

## CASE STUDY

### MaximOS™

North Table Mountain Water and Sanitation District, CO



# Disinfection byproducts reduced with MaximOS™ at North Table Mountain

## Overview

North Table Mountain Water and Sanitation District (NTM) is located about 30 miles northwest of Denver, CO, with a service area of 8 square miles. The water treatment plant is at an elevation of 5,850 feet. They purchase their water from Denver, and the source is a reservoir supplied primarily by snow melt. The plant is sized for 11 million gallons per day (MGD), but peak flow is only 5 MGD.

The plant's processes include ACTIFLO ballasted flocculation/sedimentation pretreatment, as well as disinfection of the treated water. (For questions on ACTIFLO, please contact Rick Jeschke.) The disinfectant is injected into the water stream after the pretreatment and before the filters, in a stretch of pipe about 200 feet long. Use of chlorine gas was around 100 pounds per day. The influent water has a pH of 8, and the plant had to add lime to compensate for the decrease in pH associated with the use of chlorine gas.

North Table Mountain wanted to maintain their status as a state-of-the-art facility, and chose to eliminate chlorine gas primarily for safety reasons. They were also interested in decreasing lime use and eliminating the chlorine taste in the water. In January of 2000, NTM installed a MaximOS™ mixed-oxidant generator, completely eliminating the use of chlorine gas. The site also uses a 30-ton brine generator, which will need to be refilled only on an annual basis.

## Challenge

North Table Mountain's (NTM) primary goal was a safe water plant with no potential for a chlorine accident. NTM wanted to eliminate any hazardous materials that could be detrimental to the plant operators or to the newly developing neighborhoods nearby.

## Solution

Conversion to MaximOS™ on-site generation eliminated any hazardous substances from the plant. The only feed stock for the MaximOS™ unit is brine solution, so poisonous chlorine gas is no longer transported, stored, or handled. Moreover, the plant has eliminated the potential of an accidental chlorine release.

## Results

**Safety** – NTM was concerned both with public safety and plant personnel safety. Massive subdivisions are being built around the plant, and there is a recreational lake area directly across the street that is a popular destination for boaters and fishers. An accidental release of chlorine gas meant possible harm to an operator or nearby residents. With MaximOS™, the site no longer uses, produces, stores, or transports any hazardous materials. Liability has been reduced, the plant no longer has to maintain a Risk Management Program (RMP) or fill out reports for the local fire department, and the operators no longer need to attend HAZMAT training or use safety equipment. **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.

**Chlorine Residual** – Within one week of start-up, the chlorine residual had stabilized out in distribution. With gas, they needed a residual of 1.2 ppm leaving the plant to maintain the minimum requirements at the far reaches of distribution. With MaximOS™, the initial dose at the plant has been reduced 33% to only 0.8 ppm.

This level is sufficient to maintain a steady residual of 0.3 to 0.4 ppm throughout the entire distribution system, with little variation from the plant to the farthest point.

**Taste & Odor** – NTM has not had any taste or odor complaints since installing MaximOS™. Rick Jeschke, District Engineer & Manager, says he does not smell chlorine in the air at the plant, nor can he detect any chlorine odor in the tap water at the office located immediately adjacent to the plant. Even so near the point of injection, where there is a robust chlorine residual, there is no chlorine taste or odor apparent.

**Ease of Use** – Dave Hansen said that only 1 week after start-up, the MaximOS™ unit was performing very well: "It truly is a hands-off unit and seems to run itself." Rich Jeschke says "We're really happy with the system. We got it started and it just goes on its own. It doesn't require much attention." The operators spend less than 10-15 minutes per week checking over the system, and after two months of operation, had not yet needed to change out the filters.

**Lime Use** – Since mixed oxidants have a nearneutral pH, the pH of the incoming water is not radically altered. NTM has seen about a 50% reduction in the use of lime since installation of their MaximOS™ system.

**TTHM Reduction** – Before conversion to Actiflo while using only chlorine gas, TTHMs for the plant averaged 62.7 µg/L with spikes up to 73 µg/L. Installation of the Actiflo treatment reduced TTHM formation by 35% to a level of 40.5 µg/L average production with spikes up to 53 µg/L. Replacement of chlorine gas with MaximOS™ mixed oxidants lowered the TTHM levels another 44% below that achieved with Actiflo to only 22.7 µg/L. The MaximOS™ /Actiflo combination achieved a total reduction of 64% in TTHM formation, well below even the Stage II MCL of 40 µg/L.

**HAA<sub>5</sub> Reduction** – HAA<sub>5</sub> in the plant before any changes averaged 40.4 µg/L. After the Actiflo conversion, they were reduced by 28% to a level of 27.9 µg/L. With the elimination of chlorine gas and inclusion of MaximOS™ mixed oxidants, HAA<sub>5</sub> production was reduced an additional 44% to only 15.7 µg/L. This is a total reduction of 61% with the MaximOS™/Actiflo combination, again below even the Stage II MCL of 20 µg/L. ■

**"It truly is a hands-off unit and seems to run itself."**

**Dave Hansen,**  
**Operator**

COMPARISON	Gas Chlorine (before)	MaximOS™ (after)
Safety	1-ton gas chlorine cylinders necessitated RMP planning; potential for an accident	Eliminated hazardous chemicals; no need to write RMP or do further HAZMAT training; no potential for an accidental release.
Chlorine Dose/Residual	1.2 ppm residual leaving the plant to maintain 0.2 ppm	Dose reduced 33% to a 0.8 ppm residual leaving the plant for a steady 0.3 to 0.4 ppm residual throughout distribution
Taste & Odor Problems	Minimal complaints	No complaints at all; operators can no longer detect chlorine T. & O. in tap water near the plant, despite a robust chlorine residual
Ease of Use	Minimal maintenance	Maintenance has not increased with MaximOS™; spend less than 10-15 minutes per week
Lime Use	Necessary for pH adjustment	Reduced 50%
DBPs - TTHMs	Before Actiflo: 63 µg/L After Actiflo: 40 µg/L	44% reduction from Actiflo to only 23 mg/L (64% total decrease with MaximOS™/Actiflo combo)
DBPs - HAA <sub>5</sub>	Before Actiflo: 40 µg/L After Actiflo: 28 µg/L	44% reduction from Actiflo to only 16 mg/L (61% total decrease with MaximOS™/Actiflo combo)



**Fort Lauderdale**  
**Chicago**  
**Montreal**  
**Dubai**  
**Mumbai**

1.888.PARKSON  
[technology@parkson.com](mailto:technology@parkson.com)  
[www.parkson.com](http://www.parkson.com)