JAMESTOWN CHEMICAL

Verox-8®
Cooling Water Treatment Microbiocide
Case History at a Hospital Complex

Background:

A 465-bed acute-care hospital located in northern New Jersey operates three separate open recirculating cooling water systems, on both a seasonal and year-round basis, to provide comfort cooling throughout its urban campus. The systems, with a total capacity of 2,250 tons of refrigeration, use a moderate hardness and alkalinity municipal makeup water, and were historically operated at 7 cycles of concentration (based on conductivity). The previous water treatment vendor had used a parachlorophenol-based proprietary product and sodium hypochlorite to control microbiological growth within the systems.

Despite the routine addition of high concentrations of each of these products, microbiologically-active slime deposits were present on each of the tower's louvers, distribution decks, and sump basins. Even more troublesome deposits formed on the condensers' tubes and tube sheets, and the systems' distribution piping. Under this treatment program, the condenser tubes were always very dirty, and required routine and vigorous punching to clean. As was evident by the high iron and copper residuals in the recirculating water, elevated corrosion rates in the system were also compromising the service life of the refrigeration equipment.

During the past several years, water treatment professionals have gained an increased appreciation for the various troubles that slime deposits can cause in cooling water systems. By excreting protective polysaccharide films, slime-forming bacteria provide the "glue" that entraps entrained suspended solids to form the tenacious deposits that we commonly see in many cooling systems. These acidic deposits aggressively attack underlying metal surfaces, leading to highly destructive pitting type corrosion problems. Slime deposits also protect the living bacteria cells from many types of microbiocides, allowing the films to constantly re-inoculate bulk water populations. Such protection makes it extremely difficult to ever gain proper microbiological control in any system heavily contaminated with biofilm deposits. Insulating and voluminous slime deposits also reduce heat transfer rates and restrict water flows, thereby reducing the efficiency of the refrigeration equipment and increasing overall system operating costs. More recently, several studies have shown that slime deposits provide the ideal growth environment for Legionella pneumophila, the causative agent for Legionnaires Disease, which is a major health concern in any hospital setting.

Program Application:

After being awarded an annual service contract at the hospital for the cooling water treatment program, Jamestown initiated a microbiological control program based primarily on Verox-8, a stabilized chlorine dioxide-based product. As a selective oxidizer, chlorine dioxide is able to penetrate biofilm deposits and quickly kill the slime secreting bacterial cells. However, as a relatively non-aggressive oxidizer, chlorine dioxide will not degrade other

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ingredients of the water treatment program (such as phosphonates, polymers or azoles), or accelerate corrosion rates for steel or copper system components. As a concentrated, single drum, liquid microbiocide that only requires a simple chemical metering pump for product application, Verox-8 also enabled Jamestown to quickly established a comprehensive microbiological control program without the capital expense and maintenance problems traditionally associated with generator-based chlorine dioxide programs.

In this program, Verox-8 was slug fed to the systems twice per week, at a dosage rate of 120 ppm (as product). During the warmest months of the summer, the program also used a weekly slug addition of Tolcide® PS-200 (THPS), also fed to the system at a dosage rate of 120 ppm (as product). Within only a few weeks time of initiating the program, all of the visible biofilm deposits were removed from the tower structures, and bulk water bacteria counts were reduced to 100 – 1,000 CFU's/ml (as measured by dip slides). With the pronounced improvement in microbiological and related deposit control, system operators were able to increase cycles of concentration in the towers to 10, a more than 40% increase that significantly reduced water and chemical consumption rates and dramatically improved overall operating costs. Iron and copper levels in the recirculating water also declined rapidly to less than 1.0 ppm and 0.1 ppm, respectively. In addition, after eight consecutive months of operation on the Verox-8 microbiological control program, the condensers were opened for their annual inspection and deemed, "the cleanest I have ever seen", by the hospital's long-time Trane service representative.

Program Summary:

In a series of critical open recirculating cooling water systems that had previously encountered persistent biofilm deposits and resulting operating problems, Verox-8 was able to provide the account with comprehensive microbiological control. The use of Verox-8 also provided the water treatment vendor with significantly lower operating costs for the systems, and the one-drum program was established quickly and easily with minimal capital, manpower, or maintenance expense.

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