CASE STUDY

QUAIL CREEK

Bulk Hypochlorite Disinfection System at Quail Creek WTP Replaced with On-Site Hypochlorite Generation System Saving About $160,000 per Year in Purchased Materials

OVERVIEW

Located in southwestern Utah, adjacent to both Nevada and Arizona, Washington County has historically been an agricultural community. However, in recent decades, the County has blossomed into a bustling tourist hotspot, attracting visitors worldwide. With its diverse topography and climate due to a wide range of elevations, the County offers some of the most beautiful scenic views found in the world, including Zion National Park. A site seeing tour of the area could include state parks, ghost towns, pioneer buildings, canyons, coves, caves, deserts, streams, and mineral pools. Leisure activities range from golfing, swimming, horseback riding, bicycling, and hiking. As a result, Washington County is the fifth-most populous county in Utah and enjoys the third-highest population growth rate in the state.

The rapid population growth in the last 30 years has put significant strain on the County's water infrastructure, especially given the region is the second driest in the U.S., averaging about 300 sunny days a year. In 1962, the Washington County Water Conservancy District was created to conserve, develop, manage, and stabilize the water supply for its residents. In addition to the 148,000 residents, the District provides services to a whopping 10-million tourists each year, as well as 10,000 students at Dixie State University, and a 245-bed hospital complex across its 2,430 square mile service area.

Originally built to treat 10 million gallons per day (MGD), the Quail Creek Treatment Plant in Washington County, Utah, now has an operational capacity of 60 MGD and a design capacity of 80 MGD.

SITUATION

In 1986, St. George City began construction of the $15 million Quail Creek Water Treatment Plant. The plant then had the capacity to treat 10 million gallons per day (MGD) of Quail Creek Reservoir water through multiple treatment processes, including filtration and disinfection. During its 25-plus years in operation, the plant has undergone a series of expansions to meet increased water demand, improve efficiencies, and enjoy the benefit of new technologies. An expansion in 1997 increased the plant's capacity to 20 MGD. However, that was no longer adequate, as the plant was expanded to 40 MGD in 2005 and then to 48 capacity in 2010 and will be expanded to 60 MGD in 2015. The District currently delivers over 36 million gallons a day to its customers during the peak summer months.

APPROACH

Nevertheless, St. George and Washington County continue to grapple with growth and drought issues. One of the more recent capital improvement projects to address these issues was the implementation of on-site hypochlorite generation (OSHG) disinfection into the treatment process. The District first explored using OSHG in 2003 but was not satisfied with the manufactured systems available at the time. Their impression was that the systems were too maintenance intensive, and the technology did not have a sufficient installation base proving long-term reliability and strong references. Thus, the District proceeded to use bulk delivery of concentrated hypochlorite solution (bleach) for disinfection.

With a desire to engineer and install a new system themselves in order to keep costs down, the District chose PSI's Microclor® OSHG system, in large part due to PSI's turnkey installation offer. PSI provided two Microclor® MC-600 OSHG systems with a total generation capacity of 1,200 pounds per day of equivalent chlorine. Everything needed for a complete and functional system was included: fully-automated PLC-based control system, water softeners, brine tank, hypochlorite dilution panel, and heat exchanger. To reduce additional project expenses, PSI informed the District that their existing hypochlorite storage tank and feed pump both met the minimum parameters for the Microclor® system and had sufficient usable life remaining so that replacement was not warranted at the time. The District was perfectly content to reuse this equipment. PSI also provided a concrete pad for the equipment foundation and building penetration for the vent stack. An acid cleaning cart was furnished to simplify periodic maintenance of the electrolytic cells.

"The financial benefits and supplier independence we gained from installing on-site hypochlorite generators will benefit the District and our municipal partners for years to come. Process Solutions did a thorough job of ensuring all components of the system and installation were addressed."

- Brie Esplin Thompson, Chemical Engineer Washington County Water Conservancy District

To view diagrams of our processes, visit https://cleanwater1.com/technical-content

Wide angle view of softeners on the left, with one of the 800 PPD Microclor® OSHG units on the right

RESULTS

- **The investment in Microclor® OSHG allowed Quail Creek WTP to generate its own disinfectant onsite at a much safer concentration of 0.8%, which is 20% below the hazardous material threshold.**
- **This choice also eliminated the need to transport hazardous chlorine gas or bulk bleach through the residential and industrial neighborhoods.**
- **The new smaller, vertically-oriented cells can be fully cleaned and drained in-place, resulting in a smaller installation footprint and only a fraction of the operator's time needed for maintenance cleanings. Additionally, this allows for continuous release of the hydrogen gas byproduct as well as continued operation at reduced capacity if cell removal is required.**

CONCLUSION

Making bleach is made easy by Process Solutions, Inc. The Microclor® OSHG System generates a non- hazardous dilute (0.8%) solution of sodium hypochlorite using nothing more than water, commonly-available salt, and DC current. The common availability of these raw materials makes the District self-sufficient and no longer dependent on outside vendors to deliver their disinfectant. This further reduces the risk of water supply interruption in Washington County during supply shortages, disasters, or other demanding situations. Additionally, the multi-cell design allows for continued operation at reduced capacity if cell removal is required. The District's purchase of two parallel redundant systems provides additional protection in that one system can be taken offline without any disruption of plant processes.

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