MDH Minnesota Department of Health

WATERLINE

Burnsville Becomes First Metro System with On-Site Hypochlorite Generation

When Linda Mullen took over as water superintendent in Burnsville in 2007, the city was in the process of adding surface-water treatment to its existing plant. Burnsville began purchasing water from the nearby Kraemer Mining and Materials quarry, both to supplement its supply and to help the quarry meet discharge permits.

The surface-water system went on-line the following summer, during one of the worst years in recent history for algae blooms. "Don't ever put a surface-water system on-line in July," Mullen said, recalling the number of phone calls the utility received because of taste-and-odor issues.

However, the surface-water system operated well along with the groundwater plant that has been in place since 1976. Within a few years, another major project loomed when the city began a facilities plan. For the water portion of it, Black & Veatch of Bloomington, Minnesota, explored needs and evaluated options. Upgrades for the utility's chlorine system stood out.

Mullen said the cost of rehabilitating the chlorine room's ventilation system was "astronomical," and a new scrubber would be needed, as well. In addition, safety concerns over the possibility of a leak were a major factor in looking at a new means of disinfecting the water. Within a one-mile radius of the water treatment plant are several schools, a daycare facility, a Wal-Mart, and the city center.

Bo Johnston of Black & Veatch Corporation said they compared the costs of using bulk hypochlorite, generating hypochlorite on-site, and putting in a new gas chlorine system with the required HVAC and scrubber upgrades. Bulk hypochlorite was most expensive, with on-site generation also more than chlorine gas. Safety issues swung the decision from chlorine to on-site hypochlorite generation.

Three manufacturers submitted bids to the city for an on-site system. Mullen said they looked beyond the lowest bid and evaluated the proposals on a 20-year life-cycle cost. Plant operators Dan Giles and Tony White went to South

Dakota to look at utilities using this technology, including the plant on the Missouri River in Vermillion, which treats water for the Lewis & Clark Regional Water System, which is projected to deliver water to Iowa and southwest Minnesota.

Burnsville ultimately selected a Microclor™ system from Process Solutions, Inc. of Campbell, California. The city became the first water system in the Twin Cities metropolitan area to opt for on-site hypochlorite generation and joined Baxter, Otsego, Fairmont, and Isanti as others in Minnesota to use the system.

“This technology has been around for decades,” said Johnston, “but has really taken off in the last 10 years.”

The hypochlorite uses treated groundwater and surface water from the plant’s effluent clearwell. The water is softened so that it doesn’t plug the generator, which has electrolytic cells arranged in a vertical pattern. The softened water is split and passes through the cells in a serpentine pattern. A rectifier converts AC power into DC, an electrical charge across alternating plate creates a reaction, and hypochlorite is produced. The material goes into a bulk tank, and hydrogen gas comes off the top or the reactor. A blower dilutes the byproduct, hydrogen gas, to below the explosive limits.

Johnston explained, “You’re taking an inert substance with salt and making it into a dilute solution of 0.8 percent,” below the hazardous material concentration threshold.

Mullen said that the residual is as good as with chlorine gas, and changes in the system are more stable with hypochlorite. “We don’t have to tweak it all the time,” added White.

The previous chlorine system was gutted with the hypochlorite equipment installed in the space. A three-day supply of hypochlorite can be generated, allowing the utility to make it through a weekend.

The cost of the conversion from chlorine gas to on-site generation of hypochlorite was $1.8 million, which the city was able to absorb in its capital-improvement plan. The operational costs of generating hypochlorite—including the salt, water, and electricity—are higher than chlorine, but the safety considerations made the additional expenses worthwhile.

The new system went into operation in May 2014.