Fulfilling the Promise of San Diego’s Purple Pipe Program

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City of San Diego Recycled Water Plants

North City Water Reclamation Plant
Opened 1997

South Bay Water Reclamation Plant
Opened 2002
In 2019, San Diego’s Northern Service Area Recycled Water System turned 22 years old

- City Parks and Golf Courses
- Dual Plumbed Buildings
- Cooling Towers
- HOAs
- University of California, SD
- MCAS Miramar
- Caltrans
- City of Poway/Olivenhain MWD
San Diego’s Southern Service Area Recycled Water System is 17 years old

- Otay Water District
- Caltrans
- International Boundary and Water Commission Plant
2018-2020 Recycled Water System Condition Assessment and Optimization Plan

- Drought
- Pure Water San Diego
- Existing Recycled Water System Infrastructure
- 800 Recycled Water Metered Connections
- 11 MGD Average Recycled Water Demands
- Maintenance Costs
San Diego’s Purple Pipe System – What Does It Include?

- 104 miles of Transmission and Distribution Pipeline
- 3 Pump Stations
- 2 Storage Reservoirs
- 13 Pressure Reducing Stations
- 211 Transmission Valves (>16 in)
- 1,901 Distribution Valves
- 545 Air and Vac Valves
Recycled Water System – How’s The Performance?

Overall 20 year performance is Excellent
  • Minimal pipe leaks/breaks
  • Pump Station performance issues
  • Valve failures

Goal of the study was to proactively assess system condition to develop a capital improvement program geared toward long term service success.
Program Implementation – What’s the Approach?

Data Gathering

- Inspection Techniques and Forms

Risk Model Development

Condition Assessment

Summary Tech Memos

Condition Assessment Report

City of San Diego Recycled Water System Condition Assessment and Optimization Plan
In-Line Valve and Air Valve Condition Assessment Technical Memorandum

City of San Diego Recycled Water Condition Assessment Report

City of San Diego

Condition Assessment Report

November 15, 2019

San Diego, CA
Reservoir Inspections

In Service Interior Dive Inspections
Exterior Inspections

Miramar (Meanley) Recycled Water Storage Reservoir – 9 MG
Black Mountain Ranch Recycled Water Storage Reservoir – 3 MG
Reservoir Diving, Cleaning and Inspection

What's important here...
Reservoirs – What Else Was Really Important

- Chlorination Systems
- Permanent back up water supply systems

EMPTY – DEC 11, 2011

2-INCH HIGH LINE
Pump Station Inspections – What to Consider

- Pump Performance and Testing
- Equipment Environment

Miramar (Meanley) 890 Zone and 790 Zone Pump Stations  
Canyonside 825 Zone Pump Station
Valve Inspections – How Do You Pick Em’?

- Risk Assessment Analysis – CoF and LoF
- Workshop with your Client
Valve Inspections – What’s Important?

• Coordination with operations
• Agreement on when and how to test
• Develop Plan B
• Work plan and schedule
• Coordination meetings before every week’s operation
Valve Inspections – What Did We Find?

- 13 Pressure Reducing Stations – Varying States of Condition
- 25% Transmission – Non-Operational
- 22% Distribution – Non-Operational
- 41% Air Valve – Non-Operational
- Valve Exercising Program
- Orange and Black Material Build Up In Valves
Miles and Miles of Pipe – Where to Start?

- Risk model development

LoF (50%) + CoF (50%) = Pipe Risk Score (PRS)

- Break Count (35%)
- Age (20%)
- Metallic Pipes without Cathodic Protection (20%)
- Material (15%)
  - Steel Soil Corrosion (5%)
  - Cathodic Protection Potential Data (5%)
- Customer Impacts (25%)
  - System Demand Outage (10%)
  - Key Customer Outage (10%)
  - Customer Outage (5%)
- Roadway and Rail (25%)
- Pressure (20%)
- Soil Slope (5%)
- Material Ductility (5%)
- Stream or Lake Proximity (5%)
- Environmentally Sensitive Areas (5%)
- Land Use Zones (5%)
- Access (Easements) (5%)
Cathodic Protection

- AWWARF 2608
- External Corrosion and corrosion control of buried water mains
- Identified mains without CP
- Identified mains where potential readings did not meet NACE SP0169, Section 6.2.1.3 criteria
Soil Corrosion

- AWWARF 2608

Reported Causes of Corrosion Transmission Mains
- Corrosive Soil 59%
- Other 8%
- Coating Damage / Degradation 13%
- Dissimilar Metals / Soil Environment 13%
- Stray Cu 7%

Reported Causes of Corrosion Distribution Mains
- Corrosive Soil 67%
- Other 7%
- Coating Damage / Degradation 10%
- Dissimilar Metals / Soil Environment 12%
- Stray Currents 4%
Pipe Risk Model

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Impacts to Customers

City’s Hydraulic Model

HDR Consequence Tool

Measure Consequence
- Customers Outages
- Critical Customer Outages
- Demand Shortfall
Pipe Assessment

- Risk model prioritized pipelines for condition assessment evaluation
- Soil corrosivity survey for 30-inch DIP along Dairy Mart Rd
  - Identifies soil corrosivity hot spots
  - Supports future cathodic protection implementation
Into The Future

- Maintenance Plan
- Capital Improvement Program Plan
- Cost of Service Study
- Asset Management Plan