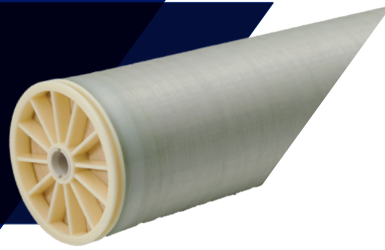


CASE STUDY

NF | UF | MBR | CHEMICALS

Drinking Water

Yucaipa Valley Water District USA



TORAY

Long-Term Performance of NF Membranes at Yucaipa Valley Water District



Figure 1: Yucaipa Valley Water District, California

BACKGROUND

The Yucaipa Valley Water District (YVWD) is committed to providing reliable water and wastewater services in an efficient and cost-effective manner. To enhance water treatment capabilities, the District installed Toray nanofiltration (NF) membranes in 2015 to ensure high-quality water supply while meeting regulatory standards. After nine years of consistent performance, a new set of NF membranes was installed in 2024 to maintain peak efficiency and long-term sustainability.

YVWD operates an extensive water system, which includes:

- 243 miles of drinking water pipelines
- 27 reservoirs with a combined storage capacity of 38 million gallons
- 18 pressure zones
- 10.360 acre-feet annual water demand (3.376 billion gallons)
- Two water filtration facilities:
 - 1 MGD Oak Glen Surface Water Filtration Facility
 - 12 MGD Yucaipa Valley Regional Water Filtration Facility

CHALLENGES AND MEMBRANE SELECTION

The decision to install NF membranes was driven by the need to enhance water quality, improve operational efficiency, and comply with stringent water regulations. Toray's NF membranes were chosen due to their superior performance, cost-effectiveness, and reliability in treating the District's diverse water sources, which include groundwater wells and surface water from Birch Creek, Oak Glen Creek, Adams Tunnel, and Clark Tunnel.

LONG-TERM PERFORMANCE OF NF MEMBRANES

Since their initial installation, the NF membranes have maintained operational stability, meeting water quality standards and demonstrating:

Table 1 – Quick Facts

Plant location	Yucaipa, California	
Feed source	Surface Water	
Treatment	Microfiltration, Nanofiltration	
Membrane model	NE8040-40	
Membrane type	High productivity NF element with low monovalent ion rejection	
Active area	400 ft ² (37.2 m ²)	
System capacity	3-6 MGD	
Elements/train	420 elements per train - Two Trains	
End use	High quality water meeting regulatory standards	
Commissioned	2015	Replaced 2024

- Consistent rejection of contaminants such as TDS, organics, and turbidity.
- Minimal clean-in-place (CIP) cycles, reducing maintenance costs.
- Stable feed pressure over nine years.
- High recovery rates, optimizing water usage efficiency.
- Long term membrane integrity with high chlorine tolerance. To effectively control biogrowth, a chlorine residual of 2 mg/L as free chlorine is applied to the NF feed once per week until 0.5 ppm of free chlorine is detected in the concentrate. Additionally, the

membranes can tolerate intermittent exposure to free chlorine levels of up to 2.5 mg/L, ensuring robust biofouling prevention while maintaining long-term membrane integrity.

MEMBRANE REPLACEMENT AND SYSTEM UPGRADE

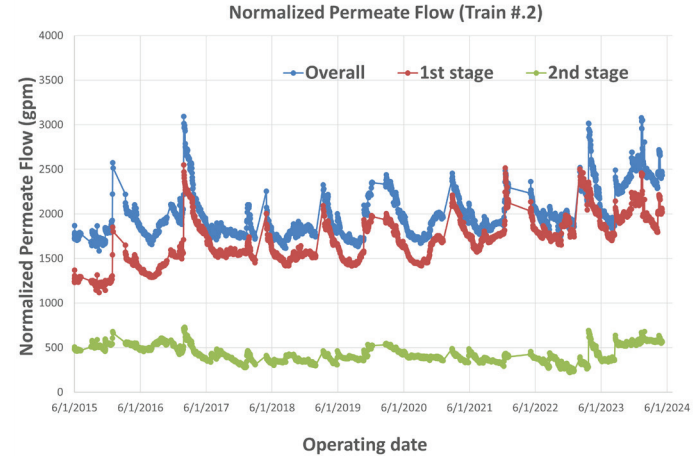
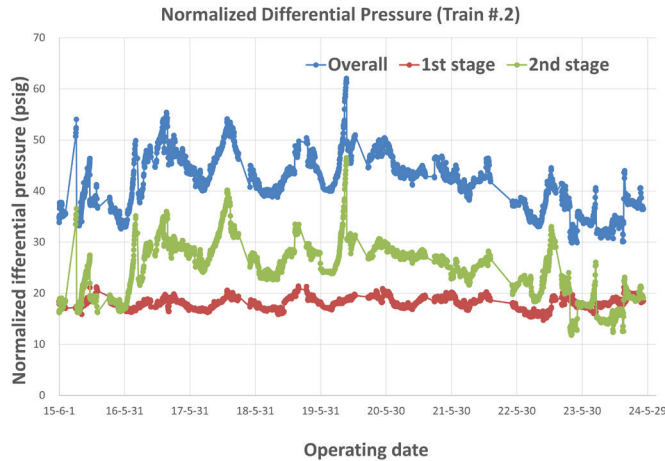
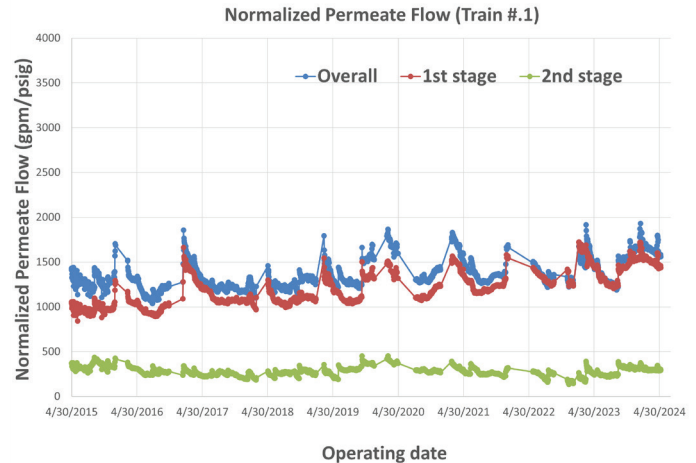
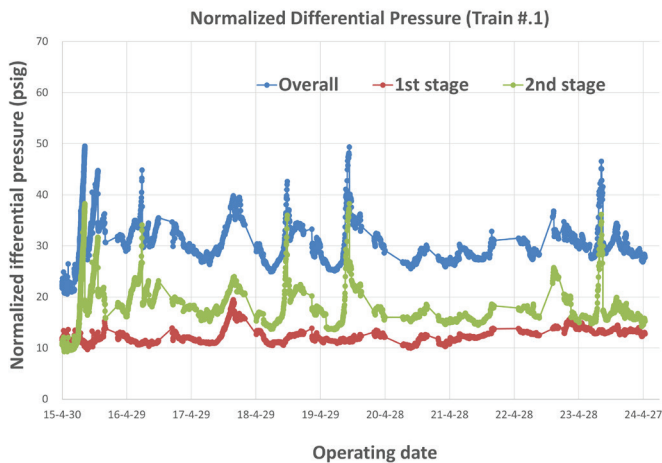
Following years of reliable operation, the district replaced the NF membranes in 2024 to maintain system performance and ensure future reliability.

YVWD's investment in this upgrade underscores its commitment to long-term water sustainability and operational excellence. The successful performance of the NF membrane highlights the importance of proactive maintenance and strategic upgrades in

ensuring uninterrupted, high-quality water treatment.

INTO THE FUTURE

YVWD is adding two more primary trains with Toray NF membranes in a strategic move by YVWD to enhance water treatment capabilities, increase capacity, and maintain long-term system sustainability. With the success of the initial membrane installation and the proven performance of Toray NF membranes, the District is poised to continue delivering high-quality, reliable water to its customers for years to come. This expansion ensures that YVWD remains at the forefront of modern water treatment technology, meeting the challenges of growing demand and stringent regulatory requirements.



Graphical performance data indicates that the membranes sustained high flux rates with minimal degradation, proving their durability over nearly a decade of service.

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