

PureLine ClO₂ Program Controls Pathogens and Eliminates Corrosion in a Co-Generation Cooling System

GOAL

To control bacterial growth and bio-fouling of the surface condenser while eliminating the destructive corrosion of critical system components.

SITE

A large co-generation plant in California.

HISTORY

Life expectancy and energy efficiency are the two most critical factors in protecting the investment in any co-generation project. While pathogen control is a must, biologically-influenced corrosion and bio-fouled heat exchangers are prevalent problems that cause irreversible damage to equipment and reduce heat-exchange efficiency. Producing cost-effective electricity is the primary goal of any power plant. Maintaining slime-free waterside surfaces is crucial to achieving this goal.

A large California co-generation plant was using reclaimed municipal sewer water as cooling tower make-up. The nutrient content and general organic loading associated with the reclaimed water, combined with the atmosphere in cooling tower operations, created a perfect environment for the growth of bacteria.

PROBLEM

The rapid growth of bacteria, coupled with the large volume of make-up water required by the cooling operations, made the application of non-oxidizing biocides much too costly. The plant's only option was to feed oxidizing biocides—both chlorine and bromine—into the system. However, the demand on these products required very high feed dosages. While sodium hypochlorite (bleach) fit the plant's operating budget, mild steel corrosion rates were more than 12 mils per year. These rates not only exceeded the plant's target goal of less than 3 mils per year, they were nearly 3 times the industry standard of less than 5 mils per year. The use of bromine lowered the mild steel corrosion rates to between 6 and 8 mils per year. Yet, even these reduced levels remained above industry standards. In addition, it was determined that using bromine was cost prohibitive. The plant also incurred higher costs for inhibitor chemistries. Studies indicated that higher inhibitor costs were directly attributed to chlorine and bromine attacking the chemical integrity of these formulations. The dosages of bromine or bleach required to keep conditions in check were actually causing aggressive corrosion. This problem would seriously reduce the projected 30-year life span of the power plant and jeopardize the projected return on investment.

Since going online, the plant had used every applicable biocide available. Yet, the traditional biocides were all considered a failure due to their high costs, product incompatibilities or adverse affect on system metallurgy.

SOLUTION

PureLine Treatment Systems offered a full-service chlorine dioxide program using a P-3M Series: Chlorite Based Chlorine Dioxide Generator combined with an innovative, proprietary control system. After a thorough study of the co-gen plant's operations and biological activity, PureLine worked with the water treatment service provider to



develop a more suitable biocide program. Since its implementation, the program has maintained system hygiene and slime-free waterside surfaces while reducing mild steel corrosion rates below 3 mils per year. The projected life expectancy of all the co-gen facility's cooling equipment is now on or above the 30-year target. Additional program evaluations have proven both biocide and inhibitor costs have dropped while all aspects of program efficacy have improved. Technical studies indicate that these improvements are directly attributed to three factors: chlorine dioxide's effectiveness at low residuals even in highly contaminated waters; chlorine dioxide's compatibility with inhibitor treatment products; and chlorine dioxide's low oxidizing potential which makes it react less aggressively with the system metallurgy.

Pure chlorine dioxide was generated using a traditional three-chemical, wet chemical generator. PureLine's full-service chlorine dioxide program combines professional on-site service with innovative, site-specific controls designed to ensure proper operation and treatment at all times. The client now enjoys hands-off biocide feed and control of biological activity. A state-of-the art control system maintains program efficacy without wasting plant resources or jeopardizing system metals.

RESULTS

Since implementing the PureLine program, corrosion has been significantly reduced compared to the results produced by previous treatment approaches. The program has provided excellent corrosion protection while maintaining the plant's high standards regarding biological control. Chlorine dioxide is more cost effective than the bromine-based program the co-gen plant formerly used, and it eliminates the corrosion problems associated with both bleach and bromine. Additionally, plant personnel have been freed-up from the risks associated with chemical handling, as well as time-intensive daily testing. Now plant personnel spend less than five minutes per day monitoring and controlling the plant's biocide program.

CONCLUSION

PureLine's innovative full-service program hasn't required any capital investment, and provides the desired efficacy without compromising the plant's operational budget. Meeting and surpassing industry standard corrosion rates has helped assure that the co-gen plant will deliver its intended return—possibly hundreds of thousands of dollars—on its capital investment.