APPLICATION BRIEF

Online THM Analyzer Aids THM Mitigation Strategies for City of Santa Cruz

In drought-ridden California, water utilities like the City of Santa Cruz Water Department (SCWD) face increasing pressure to manage water supply challenges caused by ongoing and future droughts. At the same time, they must consistently provide safe drinking water while meeting all federal and state regulatory demands. Reducing trihalomethane (THM) formation has been of vital concern to the SCWD, which has experienced elevated levels of THM formation potential (THM-FP) since placing a greater reliance on a lake as a source of water for the Graham Hill Water Treatment Plant (GHWTP). The quality of SCWD source waters varies greatly and directly affects the effluent THM-FP discharged from the GHWTP. When the Loch Lomond Reservoir is the main raw water source, effluent THM-FP levels are at a maximum of 140 ppb. When the San Lorenzo River and other Coastal Sources are the main raw water sources, effluent THM-FP levels are at a maximum of 70 ppb.

The SCWD conducted feasibility studies on aeration methodologies, enhanced coagulation, chlorine dioxide, and distribution system realignment to reduce distribution system THM levels. An online THM and THM-FP analyzer, THM-100™ from AMS, aided the SCWD in their daily operations and feasibility studies by providing real-time and reliable data on THM and THM-FP levels within the WTP and the distribution network.

Background

Before implementing an online THM analyzer, SCWD relied on traditional grab samples and laboratory analysis to measure THM levels during the feasibility study on commercially available aeration technologies to remove THMs from their reservoirs and complement existing operational THM mitigation efforts. Grab samples for THM concentration and chlorine residual were taken three times per day for the first week of the study. After that, the grab sample frequency was reduced to once per week because keeping the original grab sampling schedule became too costly, time-consuming, and labor-intensive.

A contract laboratory was hired to test the grab samples for THM concentrations. Analyses took approximately two to three weeks to return, so the SCWD conservatively operated the aerators while waiting to receive THM results to ensure they remained in regulatory compliance. This approach increased operational costs, including chemicals, sludge removal, power, and other resources used during the aeration feasibility study. Additionally, the long durations between sampling and obtaining the analytical results hindered the timely progression of the feasibility study.

Online THM Monitor Aids Aeration Study

In June 2014 the SCWD began continuous online monitoring of THM values in the GHWTP effluent with the THM-100 analyzer. The throughput for each THM analysis is approximately two hours. The THM-100 allows manually collected 'grab' samples from other locations within the water plant and distribution network to be analyzed alongside samples taken automatically by the monitor in its online mode. The THM-100 is scheduled to perform five daily online TTHM samples and one daily online THM-FP sample per day, and grab-samples are queued to start immediately when the instrument is idle.

Online THM and THM-FP analyses provided a high frequency of rapid and reliable data compared to the turnaround from external laboratories. The real-time THM data proved essential in understanding the performance of the aeration systems under varying test operational conditions. The online THM analyses aided the SCWD in cost-effectively characterizing and monitoring THM levels resulting from aeration and efficiently managing the study in a timely manner.

Following the conclusion of the aeration study, the SCWD installed two aeration systems and the THM-100 continues to be used for daily online analyses of TTHM and THM-FP levels.

THM Mitigation in the Distribution System

The THM and THM-FP data from the THM-100 analyzer have aided the SCWD in managing THMs in the distribution system. If the THM-FP data is high, the SCWD makes process changes to reduce THM concentrations at the system's endpoints. The THM-100 has also helped the SCWD optimize flushing flow rates and flushing times at the distribution system's endpoints. Additionally, real-time data on THM levels enables the SCWD only to use the aerators when necessary, supporting a reduction in energy costs.

Conclusion

The online THM-100 analyzer has become a crucial tool in SCWD's daily operations, providing real-time, reliable data on THM and THM-FP levels within the WTP and the distribution network.

a: 1225 E. Arques Avenue, Sunnyvale, CA 94085 | t: +1 (408) 523-1900
e: info@ams-h2o.com | w: ams-h2o.com