

### PolyCera<sup>®</sup> Hydro

## UF membranes demonstrate high fouling resistance and cleanability in tertiary filtration of municipal secondary effluent

### Overview

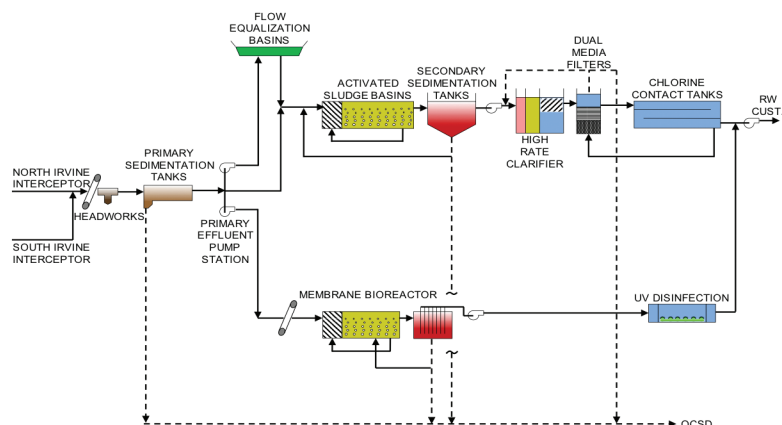
- Low-pressure membrane filtration, which includes microfiltration and ultrafiltration (MF/UF), has experienced tremendous growth in the municipal and industrial water treatment sectors.
- These applications require a robust membrane that is tolerant to secondary effluent organic matter, resist to cleaning chemicals and mechanical wear.
- PolyCera Hydro UF membranes offer all of these features along with higher water permeability and lower operating pressure. The membrane is hydrophilic and requires less frequent backwashing and is easier to clean.

### Demonstration

- PolyCera conducted a six-month demonstration on secondary effluent at the Irvine Ranch Water District (IRWD), Michelson Water Recycling Plant.
- The long-term objectives of the study were to evaluate the performance and value proposition of the PolyCera Hydro UF membrane over conventional membrane materials in providing California Title 22 equivalent product water after direct filtration of secondary treated sewage.
- PolyCera Hydro UF membranes and a "hydrophilic" PVDF UF membrane were both packaged into PolyCera's Spiral Monolith<sup>®</sup> elements and tested in a side-by-side comparison.
- Operated at identical flux rates, the filtrate water quality, membrane permeability, specific energy consumption (SEC) and operating expense (OPEX) were compared.



Process Flow Diagram



**PolyCera®  
Hydro**

**23%  
Higher  
Water  
Recovery**

**20%  
Lower  
Energy  
Demand**

**46%  
Lower  
OPEX**

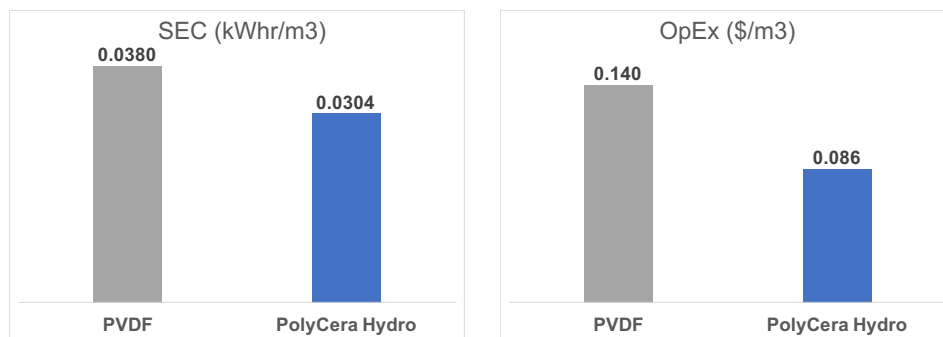
**50%  
Lower  
Irreversible  
Fouling Rate**

**<0.1 NTU  
Filtrate  
Turbidity**

## Results

- Both PVDF UF and PolyCera Hydro UF membranes consistently provided California Title 22 quality effluent water suitable for reuse.
- PolyCera Hydro UF membranes sustained a filtrate flux of 50 LMH over multiple weeks using an 88 ppm chlorine maintenance cleaning every 6 days and a full clean-in-place (CIP) every 38 days.
- PolyCera Hydro UF membranes had 50% less irreversible fouling than the PVDF membrane, which would result in twice the runtime between chemical cleanings for PolyCera.
- PolyCera Hydro UF membranes easier cleanability allowed for operation without energy-intensive air scouring, which resulted in reduced energy demand and chemical consumption.

Figure 1. SEC and OpEx for PolyCera Hydro and PVDF membranes.



## Value Proposition

- PolyCera Hydro membrane chemistry provides more water at a lower cost.
- PolyCera Hydro UF membrane chemistry is intrinsically less fouling prone and easier to clean than conventional PVDF:
  - 23% higher water recovery
  - 20% lower energy demand
  - 50% less irreversible fouling
  - 46% lower OPEX
  - 2X membrane useful life

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