they excrete. All of this leads to erosion of efficiencies in the systems and eventual equipment failure. Neglect might also allow *Legionella* bacteria to infect cooling systems—leading to health concerns in the proximity of these systems.

Prevention of biological fouling is achieved through a properly designed biocide program. Oxidizing biocides, non-oxidizing biocides, and a combination of the two is used for treatment. I am a supporter of using ORP analyzers for oxidizing biocide programs to control chemical residuals. Gauging the performance of the program can be achieved through the use of microbial dip slides and visual inspections. ATP testing can also be used as feedback to control programs. In closed systems, the anaerobic bacteria should be measured and controlled as well.

Bacterial control, to me, is an integral part of any treatment program. There's more to come, so stay tuned for Part 3!