



## Biofilm removal and cost effectiveness in a cooling tower application: THERMAL CHICAGO, IL

### **LOCATION**

Cooling system in downtown Chicago, IL

### **CONTACT:**

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### **EQUIPMENT:**

Dual SAL-80 (installed 2005)

### **PREVIOUS DISINFECTION:**

8 gallons (30 L) of sodium hypochlorite and 6 gallons (23 L) of isothiazolin biocide, fed two times per week



### **The Problem:**

The cooling system had a constant problem with algae and biofilm growth in the cooling tower basin. The facility wanted to improve safety and control the algae and biofilm, without increasing the use of existing biocides, which already contributed between 50 to 70% of total treatment costs.

### **The Solution:**

A MIOX Dual SAL 80 on-site halogen generating system capable of producing a FAC of 20 lbs/day per day was installed in 2005. The mixed-oxidant halogen eliminated algae and biofilm, maintained low bacterial counts, and decreased operating costs, without degrading the existing scale and corrosion inhibitors. The units are easy to operate and require minimal maintenance. The company has since converted to MIOX disinfection for 3 additional cooling systems, with an average unit payback between 11 and 18 months.

### **BACKGROUND:**

- Recirculation rate of 33,000 gpm (12,500 Lpm)
- Delta T = 59°F (15°C)
- pH of 8.9 to 9.1 (uncontrolled)
- Make-up water of 350,000 to 400,000 GPD (1325 to 1500 m<sup>3</sup>/day)
- Blowdown of 100,000 to 150,000 GPD (380 to 570 m<sup>3</sup>/day)
- Scale inhibitor: phosphonate / polymer program
- Corrosion inhibitor:azole yellow metal corrosion inhibitor

## Comparison between Sodium Hypochlorite and Mixed Oxidants:

	Sodium Hypo / Isothiazolin	Mixed Oxidants
<b>Algae / Biofilm:</b>	Constant growth in cooling basin	Basin cleared of algae in 2 weeks and biofilm in 4 weeks
<b>Cost Analysis:</b>	Biocides represented 50% to 70% of total treatment costs	Unit payback between 11 and 18 months
<b>Effectiveness:</b>	<ul style="list-style-type: none"> <li>• 10,000 cfu/ml in bulk water</li> <li>• 100,000 to 500,000 cfu/ml surface water</li> </ul>	Excellent microbial control, even at elevated pH levels
<b>Dosage:</b>	<ul style="list-style-type: none"> <li>• 8 gallon hypo slug 2X/wk</li> <li>• 6 gallon isothiazolin 2X/wk</li> </ul>	<ul style="list-style-type: none"> <li>• 20 lbs/day FAC with residual of 0.6 to 0.8 mg/L FAC</li> <li>• Residual reduced to 0.3 to 0.5 mg/L after biofilm removed</li> </ul>
<b>Corrosion Rates:</b>	<ul style="list-style-type: none"> <li>• 0.8 to 1.2 mpy for mild steel</li> <li>• &lt; 0.1 mpy for copper</li> </ul>	<ul style="list-style-type: none"> <li>• 0.9 to 1.4 mpy for mild steel</li> <li>• &lt; 0.1 mpy for copper</li> </ul>
<b>Safety:</b>	<ul style="list-style-type: none"> <li>• 28,500 lbs (12,900 kg) of hazardous chemicals annually</li> <li>• Disposal of 51 chemical drums</li> </ul>	<ul style="list-style-type: none"> <li>• No hazardous chemicals used, transported, or stored</li> <li>• No disposal of drums required</li> </ul>

### About MIOX Corporation

MIOX Corporation is focused on solving one of the world's most pressing issues: the need for affordable, safe, and healthy water. MIOX's patented water disinfection technology replaces the need to purchase, transport and store dangerous chemicals. MIOX is used in over 30 countries and in hundreds of communities across the U.S. for public drinking water systems, water reuse projects, and a variety of commercial and industrial applications.



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