

Hydranautics achieves ETV Verification Testing for its HYDRAcap® Ultrafiltration Capillary Membrane

Introduction

Hydranautics has been awarded the NSF ETV Verification for its HYDRAcap® Ultrafiltration membrane System. The testing was supervised by Montgomery Watson Engineers and conducted at the Aqua 2000 research facility in Escondido, CA. A complete report for the Hydranautics HYDRAcap® Environmental Technology Verification can be found at www.nsf.org/etv. HYDRAcap® was qualified on raw Colorado River water from Lake Skinner. Lake Skinner typically has water quality demonstrated by Table 1.

Table 1-Water Quality

Constituent	Unit	Lake Skinner
Turbidity	NTU	1 to 3.5
TOC	mg/L	2.5 to 3
Temperature	Centigrade	13 to 27
Alkalinity	mg/L CaCO ₃	198 to 130
pH		8 to 8.5
Hardness	mg/L CaCO ₃	200 to 300
TDS	mg/L	430-610
Ca	mg/L	47 to 75

Performance

Summary

The HYDRAcap® module ran for ~ 2000 hours on during this study. The following operational parameters were used:

Filtrate Flux:	69GFD (117 l/m ² /h)
Crossflow Rate	0 gpm
Recovery	~87%,
Backwash frequency	Every 20 min,
Chlorine Enhanced Backwash Frequency	15ppm every backwash

The HYDRAcap® demonstrated the following operational attributes:

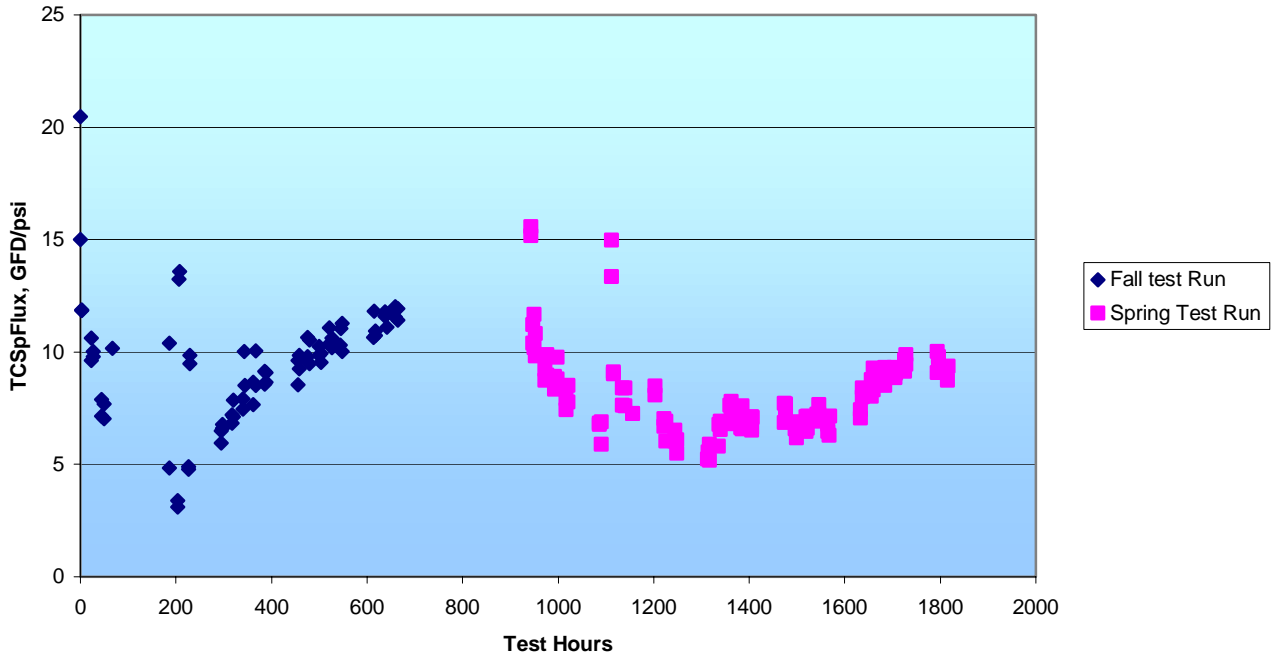
- Maintaining 69GFD and 87% recovery on this type of surface water.
- Reducing the turbidity to <0.05NTU 95% of the time
- Reducing particles >3um by 99.9%
- Providing 4-log removal of MS2 Phage (virus)

Membrane Performance Analysis-

A. HYDRAcap® Membrane Stability

Figure 1 demonstrates the HYDRAcap® permeability for the entire study. Two separate runs were performed at different times of the year with exactly the same test parameters. Rapid

Figure 1-NSF ETV HYDRAcap Testing Specific Flux



fouling was experienced during the beginning of the fall test run due to algae from Lake Skinner. The algae counts were not quantified, but an algae event was confirmed via telephone with Lake Skinner operations staff and the Aqua 200 raw water prescreen showed a daily buildup of algae during this period. Once the algae subsided, the specific flux gradually increased during the remainder of this run.

The beginning of the spring test run showed another rapid specific flux decline. This was later attributed to air binding of the chlorine pump used for chemically enhanced backwash. Once the pump was repaired, the specific flux recovered over the remainder of the run.

B. HYDRAcap® Water Quality (Turbidity)

HYDRAcap® consistently provided filtrate water with <0.05NTU. This data can be found in the complete report located via the Internet at www.nsf.org/etv.

C. HYDRAcap® Module Integrity

The attached table provides the pressure decay results at the end of the verification study. The data suggests that no fibers were broken over the 1800-hour run(s).

Table2- Integrity Test Results

Run Hour	Initial Psi	Final Psi	Duration (min)	psi/min
1815.9	15.1	14.8	1	0.3