

PolyCera® Hydro

UF membranes deliver unparalleled performance in mobile tertiary wastewater reuse application

Overview

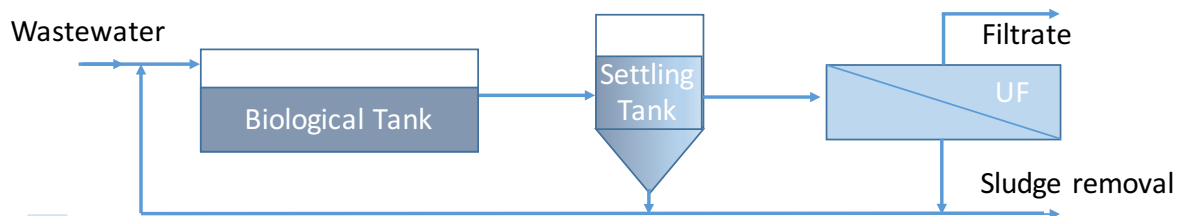
- Reuse of municipal and industrial wastewater has gained global acceptance as a method to mitigate widespread water scarcity and drought.
- Currently, many conventional wastewater treatment processes cannot consistently treat wastewater to the high-quality standards required for beneficial reuse.
- PolyCera Hydro UF membranes were implemented in tertiary filtration mode after a moving bed biofilm reactor (MBBR) process to enable affordable and reliable water reuse in mobile, off-grid wastewater treatment units.

Application

- WaterFleet, a San Antonio, Texas based company, supplies mobile water and wastewater treatment systems to off-grid man-camps supporting oil and gas drilling and completion sites as well as remote construction sites.
- Previously, WaterFleet tested hollow fiber and spiral wound PVDF UF membranes, all of which failed within days to weeks in this challenging application. As a result, the state of Texas' Type 1 water reuse quality could not be consistently met, and other treatment solutions were explored.
- PolyCera Hydro UF membranes and "hydrophilic" PVDF UF membrane were both packaged into PolyCera's Spiral Monolith® elements and tested in a side-by-side comparison to filter effluent from the biological treatment process.
- Operated at identical flux rates, the membrane permeability, filtrate water quality, specific energy consumption (SEC) and operating expense (OPEX) were compared.



Process Flow Diagram



PolyCera® Hydro

165%
Higher
Water
Permeability

54%
Lower
Specific
Energy
Consumption

<42%
Lower
OPEX

<0.1 NTU
Filtrate
Turbidity

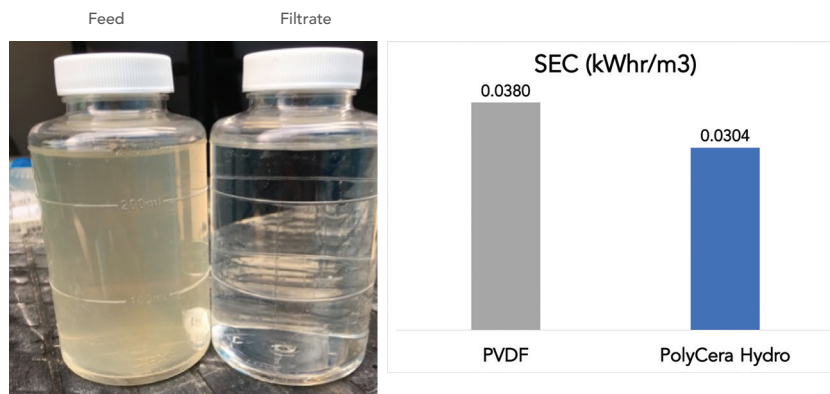
<1.0 mg/L
Filtrate TSS

>5 log
Removal of
Coliform
Bacteria

Results

- PolyCera Hydro UF provided nearly 3X higher water permeability when filtering the secondary effluent (21 vs. 7.9 lmh/bar) and a much higher water recovery due to less frequent and less intense backwashing and cleaning. The PVDF membranes experienced unrecoverable permeability loss after only 48 hours of operation, whereas the PolyCera Hydro membranes were in operation for over 12 months at the time of data presented in this study.
- PolyCera Hydro UF consistently produced effluent water quality suitable for Type 1 non-potable reuse and safe environmental discharge.
- PolyCera Hydro UF membranes delivered 6:4:3 log removal of pathogenic microorganisms (bacteria: virus: protozoa), removed solids and turbidity, and operated at a high sustainable flux.

Figure 1: PolyCera Hydro membrane feed and filtrate, and SEC relative to PVDF.



Value Proposition

- PolyCera Hydro membrane chemistry, which is intrinsically less fouling prone and easy to clean, provides more water at a lower cost.
- With PolyCera Hydro membranes integrated into the process train, Type I Texas reclaimed water quality is produced.
- WaterFleet is now using PolyCera Hydro membranes across their entire fleet of mobile water reuse systems. The membranes provide the client with a high quality effluent with sustainable operation and economics.

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