

Case Study
RO Membrane
Filtration for
Tertiary Treatment
& Reuse

Case Study: Municipal Tertiary Treatment & Reuse

Achieved consistent product flow in compliance with stringent reuse quality requirements.



PROBLEM

High-fouling feed stream needed to meet water reuse requirements



SITE

Treatment plant in Valencia, Spain



OUTCOME

Exceeded requirements; elements lasted twice normal lifetime of RO elements

OBJECTIVE

Diminishing freshwater availability in the face of increasing population and agricultural demands has been a persistent concern for communities in Spain. The problem is even more acute in the Mediterranean Coast area due to the rapid population growth from tourism activities and climate conditions.

A major municipality in the Community of Valencia, Spain, has been a pioneer in the treatment and reuse of effluents, with its Wastewater Treatment Plant (“EDAR”). The effluent plant has increased in size over the years, with the incorporation of a Tertiary Membrane Treatment Plant (“IRAD”). Prior to it, product water conductivities exceeding 2,000 $\mu\text{S}/\text{cm}$ affected the reuse objective (crop yields), resulting in

diminishing effluent reuse quotas. The objective of the membrane plant is to guarantee a consistent permeate flow and quality suitable for reuse.

MATERIALS & METHODS

TRISEP® X-20™ low-fouling membrane elements were selected for the RO treatment system downstream of the UF. Secondary effluent sent to the membrane plant is first fed to an equalization tank and is then treated by ultrafiltration. Following the cartridge filters, the RO system reduces the conductivity from 3,808 $\mu\text{S}/\text{cm}$ to less than 60 $\mu\text{S}/\text{cm}$. From here, the water is blended with UF permeate for reuse. Figure 1 outlines the process flow for the tertiary treatment plant.

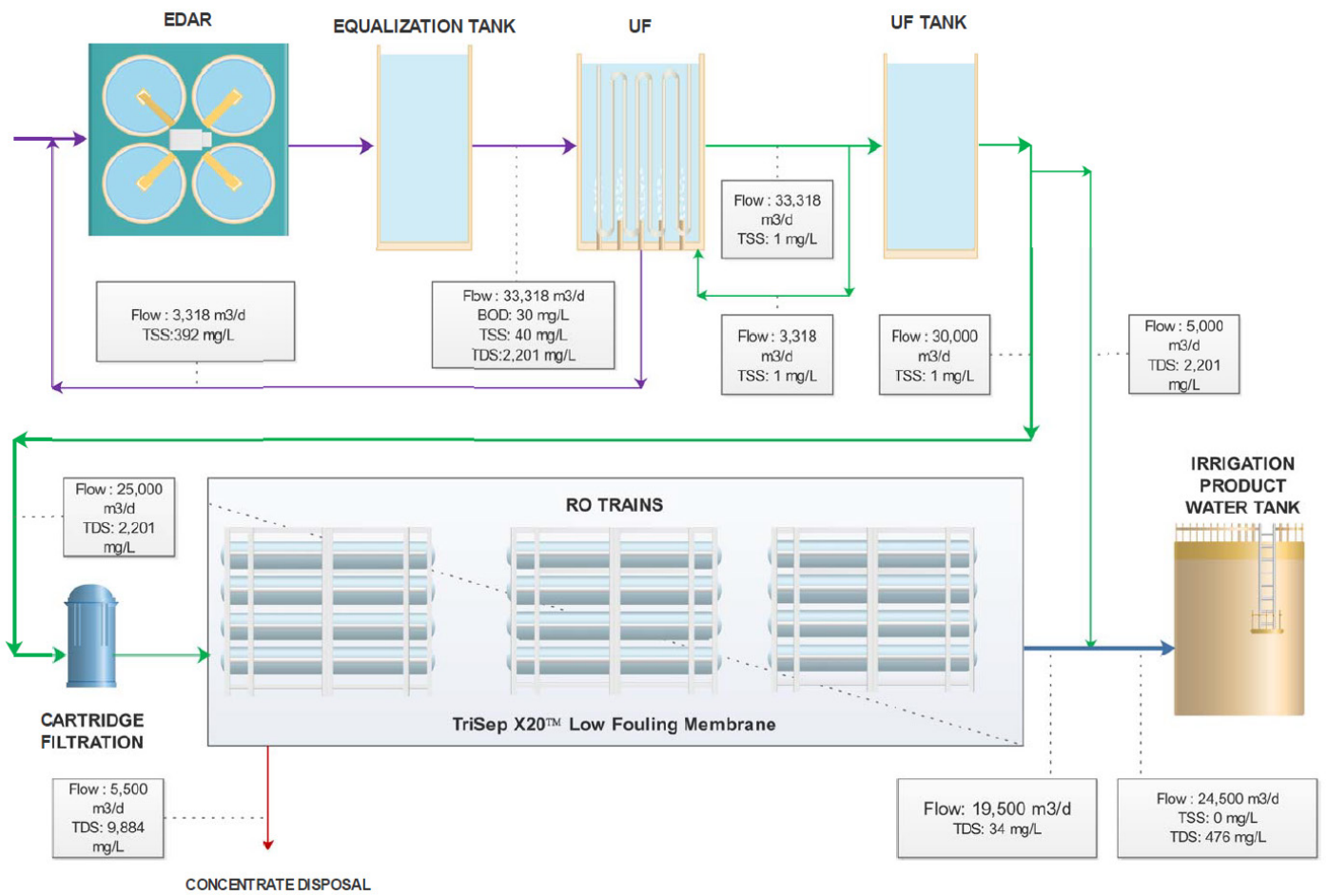


Figure 1 Process flow diagram of the tertiary treatment plant

RESULTS

The original TRISEP® X-20™ RO membrane elements have been in continuous operation for more than 11 years without being changed out. These elements produce consistent permeate flow and quality with limited cleanings.

CONCLUSION

X-20 membrane is based on a unique, patented thin-film polyamide-urea membrane chemistry. RO membrane elements typically represent 20-30% of the RO equipment capital cost. The X-20 elements in this system have lasted over twice the standard lifetime that Architectural & Engineering (A&E) consultants typically account for in RO tertiary treatment plants. The considerable operational savings from greater uptime and lower replacement costs due to the remarkable durability of X-20 membrane elements cannot be overlooked.

Membrane Element Success In High-Fouling Feedwater

Table 1 IRAD RO System Parameters

Parameter	Description
No. of Trains	3
No. of RO Elements	1,406 TRISEP X-20 Low-Fouling RO Elements
Design Recovery	78% system (81.7% overall)
Blended Permeate Flow	24,500 m ³ /d (6.5 MGD)
Product Blend	RO (77.6%) + UF (22.4%)

Table 2 Permeate Parameters

Parameter	Description
Operating Flux	17.2 LMH (10.1 GFD)
TDS	24 mg/L
Conductivity	< 60 µS/cm
RO Permeate Flow	19,500 m ³ /d (5.2 MGD)

