

Challenging Algal Bloom and Red Tide Waters Treated with Sea Water Membrane Pre-Treatment



THE CHALLENGE

The Sultanate of Oman, like other gulf countries in the Middle East, depends on desalination technologies as a major source of supply 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 EPC, to build a complete desalination plant with a capacity of 56,500 m³/day (12.5 MIGD). 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 that serves more than 2 million residents.

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

THE SOLUTION

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

THE RESULT

The Pall 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 Sea Water RO, despite treating very challenging feed water. 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 5 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 m³/hr (140,000 m³/day, close to 30 MIGD).



aria^{flex}

The Pall 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



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