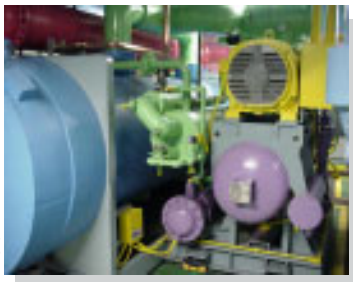
JAMESTOWN CHEMICAL

VEROX®-8 Case History
Successful Use as a Cooling Water Treatment Microbiocide at a Large Commerical Bakery

Background Information

A large New England bakery produces the rolls used to make deli sandwiches for a chain of fast food outlet stores. In the production process, the bakery uses a 300-ton open recirculating cooling water system to chill the plant's ammonia-based refrigeration equipment. With high organic loadings from air-bourne flour and other food ingredients, microbiological control has always been difficult to maintain in the system. The plant had previously used a proprietary, organic-based microbiocide, along with sodium hypochlorite, in the system. Unfortunately, product dosage rates and program costs were high, and elevated microbiological counts, biofilm formation, and foaming all presented operational problems.

Study Results



Seeking to correct these problems in such an organically-loaded cooling system, Jamestown initiated a treatment program based upon VEROX®-8, a stabilized, chlorine dioxide releasing microbiocide recently released to the marketplace. As a water-soluble gas and selective oxidizer, the chlorine dioxide technology offered the account the following benefits:

- Does not react and degrade with nitrogen-based or most organic contaminants commonly found in cooling water systems.
- Offers broad-spectrum microbiological control, including algae, bacteria and fungi.
- Is very fast acting and easy to use.
- Provides microbiological control over a wide pH range, including highly alkaline waters.
- Is not aggressive to system components, including steel, copper or wood.
- Uses easy test methods to determine product residual levels.
- Very effective against biofilms, iron and sulfate reducing bacteria, and legionella pneumophila.

The study was initiated by adding a single 120 ppm (as product) slug dose of the VEROX-8 directly to the tower basin. Throughout the next 24 hours, samples were collected on a regular basis and sent to an independent laboratory for 48-hour heterotrophic plate count analysis (conducted at 35 degrees C).

The tower system used in the study operated at approximately five cycles of concentration, with a recirculating water conductivity of 1,000 mmhos (maximum), a pH of 8.3, and a total hardness level of 80 ppm (as $CaCO_3$). A previous analysis had determined that the system's volume was 1,500 gallons. Results from the plate count analyses were as follows:

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Time Since VEROX-8 Addition (Minutes)	Heterotrophic Plate Counts (CFU/ML)
START (prior to VEROX-8 addition)	185,000
30 minutes	130
60 minutes	120
120 minutes	110
240 minutes	120
1440 minutes	1,700

Study Conclusions

Although plate counts in the bulk water were not especially high during the beginning of the study, biofilm deposits were present throughout the system. These deposits caused excessive foaming problems and diminished operating efficiencies on the refrigeration equipment. As a potent and fast-acting microbiocide that is not adversely affected by most organic contaminants, VEROX-8 was able to reduce heterotrophic plate counts in the cooling water system by 3 orders of magnitude in less than 15 minutes. In addition, subsequent twice per week slug additions of the product (at 40 ppm) were able to maintain biological counts below the system's recommended $1x10^4$ cfu/ml control limit, eliminate foaming problems, and slowly remove existing biofilms from the system. These outstanding results were also obtained at a significantly lower cost than the previous microbiological control program, providing the customer with a significant economic benefit.

VEROX is a registered trademark of THE VEROX GROUP.

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