

Aigües de Barcelona Implements Use of Online THM Monitors

Aigües de Barcelona provides drinking water to more than 3 million people across the Barcelona metropolitan area from their Sant Joan Despí Drinking Water Treatment Plant (DWTP), with a capacity of 4.5 m³/s.

The Sant Joan Despí DWTP employs a mixed conventional and advanced treatment scheme inclusive of chlorine dioxide pre-oxidation, coagulation-sedimentation and sand filtration, ozonation, granular activated carbon, chlorine disinfection, ultrafiltration (UF) and reverse osmosis (RO). Source water is provided from the River Llobregat plus additional ground water sources.



To effectively meet the drinking water demands across their service area, Aigües de Barcelona purchases additional water, approximately 50% of the volume they supply, from Aigües Ter-Llobregat (ATLL). Aigües de Barcelona is certified by the ISO 22.000 standard (Preventive Risk Management System) and sets water quality targets of the purchased water from ATLL.

When water quality falls below minimum agreed levels, ATLL can be penalized. Water quality provisions include all the parameters regulated by the European Union (EU) Directive 98/83/CE and special focus is given to trihalomethanes (THMs).

Understanding Total THM concentrations from incoming water purchased from ATLL at the entry point allows for reasonable growth within Aigües de Barcelona's distribution system, while maintaining regulatory DBP compliance.

Operational Profile

Total THM measured values at the Sant Joan Despí DWTP typically range from 10 to 25 µg/l; however, values can significantly increase up to 80-90 µg/l in remote zones of the 4,700 km pipeline throughout the distribution network.

THM fluctuations are dependent on the season of the year, the quality of the surface water, the quality of the additional water purchased from and supplied by ATLL, and the residence time of water in the distribution network.

While intermittent DBP measurements relative to volume of water supplied are necessary for regulatory compliance in the European Union, the frequency of sampling and analysis are inadequate for understanding the real-time and actual DBP levels within the water distribution system at any given moment. DBP levels can range significantly, even within the same day, due to temperature, water demand, pumping schedules, climate changes, rain events and more.

Aigües de Barcelona decided to monitor THM levels more frequently and elected to use an online analyzer to provide accurate and timely information regarding the THM formation in their network.

An extensive validation of the THM-100™ online THM monitor, manufactured by Aqua Metrology Systems, was undertaken at the Aigües de Barcelona Laboratory during June - July 2012. The validation compared results provided by the THM-100 with ISO 17.025 laboratory accredited techniques.

Following the assessment of precision, trueness and uncertainty, the THM-100 proved fully compliant with the EU Directive 98/83/CE and Aigües de Barcelona laboratory's objectives.

The Benefit of Implementing Online THM Monitors

The successful validation study led to the installation and full integration of the online THM analyzer into the THM control strategy of Aigües de Barcelona.

As part of their ISO 22.000 certification, Aigües de Barcelona strives to have complete control and understanding of water sources entering their distribution network. These efforts led to the installation of four additional online THM analyzers across the network from 2012 to 2014, Aigües de Barcelona uses five online THM monitors in total.

- (1) unit monitors THM levels in water discharged from the Sant Joan Despí DWTP in order to predict THM formation potential and levels in the distribution network 72 hours after treatment.
- (1) unit monitors THM levels, at 72 hour residence time, in a storage tank containing treated water from the Sant Joan Despí DWTP.
- (2) units monitor water supplied by ATLL from two of their drinking water treatment facilities.
- (1) unit monitors THM levels in a remote tank that holds the water supplied by ATLL's drinking water facilities.

The online THM monitors have enabled Aigües de Barcelona to readily identify rapid changes in water quality so remedial actions can be taken. When Aigües de Barcelona is experiencing low THM levels, treatment is adjusted and a lower percentage of water is treated through the RO system and/or aeration system.

The residence time of treated water in the network and storage tanks can also be reduced and where feasible, lower re-chlorination doses can be used. Depending on THM levels, various water blending schemes can also be put into effect. All combined, these process optimization measures have led to significant cost savings for the utility.

Online THM analyzers have played an important role in Aigües de Barcelona's compliance strategy. The use of online THM analyzers have helped the utility optimize their treatment processes, assist in monitoring water quality at handover points from their water supplier and reduced related expenses while ensuring regulatory compliance. In addition, the online THM analyzers have proved essential in Aigües de Barcelona's preventive approach on the water quality management.

Aigües de Barcelona had the first Water Safety Plan to obtain certification to the ISO 22.000 standard in Spain and it is the first large utility to obtain this certification for the complete drinking water cycle in Europe.