2016 Membrane Technology CONFERENCE & EXPOSITION

First Year Performance at the LVL WTF

Alex Wesner, P.E.
SPI

America's Authority in Membrane Treatment
AMTA
American Membrane Technology Association
Improving America's Waters Through Membrane Treatment and Desalting

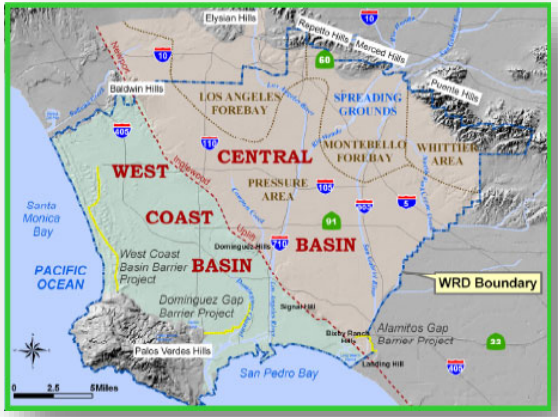
American Water Works Association
Dedicated to the World's Most Important Resource™

Overview

- Project Background
- Facility Overview
- First Year Operations
- Initial System Performance

Project Background

- Since 1959, protects and manages groundwater in Central and West Coast Basins
- Groundwater meets about 40% of local water demand of 4 million people in 43 cities
- Working to decrease reliance on imported water use



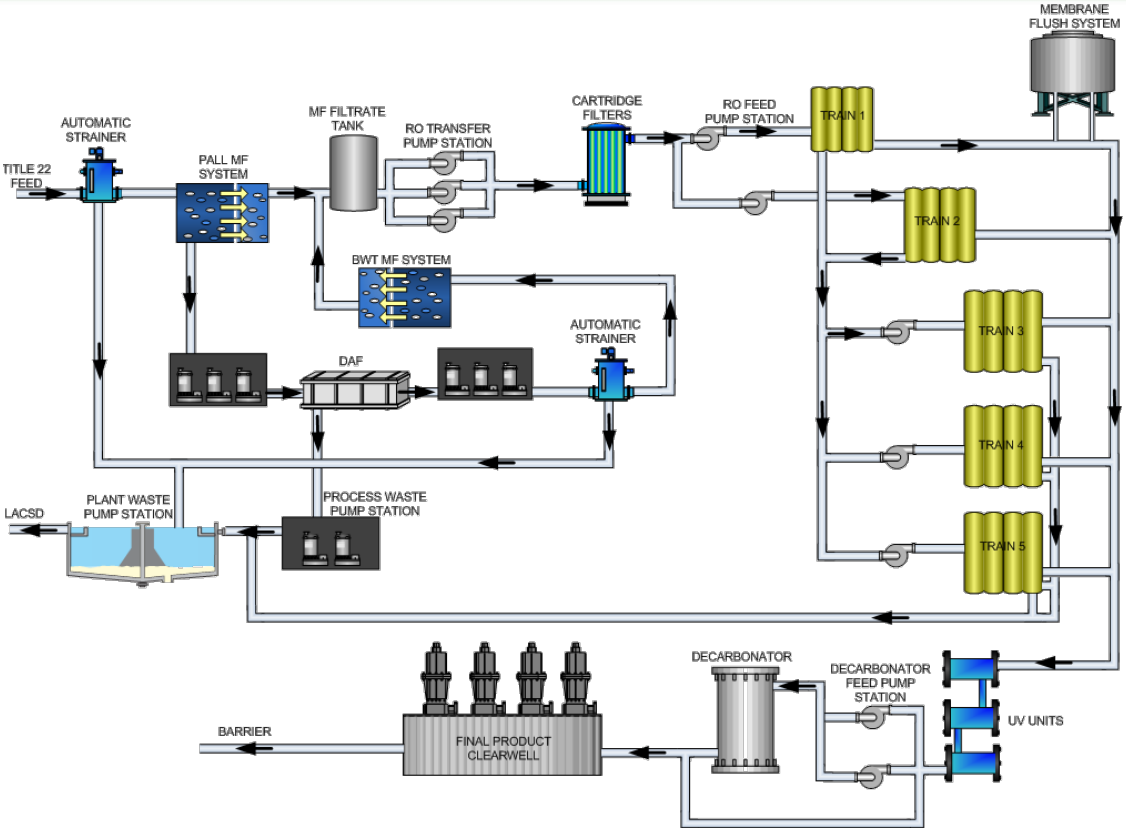
Project Background

- Facility owned by Water Replenishment District of Southern California
- Operated by Long Beach Water Department
- Original Plant Constructed in 2002 with 3.0 mgd Capacity
- Indirect Potable Reuse MF-RO-UV

Project Background

- Plant expansion from 3.0 to 8.0 mgd considered in 2005
- No increase in residuals disposal from MF and RO systems
- Increased end-to-end recovery from 79.6% to 92.0 percent
- 18 month pilot project from 2011-12
- Construction complete Dec. 2014

Facility Overview



Primary MF System

- Five Pall Microza 100 Module Quad Racks
- Rated Capacity: 8.72 mgd
- Design Flux: 35 gfd
- Recovery: 94 percent

Primary RO System

- Two Primary Trains
- 72:36 Pressure Vessel Array with Interstage Boost
- Design Recovery: 85 Percent
- Train Capacity: 3.7 mgd
- Average Design Flux: 12.2 gfd

UV/AOP System

- Original Plant Had One 3-Vessel UV Reactor
- Expanded Facility Added Two New 3-Vessel Reactors—72 Lamps Each
- Hydrogen Peroxide Dosed Ahead at Roughly 3 mg/L
- Target Reductions
  - NDMA: 1.62 – 2.03 Log
  - 1,4 Dioxane: 0.5 Log

Residuals Handling – DAF/MF

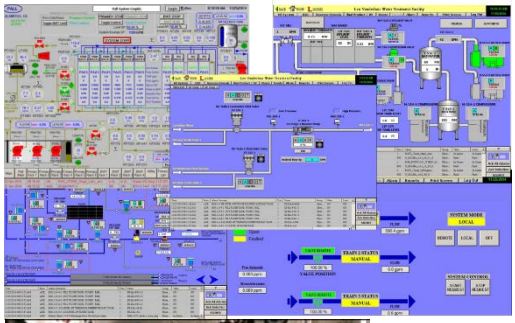
- Primary MF Backwash Treated by DAF
- Predosed with Ferric Chloride
- Effluent Turbidity < 3.0 NTU
- Feed BWT MF Units
- 4 x 25 Module Racks
- Production Rated at 0.42 mgd
- Design Flux of 24 gfd
- Target Recovery 89 percent

Residuals Handling – 3rd Stage RO

- Treat Primary RO Concentrate “In Line”
- 2 Duty, One Standby
- Single Stage, 8-element
- 0.33 mgd each
- Average Flux: 10 gfd
- Target Recovery 52 Percent
- Includes Separate, Automated Cleaning System

First Year Operations

- Largely Successful, but Plant Only Began Continuous Operation in Sept. 2015
- Before Then, Daily Operations
- Latent Construction and Warranty Issues:
  - SCADA Integration Challenges Delayed Operations Transition
  - Failure of DAF Launders
  - Transfer Pump VFD Caught Fire

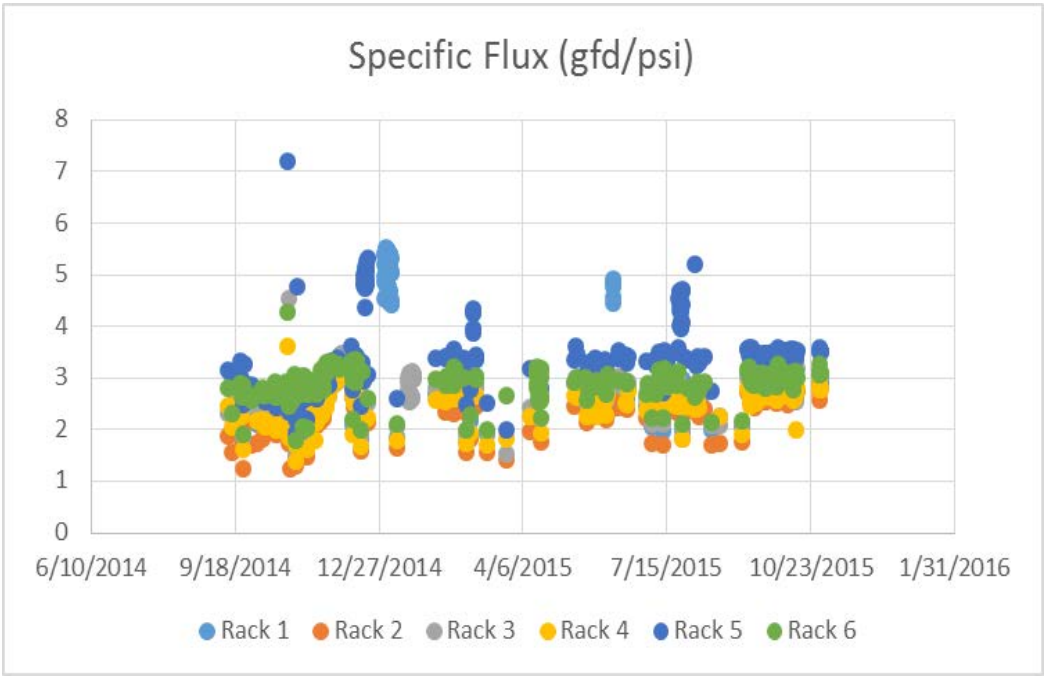


First Year Operations

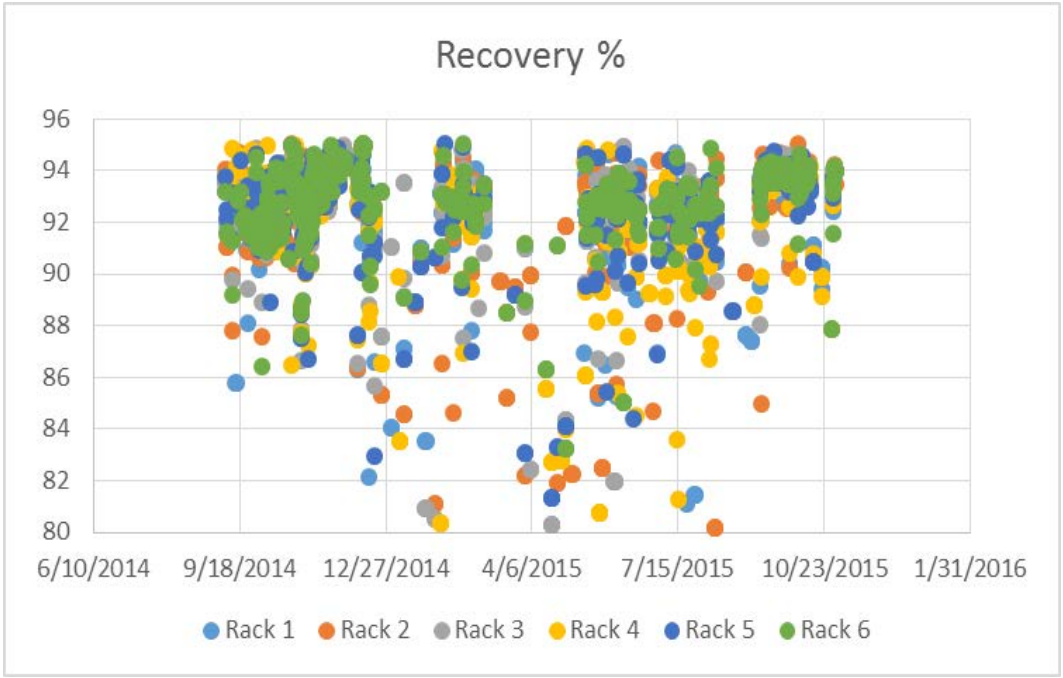
- Variable Barrier Flow Requirements Caused Challenges
- Plant Rated at 8.0 mgd; Effectively 2 x 4.0 mgd
- Barrier Demands Often Required 2.5 – 3.0 mgd
- Largest Challenge the Primary RO System
- Addressed by Adjusting Recovery

RO Train Feed	Total Train Recovery	Total Permeate Flow Rate	Stage 2 Permeate Flow Rate	Train Conc. Flow Rate
gpm	%	gpm	gpm	gpm
2,993	85%	2,543	815	450
2,924	85%	2,474	799	450
2,838	84%	2,388	773	450
2,752	84%	2,302	753	450
2,666	83%	2,216	728	450
2,580	83%	2,130	708	450
2,494	82%	2,044	683	450
2,408	81%	1,958	658	450
2,322	81%	1,872	639	450
2,236	80%	1,786	615	450
2,150	79%	1,700	591	450
2,064	78%	1,614	568	450
1,978	77%	1,528	545	450
1,892	76%	1,442	522	450
1,806	75%	1,356	500	450
1,720	74%	1,270	478	450
1,634	72%	1,184	452	450
1,548	71%	1,098	431	450

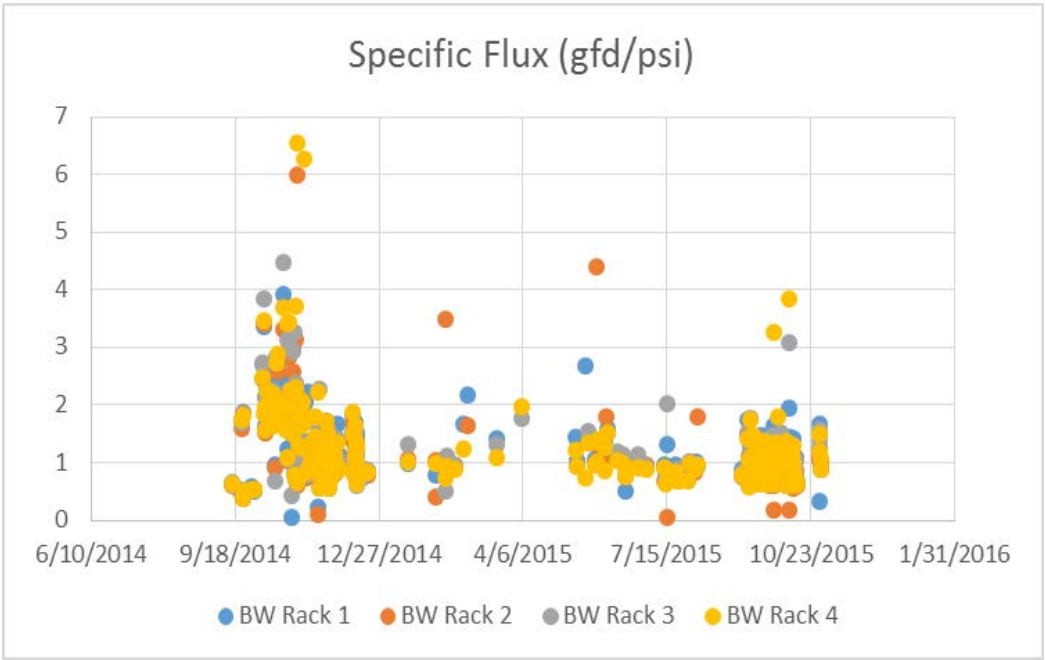
Initial Primary MF System Performance Data



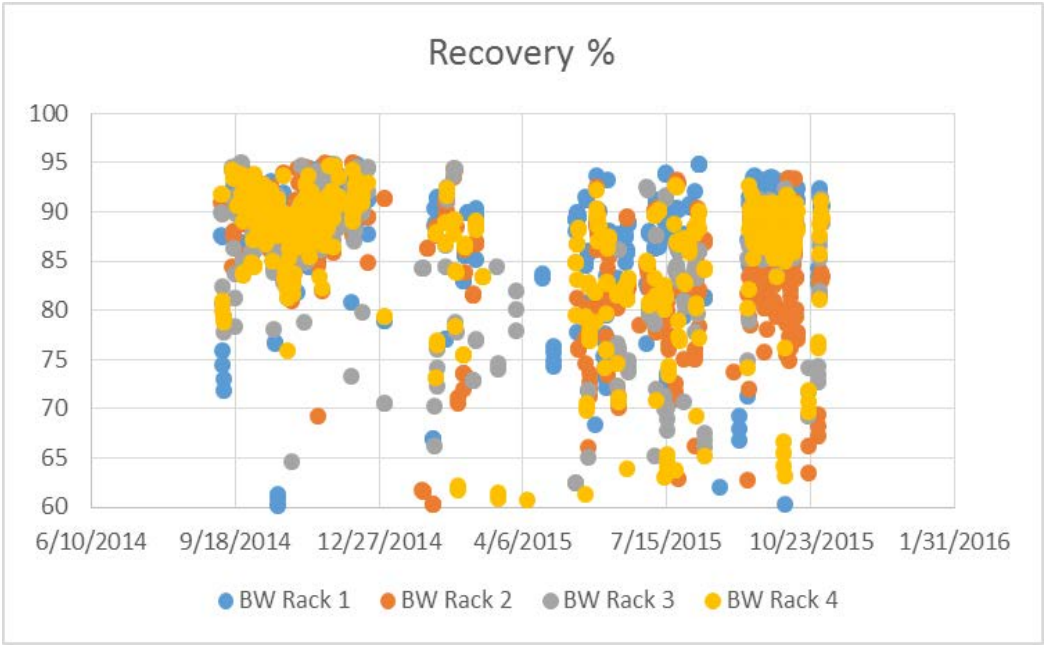
Initial Primary MF System Performance Data



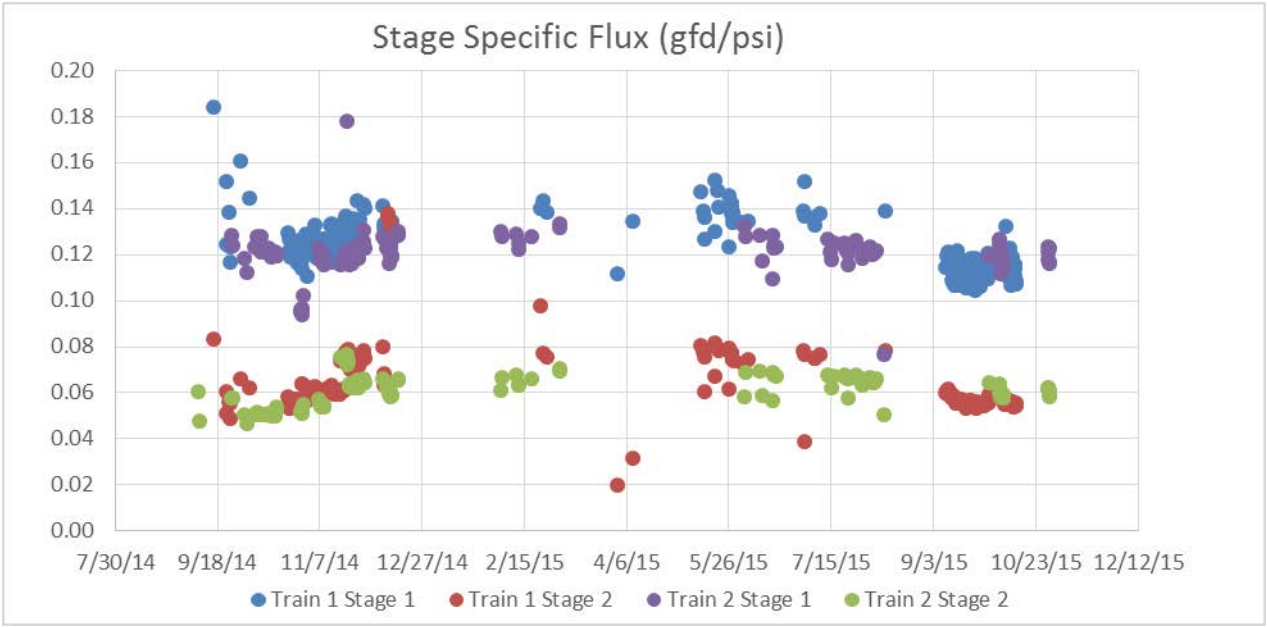
Initial BWT MF System Performance Data



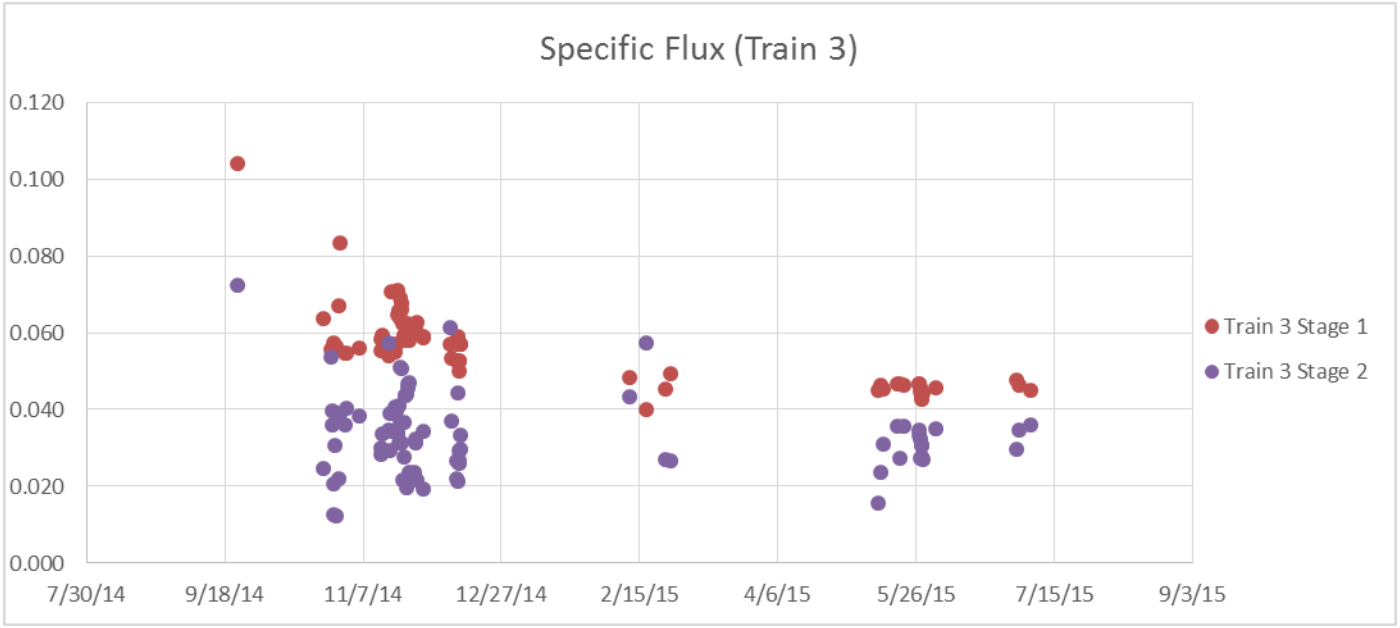
Initial BWT MF System Performance Data



Initial Primary RO Train Performance Data



Initial Third Stage RO System Performance Data



2016 Membrane Technology CONFERENCE & EXPOSITION

First Year Performance at the LVL WTF

Alex Wesner, P.E.
SPI

America's Authority in Membrane Treatment
AMTA
American Membrane Technology Association
Improving America's Waters Through Membrane Treatment and Desalting

American Water Works Association
Dedicated to the World's Most Important Resource℠