



## Apple Valley WWTP - Creating Water Security in the Desert – 1 MGD Scalping Plant with 2 MGD expansion capability



In 2014, the Victor Valley Wastewater Reclamation Authority, in California’s Antelope Valley northeast of Los Angeles, selected FibrePlate™ membranes for two new, decentralized wastewater reuse scalping plants. The sister membrane bioreactor (MBR) plants were designed by Carollo Engineers to treat and reuse the wastewater locally instead of pumping it twice, to and from the main regional plant. These plants were built to enable future development and regional growth.

Both plants were initially designed for hollow fiber membranes. The Apple Valley facility was to have an average day capacity of 1 MGD. After a late decision to switch, FibrePlate™ hybrid membranes were installed using all the existing tankage, process equipment, and instrumentation. FibrePlate™ membranes have a very high surface area density and provide exactly twice the footprint advantage compared to hollow fiber. This simple conversion makes possible a future expansion to 2 MGD with no new construction.

### Plant Design

The influent is brought in through a lift station on the main sewer line, operated on-demand since it is a scalping plant and not an end of pipe plant.

The influent is screened through a 2 mm screen before it is pumped into the anoxic/aerobic bioreactors. The mixed liquor is filtered by 4 FibrePlate™ membrane cassettes installed in 2 parallel membrane tanks. The permeate is disinfected by UV lights and distributed to the surrounding area as reused water. The wasted activated sludge is discharged into the sewer to be further treated at the VVWRA Regional plant.

DESIGN BASIS	
Average Daily Flow	1.0 MGD
Peak Flow	1.6 MGD
MLSS	8,000 – 10,000 mg/L
Average Temperature	57° F
Average Flux Rate	10 gfd

## FibrePlate™ in the Apple Valley Plant

Since the FibrePlate™ membranes only occupied half the tank space built for the hollow fibre membranes, a dip tank was built to allow for membrane recovery clean without wasting chemicals. (Note: In-situ recovery cleans are typical.)



Installing FibrePlate™ cassette in one of the 2 membrane tanks using the overhead crane.



At 1 MGD, the 2 FibrePlate™ cassettes only occupy half the space in the membrane tank. Each tank has room for 2 more cassettes which will double design flow to 2 MGD without additional construction costs.

## Reused Water on Demand!

The scalping plant is operated intermittently, depending on the water demand. The plant can be operated to reuse and sell the title 22 treated wastewater, to send the treated effluent into a percolating field, or to shut down to save on operating costs. Easy re-start is a benefit to VVWRA because it minimizes operating costs.

## Effluent Treatment Capability – Title 22 and Beyond

Once the plant is restarted and the biomass allowed to regrow and acclimatize, the plant easily meets Title 22 water reuse criteria as seen by the data table below. FibrePlate's™ continued, outstanding filtration performance is enabled by small pore size (< 0.04 microns) and tight pore size distribution.

PARAMETER	UNITS	INFLUENT	EFFLUENT
Turbidity	NTU		0.07 to < 0.2
cBOD5	mg/L	250 mg/L	Non detect
NH <sub>3</sub> N	mg/L	50- 60 mg/L	Non detect
NO <sub>3</sub>	mg/L		1.6 mg/L
Giardia	Cysts/L	4660 (average)	0
Cryptosporidium	Oocysts/L	<20	0
Bacteriophage, male specific	Ptu/100 mL	3.5 x 10 <sup>3</sup>	<1
Bacteriophage, somatic	Ptu/100 mL	4.7 x 10 <sup>3</sup>	2
Adenovirus	GC/L	6.7 x 10 <sup>6</sup>	Non detect
Enterovirus (PCR)	MPN/L	Not detected	Non detect
Norovirus GIB (PCR)	MPN/L	3.9 x 10 <sup>5</sup>	Non detect
Total Culturable Virus	MPN/L	Too toxic to measure	<0.16
Clostridium perfringens spores	Cfu/100 mL	3.5 x 10 <sup>3</sup>	<1

Microbiological data analyzed by Biovir Laboratories.