Regional Recycled Water - Advanced Purification Center

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WateReuse LA Chapter Meeting
December 5, 2017
Northern California Runoff

Below Average Runoff
8 out of last 10 years

Runoff (MAF)

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<th>Year</th>
<th>Actual</th>
<th>Normal</th>
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<td>2006</td>
<td>30.87</td>
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<td>2010</td>
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<td>2016</td>
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Runoff (MAF)
Upper Colorado River Basin Runoff

Historic 16-year Drought

Runoff (MAF)

Actual

Normal


10.83 MAF
Water Supply Management

Stabilize Imported Supply
- State Water Project Water
- Colorado River Water

Develop Local Supply
- Recycled Water
- Desalinated Waters
- Impaired Groundwater Recovery

Conservation
- Supply Allocation
- Financial Incentive
Design flow rate 400 MGD; current flow rate 265 MGD

Processes:
- Primary clarification
- High purity oxygen activated sludge
- Anaerobic digestion and energy recovery (~20 MW)
- Solid processing: dewatering, drying

Plant produces non-nitrified effluent for ocean disposal
Approach to the Regional Recycled Water Program

- Perform a study cooperatively to estimate the demand for groundwater augmentation of JWPCP treated recycled water in groundwater basins.
- Conduct pilot testing of two advanced water treatment (AWT) process trains to evaluate the feasibility of using JWPCP secondary effluent for groundwater augmentation.
- Conduct demonstration plant scale testing.
- Take phased approach to full scale facilities.
- Allow provisions for off-ramps, if necessary.
Pilot Treatment Schematic

**UF/RO Train**
- UF Membrane
  - Siemens
- Reverse Osmosis
- Ultraviolet Light/Advanced Oxidation
  - Trojan LP
- To Sewer

**MBR/RO Train**
- JWPCP Non-Nitrified Secondary Effluent
- Membrane Bioreactor
  - GE/Zenon
- Reverse Osmosis
- Ultraviolet Light/Advanced Oxidation
  - Calgon LP/MP
- To Sewer
Pilot Study Results

- JWPCP non-nitrified secondary effluent can be treated to produce high quality recycled effluent.
- UF/RO and MBR/RO permeate water quality met DDW criteria for groundwater recharge with respect to turbidity, TN, TOC, virus, and total *coli*form; however, boron and nitrate are potential concerns due to Basin Plan and SNMP objectives.
- MBR/RO was more effective than UF/RO at removing TOC, NDMA, NDPA, NDMAFP, and biodegradable PPCPs.
- AOP (UV/H$_2$O$_2$) achieved the treatment goals of 0.5-log reduction of 1,4-dioxane and effluent levels below the 10 ng/L NL for NDMA and NDPA, but not NDEA. It is likely that higher UV/H$_2$O$_2$ doses than tested would have achieved effluent NDEA levels below NL.
- The UF membrane (PVDF) was irreversibly fouled by the end of the two-year test period and RO membranes were susceptible to fouling with non-nitrified JWPCP secondary effluent.
Regional Recycled Water Program
Next Steps

- Complete design, construction, start-up and operations of Advanced Purification Center
- Proceed with facilities planning, engineering, and additional groundwater modeling
- Finalize agreements with Sanitation Districts
- Develop institutional and financial arrangements needed for implementation
- Initiate public outreach effort focused on Advanced Purification Center
Advanced Purification Center Objectives

- Achieve conditional acceptance of MBR as an alternative treatment technology for a Groundwater Replenishment Reuse Project
- Determine optimum design and operating criteria for full-scale AWT facility and coordinate operations with Sanitation Districts
- Demonstrate ability of the MBR-RO-UV/AOP process train to meet basin plan objectives
- Develop data for Title 22 Engineering Report for regulatory approval
- Provide vehicle for public outreach and acceptance
Design includes initial unit processes, and provisions for future unit processes
Process train will be MBR-RO-UV/AOP

- Two 0.25 MGD MBR Systems
- A single 2-stage 0.5 MGD RO System
- A single 20 gpm UV/AOP system

Provisions to add MF, UV and an additional RO system in future

Provisions to test alternative process technologies at a pilot-scale
Process Schematic

- **Aerobic and Anoxic Tanks**
  - 0.50 MGD

- **Membrane System for MBR**
  - 0.25 MGD
    - **Reverse Osmosis**
      - 0.50 MGD
        - **UV/AOP**
          - 20 gpm

- JWPCP Non-nitrified Secondary Effluent
  - Waste Activated Sludge to JWPCP

- JWPCP RO Brine to JWPCP
  - Return to JWPCP
3D Layout of Advanced Purification Center
Advanced Purification Center Schedule

- Final Design Complete – March 2017
- Advertised Construction Bid Package – March 2017
- MWD Board Action for Construction – June 2017
- Construction and Startup – 2017/2018
- Testing – 2018/2019
Backup Slides
Aerobic and Anoxic Tanks

Membrane System for MBR

Future Membrane Filtration

Future UV Disinfection

Reverse Osmosis

Future Reverse Osmosis

UV/AOP

Future UV/AOP

Waste Activated Sludge to JWPCP

Backwash Waste to JWPCP

RO Brine to JWPCP

JWPCP Non-nitrified Secondary Effluent

Return to JWPCP