

CASE STUDY

AWC Removes Seemingly Irreversible Foulant For Water Reuse Facility in Florida

The Facility

A power plant in South Florida purifies reclaimed wastewater to provide high purity feedwater to its high-pressure boilers.

The process consists of ultrafiltration (UF) followed by Reverse Osmosis (RO).

There are two UF trains, each consisting of 40 modules and with a capacity of 450 gpm.

The UF system employs a 60-second back pulse at 15 gpm every hour. It does not have a provision for chemically enhanced backwash (CEB), but it performs maintenance cleanings every 24 hours.

UF Model	ZeeWeed 1500
Membrane Type	Hollow Fiber
Surface Area (ft ²)	600
Filtrate Flux (gfd)	30 - 60
Operating TMP (psi)	5 - 40



The Problem

An operational upset in the upstream wastewater treatment plant caused severe fouling to the UF pretreatment system. The UF modules were hardly producing any water even at a very high transmembrane pressure (TMP).

Multiple cleaning attempts using 500 ppm sodium hypochlorite at pH 11 proved fruitless with no measurable improvement in flux and no reduction in TMP.

Cleaning with 2000 ppm citric acid at pH 3 also did not work. The cleanings were performed at a flowrate of 10 gpm/module, as recommended by the membrane manufacturer.

The situation was urgent as the water produced by the system was insufficient to meet the power plant's needs and the issue had been ongoing for over 30 days.

	Start-up	After Fouling Event
TMP (psi)	6	29
Permeability (gfd/psi)	6	0.37

The Solution

The plant operators requested AWC's assistance in finding a solution to reverse the fouling on their UF elements.

A cleaning study was performed using the plant's standard cleaning protocol. Various specialty high pH cleaning chemicals were tested at pH 11 and pH 12. However, even though the permeability tripled with the most successful regimen, it was still almost 85% below start-up values.

AWC engineers then applied a different cleaning approach: cleaning through the pores. The cleaning chemicals were circulated with the filtrate valve open and the reject valve closed enough to allow either 50% or 100% of the cleaning solution to flow to the filtrate. The best results were achieved using the latter method, indicating that there was heavy foulant buildup in the and the fiber lumen.

A low pH cleaning did not yield further improvement in performance.

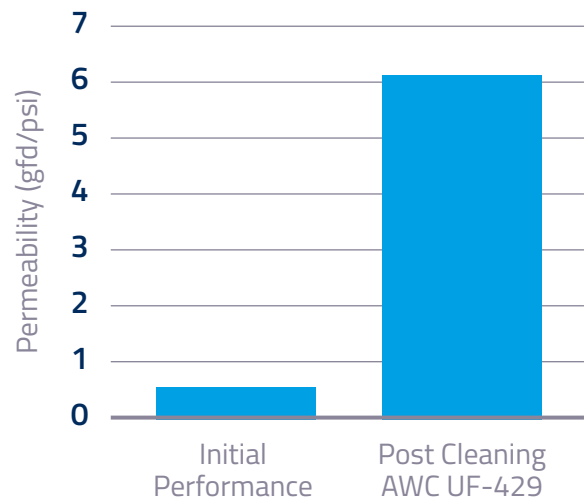
	UF-429 with Crossflow Circulation	UF-429 with Circulation Through the Pores
TMP (psi)	6	29
Permeability (gfd/psi)	0.95	6.12

The Results

The cleaning study determined that the majority of the foulant was in the fiber lumen and the fiber pores. For that reason, circulation of cleaning solution across the surface of the fibers was not sufficient to remove the foulant. The successful outcome using AWC UF-429 verified that the foulant was entirely biological and/or organic in nature.

The plant successfully applied AWC's recommended cleaning protocol to restore the plant's permeability to its startup performance levels.

Improvement in Performance



About AWC®

AWC is a solutions provider for the water treatment industry. The company offers an extensive portfolio of membrane chemicals specifically targeted to the needs of its global clients. Some of these chemicals include antiscalants and cleaning chemicals for Reverse Osmosis (RO), Nanofiltration (NF), Ultrafiltration (UF) and Microfiltration (MF). In addition, the company provides a broad range of analytical services including membrane performance testing, cleaning studies and membrane autopsies. The company's service offerings complement the chemical product line and offer unique tools for identifying the exact nature of a scale or foulant. Lab scale simulations are conducted to insure successful scale inhibition and optimal performance of RO/NF membrane systems during full scale operation or piloting.