PSI Water Technologies
A UGSI SOLUTIONS COMPANY

Project Profile

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City of Springfield, Missouri, Upgrades Disinfection System from Gas Chlorine to On-Site Sodium Hypochlorite Generation

Community's Safety and Well-Being at the Core of the Decision-Making Process

City Utilities (CU) in Missouri is a municipally-owned utility serving Springfield and surrounding areas of the community with electricity, natural gas, water, broadband and transit services. The CU water department consists of two municipally-owned reservoirs and raw water pump stations, the Fulbright and Blackman water treatment plants, and a distribution system that includes three pressure zones and multiple treated water storage facilities.

Built in 1980, Blackman Water Treatment Plant (BWTP) serves the city of Springfield, Missouri, with a service area population of 229,000. BWTP is currently completing filter upgrades to treat 52.5 million gallons per day (MGD). The facility uses conventional treatment methods including coagulation, flocculation, clarification, filtration, and disinfection. They also use additional seasonal chemical treatments for taste and odor control.

Considering Options to Chlorine Gas

BWTP had been using chlorine gas for water disinfection since its construction in 1980. CU had been looking at alternative disinfection options for several years and the decision to change their disinfection technology from chlorine gas was driven by public safety concerns due to increased local population and increasing regulatory requirements. Springfield's community has developed, and the population has increased over the last three decades, with more homes, schools, a large business complex, and most recently, a city park and recreational center adjacent to the water plant.

Before deciding on on-site chlorine generation, CU considered other options including keeping chlorine gas, but housing it in a new building with a scrubber unit. While a scrubber would mitigate some of the public safety issues, the decision-makers at CU were concerned that it wouldn't address the danger to maintenance personnel and the utility would be required to continue their risk management program (RMP).

> "PSI was very helpful through the design phase to assist the consulting engineer with aspects specific to on-site generation. PSI has been very helpful and generous in their availability and training of our plant personnel to make sure our people know how to properly operate and maintain the system. Our maintenance personnel don't seem to miss donning required personal protective equipment or the risks associated with changing out chlorine gas containers!"
>
> ***Craig Kern,***
> ***Engineer IV, City Utilities***

They also considered switching to a bulk 12.5% sodium hypochlorite solution. The bulk hypochlorite delivery option, however, was the most costly over a 20-year period and there appeared to be greater storage and feed issues

with the higher strength caustic. The commercial-strength hypochlorite also posed a greater risk of byproducts such as perchlorate, which CU knew was under consideration for more stringent regulations.

Choosing On-Site Generation

Throughout City Utilities' investigation into the best disinfection option for the city of Springfield, the overall safety of both the community and plant personnel were always paramount in their decision-making. City Utilities was also aware of discussions among legislators about the risks associated with gas chlorine, so the possibility of future limits on gas chlorine use were also considered. After careful consideration, City Utilities decided that on-site generation of sodium hypochlorite would be the best option for the people of Springfield and surrounding communities. This water disinfection method addressed the concerns associated with transporting chlorine gas through their growing community. It would also be more cost-effective than bulk delivery and no RMP would be required.

How it Works

On-site generation applies electricity to a solution of salt and water to produce sodium hypochlorite. Incoming water first goes through a softener, then splits into two lines. One line goes to the electrolytic cell, where electricity is applied to the brine solution, and the other goes to a brine storage tank. Near-saturated brine is injected into the softened water that is going to the electrolytic cell. A current is passed through the electrolytic cell, producing sodium hypochlorite, which is stored in another tank, then metered into the water moving through the treatment process. Hydrogen gas is a natural byproduct of the electrolytic process and must be removed from the cell and storage tank.

Choosing the Right System

Several manufacturers offer on-site hypochlorite generation systems in the U.S. While the competitors offered similar products, Process Solutions, Inc. (PSI) offered additional benefits that were important to City Utilities, particularly the safety aspect of PSI's hydrogen-purging design. In PSI's Microclor® on-site generator, the electrolytic cells are configured in a patented vertical format with a recirculation loop on each cell that allows for passive release of the hydrogen gas from each individual cell. This design increases operator safety and reduces the possibility of hydrogen gas build-up in the cell.

Another key factor that contributed to CU choosing PSI's Microclor® system is the ability to remove one electrolytic cell without going offline. The Microclor® vertical cell design allows the cell to be removed from the cell carrier piping by simply breaking two unions, making for easy cell maintenance or replacement and increased redundancy.

In April 2013, City Utilities started up three Microclor® Model MC-1500 skid systems, each rated at 1,500 pounds per day of free available chlorine. Since the new systems have been running, CU's water quality has remained excellent, and they've even encountered an unexpected benefit from the new system: an increased pH in their finished water. CU feeds soda ash for pH adjustment to comply with lead and copper rule requirements. Since switching from gas chlorine to on-site generation of sodium hypochlorite, they observed a significant reduction in soda ash feed since replacing acidic gas chlorine with the slightly base low strength hypo. More importantly, they are satisfied that their thorough review of disinfection options has resulted in a safer, more cost-effective treatment method for the city of Springfield, Missouri, and the surrounding communities.

For additional information, please find and contact your local representative at www.ugsicorp.com