

Central Texas Water Supply Corporation Manages DBP Formation with Help from Online THM Analyzer



The Central Texas Water Supply Corporation (WSC) in Bell County is a water wholesaler serving the needs of more than 20 municipal customers across 7 counties in Central Texas. Despite having relatively good source water quality, the Central Texas WSC Water Treatment Plant (WTP) experiences high organic loading, leading to trihalomethane (THM) formation in their distribution network. The utility uses chloramines, combined chlorine and ammonia treatment, as their primary disinfection method to help minimize THM formation.

The Central Texas WSC produces 21.8 million gallons per day (mgd) of water to service customer demand using three treatment plants; two conventional and one ultrafiltration. The Stillhouse Hollow Lake, the primary water source for the Central Texas WSC WTP, is of relatively good water quality with a total organic carbon (TOC) of 4 mg/L. However, the lake is part of an agricultural-based watershed where tannins and lignins routinely wash into the lake and cause elevated manganese and iron levels.

Before the Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR), the Central Texas WSC WTP would maintain an effluent total THM (TTHM) value of less than 40 ppb to ensure that TTHM values 60 miles out in their distribution would be below 80 ppb. With the advent of Stage 2 DBPR, locational running annual average (LRAA) requirements at specific monitoring locations throughout the distribution system were determined with quarterly sampling for TTHMs.

The change to LRAA requirements highlighted the need for the Central Texas WSC to review operational performance and optimize DBP mitigation strategies to ensure continuous production of treated water containing less than 80 ppb TTHM.

The Central Texas WSC worked to adjust ammonia and chlorine concentrations, keeping them as consistent as possible to maintain a proper ratio of monochloramines. Effluent TTHM was maintained at 15 ppb to ensure compliance at remote locations in the network and handover points. A mixer was installed at the ultrafiltration plant's clearwell to reduce THM formation.

The Value of Real-time THM Data

Until 2014, the Central Texas WSC relied solely on external laboratory analyses of water samples to validate the efficacy of process improvements and changes. However, results often took two to three weeks to return, at which point the treated water had already exited the plant and entered the distribution system. To obtain timely results on TTHM levels in the WTP effluent, within the distribution network, and at handover points, the Central Texas WSC began a yearlong full-scale study of the THM-100™ online THM monitor manufactured by AMS.

The THM-100 monitor was installed at the Central Texas WSC WTP, and six daily samples were analyzed. The instrument provided plant operators with immediate, real-time results for TTHM. As a result of the real-time data provided by the online monitor, THM formation within the Central Texas WSC WTP and distribution system became easy to identify. Operators could better manage the ratio of monochloramines, adjusting it accordingly as TTHM levels fluctuated. In addition, fluctuations in TTHM levels above 15 ppb were easily identified, and process changes were made immediately.

This process optimization reduced chemical costs as the ammonia-to-chlorine ratio was managed based on real-time TTHM levels instead of dated results from external laboratory analyses.

The baseline and predictive data available through the THM-100 allowed operators to see the effect of process changes easily. For example, during the clean-in-place (CIP) treatment of the ultrafiltration membrane elements, the online THM monitor showed that in-plant TTHM levels reached 90-100 ppb, following the return of wastewater into the process stream. Without the real-time data provided by the online THM monitor, operational staff would not have easily identified the negative effect of returning the CIP wastewater to the treatment plant. However, using the online THM monitor enabled operators to see the effect, within hours.

With the conclusion of the yearlong study and successful operation of the THM-100, the Central Texas WSC WTP installed a permanent online THM analyzer at the facility. Providing safe drinking water is of the utmost importance for the Central Texas WSC operational staff. The THM-100 is a viable tool, among others, that enables plant operators to have a firm and immediate understanding of water quality leaving their plant and throughout their distribution network.