

Online THM Analysis Enables THM Control at the R.E. Badger Filtration Plant

The R.E. Badger Filtration Plant is a 40 million gallons per day (mgd) Conventional Filtration plant that treats water for the Southern California cities of Rancho Santa Fe, Encinitas, Solana Beach and Fairbanks Ranch. Built in 1970, the treatment plant treats water from local sources as well as imported water from the San Diego County Water Authority aqueduct raw water lines. The local sources — San Dieguito Reservoir and Lake Hodges — contain local runoff and are very challenging to treat compared to the imported water supplies.

Because of the relatively large watershed and high nutrient loading found in these sources, both are subject to large algae blooms, lake turn-over and high turbidity during rainfall events. These events have subjected the treatment plant to difficulties ranging from shortened filter run times, chemical demand fluctuations, taste and odor problems associated with 2-Methylisoborneol (MIB) and Geosmin compounds, high Disinfection Byproducts (DBPs) due to high levels of Total Organic Carbon (TOC) and Dissolved Organic Carbon (DOC), all of which result in higher treatment costs and lower customer satisfaction.



The AMS THM-100™ analyzer provides the R.E. Badger Filtration Plant automated and reliable measurement of THMs levels; measuring chloroform or bromoform species as well as Total THM and THM Formation Potential.

The treatment plant has worked diligently to optimize many of the treatment processes and lake management systems installed in San Dieguito Reservoir to reduce treatment costs and produce higher quality water. The facility has installed aeration systems and other lake management monitoring equipment to minimize the formation of blue-green algae species and pre-oxidize Lake Hodge Water deliveries to reduce iron, manganese and sulfur compounds. Management and monitoring of the local source together with coagulant optimization have increased the amount of local water that the treatment plant can reliably use.

The low cost of the local water provides the incentive to use local sources over the much more expensive imported water. Through these efforts, local water usage has increased from 30% to 50% of total water deliveries. This increase saved the water district over \$1 million per year by minimizing the purchase of more expensive imported water supplies. In addition, the source water management efforts resulted in a significant decrease in challenging constituents. Blue-green algae blooms, which have been problematic in the past with their production of MIB and Geosmin (Taste and Odor) compounds, have been all but eliminated, lake turn-over has been eliminated, low dissolved oxygen (DO) episodes have been eliminated, manganese and other color related issues and customer complaints have been reduced, TOC concentrations have been reduced by 30%, all of which result in a higher quality end product.

One of the challenges that the R.E. Badger Filtration Plant has historically faced has been compliance with the contact time (CT) requirements. Following detailed testing to understand how THMs react in their system, the facility determined an action plan for increasing local water usage while firmly remaining in compliance with the Stage 2 Disinfectants and Disinfection Byproducts Rule (DBPR).

Monitoring actual THM formation would allow for much greater control of its production. Without the means to continuously monitor THM production, the plant would often select blends of local and imported waters that would most likely produce lower

levels of THMs in order to remain in compliance with the regulations. Typical DBP turnaround analysis time with a contract lab using GC/ECD or GC/MS can be as long as two weeks; too long to be a practical method for monitoring current production values. However, with an online THM analyzer, optimization to the treatment process with regards to THM control is possible. By establishing action levels of THMs at the end of the process, more precise manipulation of flow blends can be achieved without the potential for violations of the DBPR.

The online THM analyzer, [THM-100™](#), manufactured by Aqua Metrology Systems (AMS) was tested and then implemented in full-scale operation at the R.E. Badger Filtration Plant in March 2012. The THM-100 analyzer provides automated, unattended, reliable, and accurate measurement of THMs levels; measuring chloroform or bromoform species as well as Total THM and THM Formation Potential.

The analyzer data provided insights into THM formation at the R.E. Badger Filtration Plant that would not have been revealed with analysis by infrequent grab-samples. With confidence in the reliability and accuracy of the analyzer, operations staff maximized the amount of local water without violating the THM standard by using the online THM-100 analyzer to characterize the increase in THMs in the distribution system. The online THM analyzer has provided R.E. Badger Filtration the visibility of THMs or predictive THM levels in real-time, offering early indication of potential problems before they become a compliance issue.

"We've been very impressed with the level of service provided by the AMS team and the monitoring capabilities of the analyzer," said Tim Bailey, Water Treatment Plant Manager for the R.E. Badger Filtration Plant of the Santa Fe Irrigation District. "The THM-100 has given us the confidence to shift our focus to other areas of the treatment process, knowing that if there is ever a change in the THM levels in the distribution system, we can intervene immediately. The response time of the AMS service team and monitoring attentiveness is second to none."

