

# HALOX Case History #1

## Legionella Control In Healthcare Facilities

- Application:** 50,955 healthcare facilities<sup>1</sup> - hospitals, rural health clinics, nursing homes, etc.
- Problem:** Consistently and long-standing positive test results for Legionella pneumophila bacteria.
- Solution:** Halox chlorine dioxide (ClO<sub>2</sub>) generation and delivery systems

<sup>1</sup> Source: American Hospital Association. Total potential market = 50,955 facilities



### The Healthcare Facility

A 500+ bed healthcare facility in the eastern United States represents 75 medical specialties and includes treatment centers for cancer, kidney transplants, heart and neurological disease and infertility. All inpatient and outpatient services are fully accredited by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), a major hospital industry trade organization.

Dedicated nearly 80 years ago, the facility has been repeatedly named by the Top 100 Hospitals Study as among the best-performing hospitals in the United States. Patients received higher quality care as determined by better mortality and complication rates than their peers.

### The Problem

The facility consistently had positive test results for Legionella bacteria at water faucets and showers throughout its large campus. With water consumption in excess of 500,000 gallons per day (1.9 million liters), this presented a significant challenge. They were treating their extensive H<sub>2</sub>O system with traditional techniques including chlorination, superheating, and copper/silver ions; none of these worked to their satisfaction. In spite of these aggressive treatments, they could not eliminate the positive Legionella readings.

### The Approach

A Halox distributor was servicing the cooling towers at this facility. They became aware of the Legionella problem and brought it to the attention of the facility's engineering staff. At this point Halox became involved. Halox, along with the water treater, conducted extensive training on both the efficacy of chlorine dioxide (ClO<sub>2</sub>) on Legionella and other water-borne pathogens, and the ClO<sub>2</sub> generation equipment itself. (See Background for additional details).

### The Specifics

The collaborative team which included the hospital clinical staff, the water treater and Halox personnel chose the Halox System 1000 as the ClO<sub>2</sub> generating source. The facility was sized with two System 1000 units with a third unit as back up. Each unit uses 4 cassettes to produce the required ClO<sub>2</sub> to treat the >500 thousand-gallon system (1.9 million liters). Two units operating 24 hours per day, 7 days per week produce 2.2 pounds (1000 grams) of ClO<sub>2</sub> per day. Following a comprehensive risk assessment and site preparation, the three units were commissioned. They were operated as part of an overall water hygiene program that included the elimination of dead legs and gathering data on high and low water use areas. For example, low use showers could be flushed often or taken out of service.

### The Results

Within a very short period of time, there were measurable ClO<sub>2</sub> residuals in the water distribution system. Over the next six months, Legionella positive results continued to decrease at an accelerating rate. Over the second six months, positive readings were nearly eliminated. By the end of 18 months<sup>2</sup>, the entire campus was virtually

Legionella-free. The healthcare facility's management is extremely pleased with the results. The key was a multi-function, comprehensive approach to the problem.

## The Benefits

The cost to treat potable water using ClO<sub>2</sub> vs. chlorine is similar. However, the key factor in the case of Legionella is not cost savings, it is the health of the patients with which the hospital is charged. Cost and liability avoidance are secondary benefits. Chlorine just doesn't do the job – ClO<sub>2</sub> does. With chlorine dioxide, the patients' exposure to Legionella Pneumophila has been nearly eliminated.<sup>3</sup>

## Background

### Healthcare Facilities

The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) is a major hospital industry trade organization that has issued guidelines for Legionella control in healthcare facilities. Effective Jan 1, 2001, JCAHO recommends that all healthcare facilities have a written plan that addresses managing pathogenic biological agents (e.g. Legionella) in cooling towers, domestic hot water, and other aerosolizing water systems. While this recommendation is voluntary, JCAHO carries significant moral authority in the healthcare field.

### Chlorine dioxide (ClO<sub>2</sub>)

ClO<sub>2</sub> has long been recognized as a superior biocide. Its unique properties have made it the water treatment chemical of choice for such large-scale applications as industrial process water, food and beverage processing, and pulp and paper production. It has all of the required regulatory approvals for these applications. It is also approved and recommended by the U. S. Environmental Protection Agency as an environmentally friendly drinking water additive to replace chlorine (which forms carcinogenic byproducts). In the UK, The Health and Safety Commission (equivalent to OSHA) has named ClO<sub>2</sub> as the best available technology for legionella control as part of an overall water hygiene program.<sup>4</sup> It is preferred over hyperchlorination (corrosion problems), superheating (scalding risks) and copper/silver (banned in the UK due to silver toxicity).

However, Federal law prohibits the transportation of ClO<sub>2</sub>, it must be produced where it is used. Most traditional generation techniques are unacceptable to small and intermediate size users. These methods produce excessive quantities of ClO<sub>2</sub> (solutions containing 2 to 5 thousand ppm ClO<sub>2</sub>). They also involve the use of multiple hazardous reactant chemicals and are difficult and dangerous to operate. The Halox System is a self-contained generator that provides for the safe, continuous production of chlorine dioxide. The Halox System brings economical ClO<sub>2</sub> to a large group of new users for whom the high cost and complexity of traditional generating equipment has been prohibitive.

The Halox System uses an electrolytic method that makes up to 5.5 pounds (2.5 kilograms) of ClO<sub>2</sub> per day using a single precursor, sodium chlorite. This simple-to-operate system is the perfect solution for small to intermediate sized operations. The patented Halox System is a ClO<sub>2</sub> generating process that requires NO acid, NO chlorine gas, and NO bleach. Because of its unique ability to perform controlled oxidation, the Halox System generates a very pure product and is cost-effective. ClO<sub>2</sub> is ideal for systems with corrosion problems. ClO<sub>2</sub> will not attack water distribution systems including copper pipes. The heart of the Halox system is a patented electrochemical cassette that directly converts sodium chlorite to chlorine dioxide. When operated according to Halox guidelines, this Halox equipment generates a safe, dilute solution at a controlled, measurable rate that contains up to 550 ppm of chlorine dioxide. For specific sizing concentrations, please contact Halox Technical Service.

<sup>2</sup> This is not atypical. Unlike other biocides, (including copper/silver and chlorine), ClO<sub>2</sub> works to significantly reduce biofilm where pathogens thrive. Therefore, it can take some time for residuals to reach outlying regions of the distribution system.

<sup>3</sup> Assumes proper maintenance, setting of equipment, and no significant change in feed water, distribution system, etc.

<sup>4</sup> "Legionnaire's Disease, The Control of Legionella Bacteria in Water Systems, Approved Code of Practice and Guidance L-8." Published by the Health and Safety Commission and Executive, St. Clements House 2-16 Colegate, Norwich NR3 1BQ, UK.