

Treatment of Industrial Waste Water for Reuse in Turkey

Context

In 2006, Arbiogaz from Istanbul, Turkey received the order to upgrade an existing Waste Water Treatment Plant (WWTP). The system consisted of a two-stage membrane system combining ultrafiltration (UF) and reverse-osmosis (RO) with a capacity of 50,000 m³ per day (50 MLD). Membrane technology was necessary to meet the increased water quality requirements of the various industrial clients and to prevent the use of costly potable water for production purposes.

3M engineers ran pilot-tests from January to August 2007 to obtain reliable data supporting the basic system design and to identify possible impacts from the operation of the existing WWTP. In addition, 3M was entrusted with the supply of the UF modules for the entire plant.

Performance

The projected flux of 75 l/mh in the UF units was achieved during the start-up phase. The backwash interval was increased from 30 to 60 minutes since the transmembrane pressure was held below 0.2 bar (2.9 psi) during filtration. The Chemical Enhanced Backwash (CEB) was optimized to cope with the varying raw water quality. During the first 8 months of use, one CEB per day was sufficient. When there was a case of high contamination of the raw water, the frequency was raised to every 12 hours or, in rare cases, every 8 hours. In general, the UF filtrate quality was checked continuously for SDI-15 of <3 and turbidity of <0.1 NTU. The high quality of the UF-pretreated water increased the RO yield from 75% up to 85%.



Treatment challenges

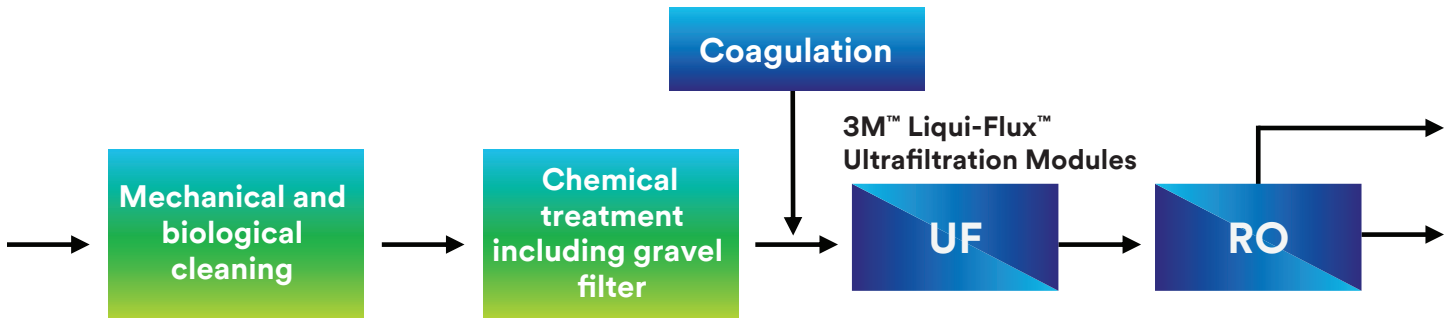
The UF system had to cope with a wide range of industrial impurities including dyestuffs and several metals due to significant seasonal variations of the raw water quality. Under all conditions, a suspended solid content <0.1 mg/l had to be maintained as well as SDI <3. Fractions of the UF filtrate could be used and blended with the RO permeate to adjust process water parameters.

System Summary	
Ultrafiltration System Summary	532 3M™ Liqui-Flux™ W02 Ultrafiltration Modules in 7 racks
Location	Turkey
OEM/System Manufacturer	Arbiogaz
End User	Industrial park
Market/Industry	Automotive, textile and chemical
Plant Capacity	50,000 m ³ /d
Application	Advanced wastewater treatment, ultrafiltration upstream of reverse osmosis
Feed Water Source	Mixture of industrial sewage partially pre-cleaned and diluted by rain water
Pre-treatment	Biological and chemical treatments including gravel filter
Commissioning	August 2007



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Process Diagram



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