

Online THM Analyzer Proves Valuable to THM Mitigation Strategy & Optimization for Birmingham Water Works Board

The Shades Mountain Filter Plant (SMFP) is an 80 mgd conventional filtration/disinfection facility operated by the Birmingham Water Works Board (BWWB). The large open-air sedimentation basin at the front of the SMFP is susceptible to algae growth, particularly during the summer months of June through August.

While algae growth is managed with the addition of chlorine, naturally occurring organic matter present in the raw water reacts with the disinfectants to form THMs. Effluent THM values can be as high as 55 ppb during the summer months, which doesn't account for increased formation through the distribution system.



To ensure regulatory compliance with Stage 2 DBPR, the BWWB has implemented a THM mitigation strategy inclusive of aggressive tank fluctuations, pipe flushing, and extensive chemical treatment research. Before continuously monitoring THM's, the BWWB focused efforts on organics removal and managing water age to combat THM formation at the plant and in the distribution system. Fluctuations in THM levels arriving from variable influent conditions affect process control changes that are difficult for the BWWB to characterize based on the frequency of quarterly grab samples and the turnaround time of in-house and external laboratory analysis. However, to truly monitor the success of their THM mitigation processes, the BWWB needed an analytical method that provided reliable data of THM levels in real or near real time.

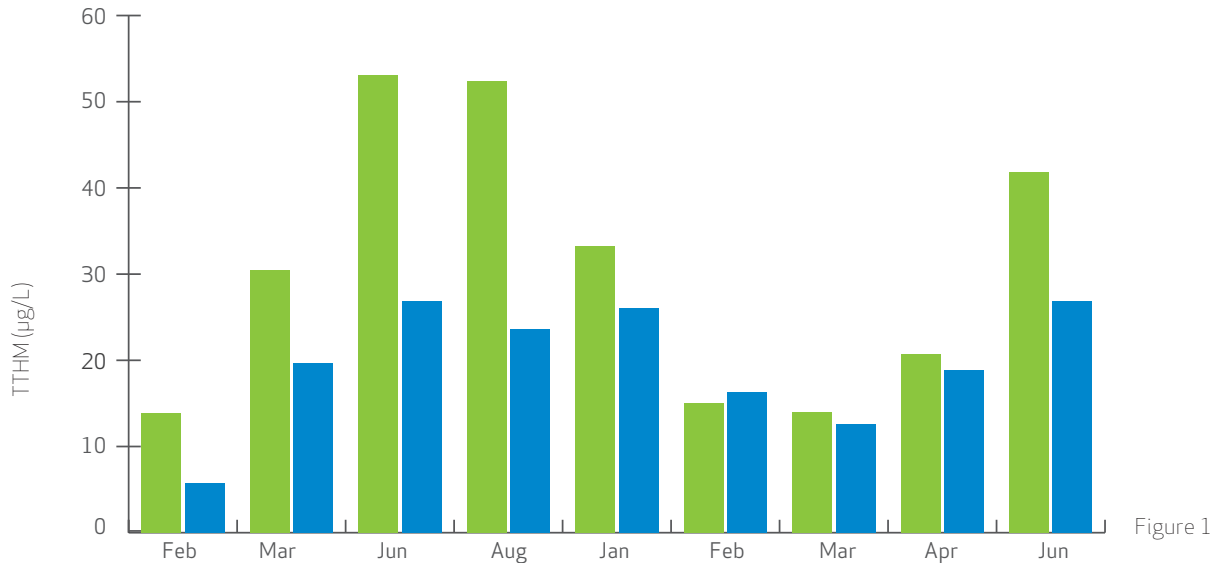
In September 2013, the BWWB piloted the THM-100™ online instrument manufactured by Aqua Metrology Systems to characterize and monitor THM levels in their SMFP. After a successful demonstration, the BWWB began using the online THM-100 monitor in full-scale operation at the SMFP. The THM results for 18 months pre and post THM-100 analyzer are noted in (Figure 1).

SMFP's previous strategy focused on the removal of organics to combat THM formation. However, the required use of chlorine entering the 4 acre open air sedimentation basin to minimize biological growth elevated plant THM levels. The BWWB often conservatively operated their facility while waiting to receive results to ensure they remained in compliance with regulatory requirements. This approach resulted in extensive enhanced coagulation, which increased operational expenses on chemicals, sludge removal, processing, power and other resources.



Online THM-100™ Analyzer installed at the Shades Mountain Filter Plant.

THM Results 18 months Pre & Post THM-100™ Analyzer



	Feb	Mar	Jun	Aug	Jan	Feb	Mar	Apr	Jun
Pre-Analyzer Finished TTHM (2012-2013)	13.91	30.51	53.05	52.42	33.22	15.08	14.02	20.74	41.78
Post-Analyzer Finished TTHM (2014-2015)	5.72	19.69	26.85	23.57	26.01	16.31	12.61	18.91	26.86

Benefits of the THM-100™ Online THM Analyzer

The online THM-100 monitor enabled the BWWB to optimize their chlorine disinfection process and minimize the formation of THMs in their treated water by providing the operational staff with immediate and accurate daily reports on THM levels. Following the Summer 2014 season, fluctuations in THM levels were reduced to maintain an average of 33 ppb as opposed to 55 ppb. Instant trending results were developed using the software reporting output of the online analyzer, providing important insight required to ensure regulatory compliance with the Stage 2 DBPR.

THM formation has been lowered as much as 50% since the installation of the THM-100 analyzer. The cost per THM analysis was reduced from \$45/sample (lab-based method) to \$3.75/sample (online THM-100 analyzer method), resulting in an annual savings of \$173,000 in THM sampling and associated costs. The real time high frequency data on daily THM values has proved valuable to SMFP THM mitigation strategy and optimization.