

Challenging Algal Bloom and Red Tide Waters Treated with Seawater Membrane Pretreatment

The challenge

The Sultanate of Oman, like other gulf countries in the Middle East, depends on desalination technologies as a major source of potable water to the distribution network. In 2015, a leading developer and operator that is based in Oman and operating Barka 1, awarded Osmoflo, an engineering, procurement, and construction contractor, to build a complete desalination plant with a capacity of 56,500 cubic meters per day (m^3/day) (12.5 million gallons per day [mgd]). This plant, called MSF Reject Desalination at Barka 1 Expansion Phase 2, is where Oman was to provide potable water in less than a year so it could add capacity to the Muscat city's water network, which serves more than 2 million residents.

Although Osmoflo had more than 50% of the seawater reverse osmosis (SWRO) plant available, the biggest challenge was the pretreatment that was to be built in less than 7 months (210 days). Another challenge was to design the pretreatment system to operate on difficult feedwater conditions. The system was to be designed not only for filtering high temperature seawater, but also to handle the seasonal algal bloom and red tide infestations that are common in the region's coastal waters from December to March nearly every year.

The solution

Ultimately, Aria Filtra™ was selected to deliver the custom-designed Aria FLEX™ membrane system. Aria Filtra's ability to successfully treat difficult feedwater conditions without extensive—or any—pretreatment, and its design of the complete pretreatment with process knowledge, was the big driver for this selection. Additionally, Aria Filtra was chosen as it offered the best lifecycle costs to the end user along with a local presence in Oman. Proximity to Aria Filtra technicians was important, as many similar filtration providers do not have a strong physical support presence in the region.

The results

The Aria Filtra team customized the engineering process for the Aria FLEX units to assure that they were able to successfully produce high-quality filtrate water to be fed to the downstream SWRO, despite treating very challenging feedwater. The system's advanced pressurized filtration membranes were designed to be well-suited to handle seasonal algal bloom and red tide infestations. Due to the custom engineering of the Aria FLEX racks and its advanced control philosophy, the plant is capable of running at full capacity during the algal bloom season, which is very uncommon



as many plants are forced to halt operations for the entirety of the red tide influx due to the harm it invokes on membranes.

Beyond the ability to treat the challenging and unique characteristics of the water in this region, the speed of deployment was critical. Within five months, the project was contracted and installed, with the Aria FLEX system producing water a month and a half later. This is particularly impressive given the large scope of this project, which utilizes Aria FLEX racks that have a peak capacity of more than 5,600 cubic meters per hour (140,000 m³/day; close to 30 mgd).

The benefits

The Aria Filtra units are capable of running at full capacity during the region's annual algal bloom and red tide infestations. Overall, the Aria FLEX operation was able to meet the following requirements:

- Undisrupted water production during algal bloom
- Custom engineering to meet challenging water characteristics
- Quick deployment of large-scale project

Available as a full water treatment solution or a skid, Aria FLEX custom water treatment systems can adapt to any water treatment need.

- Scalable to accommodate any capacity
- Easy to operate
- Reliable performance



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