

CASE STUDY

MaximOS™

Sangre de Cristo Water Company, Santa Fe, NM



MaximOS™ improves Santa Fe's WTP process and reduces operational costs

Overview

The City of Santa Fe is located in the foothills of the Sangre de Cristo mountains in north-central New Mexico. The water utility, Sangre de Cristo Water Division, is owned by the City, but is operated by PNM Water Services. The service area is approximately 40 square miles and ranges from approximately 8,000 feet to 6,500 feet elevation.

Santa Fe's potable water supply comes from surface and ground sources. The surface water source is from snow-melt and summer thunderstorm run-off from the mountains. This water is detained in two reservoirs upstream from the CRWTP, a conventional plant built in 1968 with a design capacity of 10 MGD. The plant's processes include clarification and filtration of the influent with dual media sand filters, as well as disinfection of the treated water.

The ground water sources come from 6 wells located within the City and a well field near Buckman Crossing, 14 miles northwest of the City. Each well produces approximately 0.8 MGD; the Buckman field can produce as much as 6 MGD. Santa Fe's water production ranges from approximately 10 MGD in the winter to 22 MGD in the summer. During the summer peak, all production sources must be used to meet the demand. Santa Fe plans to add to its sources in the next 5 years by taking advantage of surface water rights from the San Juan-Chama project.

Challenge

Santa Fe wanted to avoid EPA's 1999 requirement for a Risk Management Plan (RMP) and improve community safety by

eliminating chlorine gas. The Canyon Road Water Treatment Plant (CRWTP) stored 3 tons of chlorine gas at the plant. Delivery trucks traveled up a very narrow residential road to the plant, which is above a heavily-touristed area. The Buckman well field stored 1-ton cylinders at the site also. Five other wells had 150-lb. cylinders stored around the city in residential areas and commercial districts.

Santa Fe was forced to reduce spring flows at the water treatment plant to reduce turbidity. Their TTHM limits were threatening new EPA DBP limits. They wanted to maximize plant capacity while meeting turbidity and DBP requirements.

Solution

Boyle Engineering evaluated cost and performance for two on-site disinfection options: mixed oxidants (MaximOS™) and on-site generation of sodium hypochlorite (bleach). The final report favored MaximOS™ due to superior disinfection potential and cost competitiveness. MaximOS™ is now used for both pretreatment and final disinfection at the CRWTP, as well as at all well sites throughout the city.

In recent years, political opposition as well as a lack of popular support by the general public has led to a significant decline in the agricultural utilization of sludge on the island causing the city to look for alternative disposal methods. High costs made transportation to the Spanish mainland prohibitive, thus forcing the city to find a method for suitable disposal on the island itself. Finally, the island's dependence on tourism demanded a flexible, environmentally friendly solution.

COMPARISON	Gas Chlorine (before)	MaximOS™ (after)
CRWTP Water Production/ Microflocculation	4 MGD during spring (8 MGD capacity).	10 MGD production; 60-66% less alum & polymer achieved settling in < 20 min., even at 38° F. Filter runs extended 50%. Sludge handling cut 15-20%.
Turbidity	0.6 NTU (above 0.5 MCL).	0.25 NTU in summer; as low as 0.01 NTU in winter.
Fluoride	Normal fluoride dose.	20-50% less fluoride.
Chlorine Dose/Residual	1.6 ppm FAC clearwell dose required for residual.	Clearwell FAC dose reduced 31% to only 1.1 ppm for a 0.3 ppm residual at all points.
DBPs / TTHMs	> 60 µg/L w/ spikes > 80 µg/L.	33 µg/L average.
Taste & Odor Problems	Yes, especially w/mixed surface & well water.	No (only 1%-2% of previous complaints); eliminated problems w/ mixed surface & well water.
Safety	1-ton gas chlorine cylinders necessitated RMP planning.	Eliminated hazardous chemicals; no need to write RMP or PSM or do further HAZMAT training.
Operating costs	Operating costs at \$79,000. Low spring flows mandated use of expensive wells.	Operating costs cut 34% to \$52,000 at SWTP. Ability to run SWTP at peak capacity year-round avoids need to go to more expensive well water.

Results

Water Production/Microflocculation – In past winters, the SWTP flow had to be slowed because the water was too cold for the flocculent to work well. Slowing the flow was the only way to keep the turbidity < 1 NTU. MaximOS™ caused a microflocculation effect, causing a much quicker settling reaction. In jar tests, it achieved complete settling in 17 minutes, whereas chlorine gas achieved no settling, even after 2 hours. In fact, the plant has cut their total coagulant dose by 39%. In addition, starting the plant up in spring took only 8 hours, instead of the normal 2 to 3 days. The plant is able to maintain capacity at a consistent level throughout the year. The filter backwash interval with MaximOS™ was also extended from 48 – 72 hours to 72 – 100 hours, and the backwash occurs much more rapidly using less water. In addition, the sludge is drier due to lower alum concentration, reducing sludge production by about 15 to 20%.

Turbidity – Even at increased capacity, the finished water turbidity level was cut from an average of 0.6 ntu to 0.25 ntu, bringing it below the national MCL of 0.5 ntu.

Fluoride – Fluoride use has decreased by 50% since installation of MaximOS™, due to the reduction in alum, with which it reacts.

Chlorine Dose/Residual – The FAC dose as mixed oxidants was reduced 31% and a consistent residual is still maintained.

DBPs/TTHMs – With chlorine gas, TTHMs averaged > 60 µg/L with at least 5 spikes above the 100 µg/L limit. With MaximOS™, TTHMs average

33 µg/L in the distribution system, with spikes well below projected MCLs.

Taste & Odor Problems – Previously, complaints were received due to chlorine taste and mixed surface and well water. With MaximOS™, the operators report only 1% to 2% of the previous level of complaints.

Safety – Santa Fe has eliminated the need to transport, store, or handle chlorine gas, and will not have to write an EPA Risk Management Plan (RMP), an OSHA Process Safety Management (PSM) plan, or do any further HAZMAT training.

Operating Costs – Safety-related costs are completely absent. When savings for fluoride, alum, polymer, lime and sludge disposal are added in, MaximOS™'s actual annual operating costs (\$52,000) are one-third lower than the cost of operations with gas chlorine (\$79,000). The utility will recover their capital cost in just over three years. In addition, Santa Fe's gravity-fed surface water costs less than well water. Due to increased SWTP capacity in spring, the utility saves even more on operating costs.

Success – Due to the successes at the Canyon Road WTP, the City of Santa Fe decided to convert entirely to MaximOS™ disinfection. To date, there is no hazardous chlorine gas in the city. Another stated advantage is that MaximOS™ provides a third barrier for Giardia and Cryptosporidium after the clarifier and filtration. Santa Fe is very satisfied with their MaximOS™ equipment and the service they have received. ■



Fort Lauderdale
Chicago
Montreal
Dubai
Mumbai

1.888.PARKSON
technology@parkson.com
www.parkson.com