dependable disinfection

Texas university turns to onsite sodium hypochlorite generation

By Greg Gaffney

Ranked by U.S. News & World Report as one of the top 20 research institutes in the U.S., Texas A&M University has hundreds of laboratory facilities on its campus where a variety of proven water treatment technologies are used to control the quality of the water used in research.

When it came time to choose a new disinfection system for the drinking water facility that serves the campus, the university's Water & Environmental Services department chose another proven water treatment method: generating sodium hypochlorite on site.

Home of the Aggies

Located in College Station, Texas, and with a student enrollment of more than 50,000, Texas A&M is the sixth largest university in the U.S. The school is probably best known for its perennially strong "Aggies" football team and its rivalry with the University of Texas, and its Corps of Cadets, which provides more commissioned officers to the U.S. Armed Forces than any other school outside of the service academies.

Built on the Texas prairie in 1876, the university has been in the utilities business since it opened. Since 1951, drinking water for students, faculty and other university employees has been provided by the Wellfield Pump Station, located approximately 11 miles north of campus. The university owns seven wells with a combined production capability of 12.8 million gal per day (mgd). The current average production is 4.7 mgd and has been as low as 4 mgd during non-drought years. The water production serves a campus population that peaks at close to 65,000 people during the fall and spring semesters. The campus' entire water system includes more than 200 miles of water distribution lines, groundwater wells, pump stations and two elevated water storage tanks. The water system has a "superior" rating from the state of Texas.

The Wellfield Station draws water from six groundwater wells. The high-volume deep wells are located near a geothermal source; as a result, the surface temperature of the water from these wells ranges from 106°F to 134°F. To reduce the temperature, the water is pumped through cooling towers, lowering the temperature to below 90°F.

The source water for the main campus is clean enough that only chlorine disinfection is needed to treat it to Safe Drinking Water Act standards. Since the Wellfield Station's opening, gaseous chlorine has been used to disinfect the water and provide an effective chlorine residual. After the water is disinfected, it is pumped through a 7.5-mile dual-pipe transmission system to a booster station located adjacent to the campus, then into the water distribution system, which includes a 2.1-million-gal elevated storage tank. The tank provides an adequate supply of water pressure for the many domestic, research, recreation, irrigation and utilities uses on the 5,500-acre campus.

Security Rules

In 2001, Nathan Jones, water and environmental services manager for the university, began considering an alternative disinfection method. "Our gaseous chlorine system was working fine, and our water was in full compliance," Jones said. "But in light of the new Homeland Security rules, it made sense to get our 1-ton cylinders out of service, especially since they were located both in populated areas and in unmanned locations. Changing our disinfection system also would allow us to get out from under the U.S. Environmental Protection Agency Risk Management Plan requirements."

Jones mentioned another benefit of onsite generation. "Chlorine is a contact disinfecting agent and is not soluble in water, so it is easily driven off through agitation, air relief stations, pumps and tank changes," he said. "To maintain the necessary residuals, we had to use excess amounts of chlorine to maintain the far ends of the system. By contrast, sodium hypochlorite is soluble in water and is not diminished by agitation as it makes its way through the system."

That year, the Water & Environmental Services department pilot tested a ClorTec onsite sodium hypochlorite generating system from Severn Trent Services. The test went well, and Jones submitted a budget request for a full-scale system. When budget approval came several years later, Jones and his staff evaluated several onsite systems. In July 2009, a ClorTec CT-450 was installed, along with a 7,300-gal storage tank and a 25-ton salt storage tank. The CT-450 can produce up to 450 lb per day of chlorine equivalent.

Onsite Generation Benefits

The use of onsite generation offers several advantages over the use of gaseous chlorine for disinfection. The disinfectant is produced and stored in liquid form, so there is no danger of leaks from chlorine gas cylinders. It also is not necessary for facilities using onsite sodium hypochlorite generating systems to develop and maintain a risk management plan. Hazmat training is not required for handling the disinfectant, nor is there any need for the use of self-contained breathing apparatuses. In addition, onsite sodium hypochlorite disinfection systems do not suppress finished water pH to the extent that gaseous chlorine disinfection does; therefore, the amount of pH adjustment chemical

The sodium hypochlorite system

(e.g., lime or caustic) necessary before distribution of finished water is reduced.

The onsite generation process is simple, as three common consumables—salt, water and electricity—are used. The system operates by feeding softened water into a brine dissolver. The salt dissolves to form a brine solution, which is further diluted to the desired salt solution and then passed through electrolytic cells, which apply a low-voltage direct current to the brine to produce the sodium hypochlorite. The solution then is safely stored in the 7,300-gal storage tank. When it reaches the low-level set point, the system automatically restarts to replenish its supply. The 0.8% sodium hypochlorite solution is nonhazardous; the only byproduct is hydrogen gas, which can safely be vented to the atmosphere.

The ClorTec onsite sodium hypochlorite system has been installed at more than 3,000 locations around the world.

Jones noted the benefits of the unit's design. "The clear cylindrical cell allows full visibility and easy access to the electrode array. The cells can be removed as a single unit, eliminating the time and labor spent disassembling cell structures and handling electrodes individually," he said. "We also like the fact that the ClorTec unit is one large cell with expansion capabilities versus a daisy chain of smaller cells." He added that he receives good customer support from Severn Trent and its associated component distributors.

According to Jones, the ClorTec system has performed as expected. "Safety and security was the driving factor behind our switch to onsite generation. We have been able to meet the chlorine residual requirements while using fewer chemicals. We calculate that we use about 25% less equivalent product to get more stable residual results." WWD

Greg Gaffney is regional sales manager for Severn Trent Services. Gaffney can be reached at ggaffney@severntrentservices.com or 281.274.8489.

For more information, write in 1109 on this issue's reader service form on page 41.