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APPLICATION BRIEF

Real-Time THM Data Help Utilities Achieve DBP Compliance, Optimize Aeration Processes and Ensure Public Safety

The adoption of online, real-time monitoring and the timely analysis of data are driving significant change in the water industry. Utilities looking for innovative and cost-effective solutions are turning to high-frequency data to not only aid them in identifying contaminants of concern but also in understanding and optimizing the performance of their treatment processes once a solution has been installed.

2 MGD storage facility (Clearwell #2) at San Luis Obispo Water Treatment Plant where the online THM-100 is used to control the TTHM removal equipment.

Let's take trihalomethanes (THMs) for example. THMs are the most common type of regulated disinfection byproducts (DBPs) that water utilities struggle with. When raw or treated water that contains organic material is disinfected with chlorine, THM precursors are produced. While the disinfected water travels from the water treatment plant to the consumer the reaction of organics with residual chlorine continues and some pre-formed DBPs progressively break down into THMs. A failure to reduce the presence of THMs once they have been created places the utility at risk for violation of regulatory compliance at the customers' taps and threatens consumers' health.

Driven by regulation and brought on by the need for effective management of carcinogenic DBPs, the use of aeration is being adopted widely in the U.S. as a solution to lower THM levels in water distribution networks and storage systems, and hence the THM Formation Potential (THM-FP) of the water treatment plant effluent. Utilities spend a significant amount of operational capital to mitigate harmful THMs with aeration. If they overtreat, they waste a lot of money, and if they undertreat, they might be in breach of the regulation.

But choosing an aeration system that balances THM removal with operating cost is not straightforward.

Why? Because aeration system manufacturers often talk about % THM reduction; however, utilities are better suited with data on the absolute level of THMs leaving the storage tanks or reservoirs, irrespective of levels entering or forming within them.

And understanding real-time THM levels is difficult since they change rapidly and are highly influenced by variance in water quality parameters including temperature, pH, precursors such as organic matter and bromide, chlorination levels, rain events, and more, along with water demand and age. These frequent and significant THM fluctuations, occurring even within the same day, are difficult to capture with quarterly regulatory grab samples, and immediate operational response is impossible with the turnaround time to THM results of external laboratory analysis.

Therefore, the operational implication of not having continuous real-time THM data is an inability to adequately validate and then optimize aeration system performance and the reservoir management strategy. This is because there is a direct correlation between the cost-effective operation of an aeration system and the ability to understand, in real-time, THM and THM-FP levels.

Today, online water quality analyzers increasingly are being specified by consulting engineers and end-users into aeration treatment system design, establishing continuous real-time THM data as vital assets in meeting regulatory compliance and ensuring public safety. Online THM analyzers act as the "brains" of aeration systems, providing operational certainty that utilities did not have before with grab samples.

Thus, utilities are implementing real-time, online THM analyzers, such as the THM-100™ from Aqua Metrology Systems (AMS) to better adjust to incoming water quality, manage treatment processes and reservoir quality 24/7, achieve regulatory compliance and ensure system THM and THM-FP are at levels needed to ensure the protection of public health.

City of San Luis Obispo, California

Located on California's Central Coast, the City of San Luis Obispo's Water Treatment Plant is a 16 million-gallon-per day (MGD) facility with a distribution system span of over 180 miles which receives water from three different surface water reservoirs with varying levels of naturally occurring organic material (NOM) in the feedwater. The facility uses ozone for its primary water disinfection; however, secondary disinfection is done with free chlorine.

In 2014 and 2015, the city experienced high THM levels and staff began to research processes and practices that could head-off high THM recurrences. To ensure DBP regulatory compliance, the city chose in-tank aeration to mitigate THMs. While effective in the removal of THMs, in-tank aeration is a high-energy consumption process. Spending approximately $10K per month on power, San Luis Obispo began searching for an effective solution that would help reduce energy expenses while optimizing the treatment process and making it more cost-efficient.

The city selected the online THM-100 analyzer which delivers accurate and reliable high-density THM data with an average sample time of less than 120 minutes. The analyzer comes standard with sampling every four hours and can be adjusted for more or less frequent intervals. In addition to the online samples, manually collected grab samples from other locations in a network can be collected and analyzed on the THM-100 alongside samples taken automatically by the monitor in its online mode.

At the City of San Luis Obispo, the THM analyzer is connected to SCADA, allowing operators to track daily, weekly and seasonal trends when switching between their water sources. Before the installation of the online analyzer, San Luis Obispo's operators had to conduct grab samples every Tuesday from regulatory compliance sites in the distribution system. Also, on Friday or Saturday, they would randomly pick sections in the distribution system to sample in order to gain a better understanding of what was happening in the distribution system network.

Online THM-100 analyzer installed at the onsite laboratory of the San Luis Obispo Water Treatment Plant.

"Thanks to the fully automated THM-100, we analyze three water treatment plant samples per day and perform up to four bottle [grab] samples from the distribution system per day," said Jason Meeks, the water treatment plant supervisor, for the City of San Luis Obispo. "With the online analyzer, we can see performance in real-time, even on a cell phone, which gives me and the rest of the operations team peace of mind and allows us to focus on other important aspects of our jobs."

According to Meeks, the city has been very happy with the selection of the online THM-100 analyzer and the customer service provided by AMS. "The online analyzer has paid for itself in electric bill savings alone through better management of the aeration technology. The analyzer has provided us with accurate and reliable THM results to better manage our operations, and the system is backed by excellent customer service and maintenance from AMS."

The Value of Real-Time THM Formation Potential

As utilities continue to turn to aeration as an effective method of THM control, they must be armed with real-time, accurate and reliable THM and THM-FP data so they can operate their treatment systems to ensure that their consumers always receive water that is safe to drink and in compliance with regulatory requirements. AMS' real-time online THM and THM-FP monitoring solution helps to optimize the aeration treatment processes and significantly reduce energy costs amidst the ever-changing water quality conditions, ensuring regulatory compliance and public safety.

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