

Ionics* EDR handles surface water variability and trihalomethane precursors for Barcelona

Electrodialysis reversal (EDR) proves to be a superior solution for local drinking water

Project Summary

end-user Aigües Ter-Llobregat
location Abrera (Barcelona), Spain
commissioned 2008
application drinking water
technologies electro dialysis reversal (EDR),
 cartridge filters
capacity 220,000 m³/day (58 MGD) effluent

factors impacting technology selection – season-ably variable surface water source; water stressed region with new regulations; compatibility with existing treatment system

operational results – 90% recovery; reduced trihalomethane formation potential from 160±40 to 64±16 µg/L

winning value proposition – high recovery; minimized fouling from surface water organics and scaling minerals; robust handling of seasonal variability; desalination solution without extensive pre-treatment

keywords – municipal; drinking water; surface water; high recovery; organics; trihalomethanes (THM); variable feed source; seasonality; electro dialysis reversal (EDR)



Figure 1: EDR water treatment plant at ATLL

Challenge

Located in Abrera (Barcelona), Spain, Aigües Ter-Llobregat's (ATLL) Drinking Water Treatment Plant (DWTP) was plagued by the same conditions that affect the water supply in much of the Catalonia region of Spain, including poor water quality, water scarcity, and regulatory concerns. New regulations governing the quality of drinking water in Spain led the company to seek out membrane technologies to achieve the required levels and improve the quality of the water treated at the DWTP. The source water from the Llobregat River varies considerably throughout the year and contains a combination of bromides and dissolved organic matter that create the precursors for chlorination disinfection byproducts called trihalomethanes (THMs). Trials to minimize chlorine usage were unsuccessful, and once formed, THMs are difficult to remove.

Table 1: Llobregat River Facts

| Characteristic | Amount |
|----------------------|-------------------------|
| Conductivity range | 500 - 2,500 μ S/cm |
| Bromide | 0.5 - 1.2 mg/L |
| Chloride | 150 - 1,300 mg/L |
| Barium | 30 - 190 μ g/L |
| Strontium | 1,100 - 2,200 μ g/L |
| Total Organic Carbon | >5.0 mg/L |

Solution

Aigües Ter-Llobregat carried out several studies of different systems to determine the best technology to treat the raw river water after it passes through a system containing oxidation by potassium permanganate, flocculation/sedimentation, chlorine dioxide treatment, sand filtration, and activated carbon. Pilot tests of electrodialysis reversal and reverse osmosis were conducted with emphasis on compatibility with the existing treatment system in addition to the regulatory and scarcity challenges of the Catalonia area.

After a two-year pilot test, ATLL chose SUEZ's Ionics EDR technology to reduce dissolved solids and organic matter in its water supply in order to meet treatment goals. During the testing period, ATLL discovered that EDR provided high water recovery and low concentrate (brine) flow without the need for additional pretreatment technology such as ultrafiltration.

Through an electrochemical separation process, SUEZ's EDR technology removes contaminants found in many source waters, like Barcelona's Llobregat River. While improving the overall availability of quality drinking water without additional pretreatment, the technology also allows the facility to operate at an exceptionally high water recovery rate. The EDR system strategically addresses a dynamic water source and eliminates the

harmful fouling that can decrease a plant's operating performance or even shorten its overall lifespan. The pilot testing with reverse osmosis membranes presented challenges on operating at high recovery due to the presence of scaling minerals, as well as issues with biofouling from a variable and high organic source surface water.

SUEZ's EDR water treatment system is the centerpiece of the ATLL plant, currently providing high quality drinking water reliably for nearly 20% of Barcelona's metropolitan region. As of 2017, the operation was the largest EDR plant in the world. The plant is capable of producing 220,000 m³/day (58 MGD) of product water, which blends back into the effluent of the existing treatment plant. The EDR system consists of nine EDR trains, each comprised of 5-micron nominal cartridge filters and 64 Ionics EDR Mark IV-2 stacks for a total of 576 EDR stacks.

Results

SUEZ's EDR solution also provides ease of operation and maintenance. Despite the Llobregat River's changing feedwater quality, SUEZ's EDR systems are able to adapt to the changing temperature and salinity of the river water without disrupting the quality of water production. The plant operates at a water recovery rate of 90%, which addresses the water scarcity conditions in Catalonia, and the concentrate from the plant is sent via a pipeline to the head of the Llobregat River as it enters the Mediterranean Sea. Due to the seasonal nature of the Llobregat River, SUEZ's EDR technology allows ATLL to achieve its product water objectives, while operating on highly variable feed water.

Contact Us

If you would lo learn more about how SUEZ can provide an EDR solution for your drinking water needs, please visit:

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