CASE STUDY

MaximOS™

Apple Valley Ranchos Water Company, CA

Parkson Disinfection

Powered by MIOX

Apple Valley keeps chlorine residual in long distribution system with mixed oxidants

Overview

Apple Valley Ranchos Water Company serves a community of approximately 45,000 people. Their drinking water supply comes from 22 well sites ranging from a depth of 250 to 400 feet. Flow rates range from 350,000 gallons per day (GPD) to 2.7 million GPD during peak usage. The raw water has a hardness of 29 mg/L to 408 mg/L and a pH of 7.6 to 8.7.

Apple Valley traditionally treated their water with chlorine bleach, in the form of 12.5% sodium hypochlorite. A desire for improved safety and elimination of all hazardous chemicals drove them to investigate on-site generation. They installed their first MIOX SAL-80 generator in 1996, with a total capacity of 10 pounds per day of free available chlorine (FAC). This was followed by DUAL-80 systems in 1998 and 1999, each with a capacity of 20 pounds FAC.

The disinfectant was designed for injection immediately before the water goes to distribution. The water system is set up on a pressure grid with elevated storage tanks into which all wells pump. The distribution system covers 43 square miles with the longest reach being 13 miles from the plant.

Challenge

Apple Valley wanted to get away from the safety concerns associated with the high concentration of commercial bleach.

Solution

The first MIOX SAL-80 system was installed in 1996 to evaluate on-site mixed-oxidant generation. The equipment resulted in improved safety, superior chlorine residual maintenance, lack of chlorine taste complaints, and reduced cost.

Results

Safety – Disinfection with sodium hypochlorite involved handling a concentrated 12.5% bleach solution. Dealing with a hazardous material mandated several safety precautions, such as eyewash stations and safety training. In addition, bleach is highly corrosive, can cause chemical burns, will form a chlorine gas cloud if washed down with water, is classified as a RCRA waste, and requires documentation and reporting for leaks or spills. In contrast, mixed oxidants require only salt and power as feed stocks. Their SAL-80 mixed-oxidant solution was generated at a concentration of about 0.2%, thus does not require protective gear and will not burn the skin.

Residual Maintenance – Apple Valley's distribution system covers 43 square miles with a maximum distance of 6 miles from the disinfection stations (previously 13 miles). When using hypochlorite, they dosed 0.8 mg/L on Well #10 but had only a 0.1 mg/L residual 8 miles from the initial disinfection point. Thus, they had to boost with a 0.2 mg/L dose (for a total dose of 1 mg/L) to maintain a

COMPARISON	Gas Chlorine (before)	Mixed Oxidants (after)
Safety	12.5% commercial bleach mandated eyewash stations and other safety measures.	Dilute 0.2% concentration of mixed-oxidant solution eliminated handling of hazardous materials and associated safety regulations.
Residual Maintenance	Dose of 0.8 mg/L required boosting with an additional 0.2 mg/L to maintain residual over 13-mile stretch. Residual lasted only 5 days in remote storage tank.	Total dose reduced 40% to 0.6 mg/L for a 0.25 mg/L residual to all holding tanks with no boosting required. Residual maintained three times longer (15 days) in remote tank.
Taste & Odor	Approximately 11 taste complaints annually due to chlorine taste.	No taste complaints since installation.
Costs	Costs included chemical purchase and transportation.	Total costs reduced 12%. Only expenses are salt and power.

residual to the end of the 13-mile line. With mixed oxidants, their dose was only 0.6 mg/L at that well, a 40% reduction overall, with no boosting required for a stable 0.25 mg/L residual in the holding tanks. Mixed oxidants maintained a residual for up to 15 days in a one million gallon tank in a remote industrial area, whereas bleach only lasted for 5 days. As additional well sites are converted to mixedoxidant disinfection, the water company expects superior residual maintenance throughout their entire system.

Taste & Odor – Those areas treated with bleach would receive monthly complaints of a chlorinated taste to the water. After conversion to mixed oxidants, there were no more taste or odor complaints in the zones treated by MIOX disinfection.

Costs – The water company reports that mixed oxidants reduced operating costs by 12%. The combined cost of salt and power for mixed-oxidant generation was less than the cost of purchasing and transporting drums of bulk sodium hypochlorite. ■

"MIOX holds a lot longer in that zone than sodium hypochlorite – that's where we noticed it."

Scott Weldy, Superintendent

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