

Online THM Analyzer Supports DBP Compliance Strategy for City of Benicia



The City of Benicia, California, must address high levels of dissolved organics in their source water while servicing the water treatment needs of approximately 28,000 residents through a nominally rated 12 million-gallon-per-day (mgd) conventional treatment facility. With access to two water sources, the primary source water for the Benicia Water Treatment Plant (WTP) contains high levels of natural organic matter (NOM) with total organic carbon (TOC) levels ranging between 4-18 mg/L. While the Benicia WTP has successfully and continually reduced TOC levels by approximately 50% through pre-treatment efforts, residual TOC combines with the chlorine disinfectant used onsite to form moderate levels of trihalomethanes (THMs), leaving the WTP.

The Benicia WTP has implemented a series of best management practices (BMPs) to help minimize the formation of THMs in its distribution system and ensure compliance with the Stage 2 Disinfectants and Disinfection Byproducts Rule (DBPR). In addition to minor pre-treatment and disinfection process changes, the Benicia WTP decided to monitor THM levels more frequently since real-time fluctuations in THM levels were difficult to characterize based on the frequency of quarterly grab samples and analysis timing. Monitoring the real-time correlation between operating conditions and THM levels was imperative. Some locations throughout the distribution system were experiencing high levels of THMs due to residence time and the age of water conditions. However, the turnaround time to receive results from external laboratory analysis proved too long to implement proactive management of THM mitigation strategies, limiting their efforts to reduce THMs leaving the plant and minimize the formation of THMs in the distribution system.

Monitoring THM Levels

The Benicia WTP began to explore options and learned about an online THM analyzer capable of providing immediate results and measurements for TTHM and THM species. THM speciation at the Benicia WTP is composed of approximately 80% chloroform (CHCl₃), followed by 20% bromodichloromethane (CHCl₂Br), 0% dibromochloromethane (CHClBr₂) and 0% bromoform (CHBr₃).

As a result, the Benicia WTP installed an online THM analyzer, THM-100™, manufactured by AMS, to provide accurate and timely information regarding THM levels in their treated water. Typically scheduled to take measurements every six hours, the Benicia WTP set the self-calibrating THM-100 analyzer to sample every four hours (0200, 0600, 1000, 1400, 1800, and 2200) so it would coincide with other water quality measurements and sampling scheduled at the facility.

Since installing the online THM analyzer in October 2012, the Benicia WTP has been able to accurately monitor the correlation between operating conditions and THM formation potential. Daily THM results provided the operational staff with real-time feedback on the implication of process changes on THM levels in the finished water (Figure 1).

As THM levels fluctuated, the operational staff would apply BMPs to adjust for increased THM levels. Operators have optimized plant performance and chemical dosage, allowing them to economize plant chemicals and dose pace accordingly. Treatment anomalies have been detected early, enabling immediate correction to process controls. Integrating the THM-100 analyzer at Benicia WTP has helped ensure regulatory compliance and the delivery of treated water of the highest quality to the City of Benicia.

Figure 1. Daily Average TTHM Levels (ppb)

