Metropolitan’s PCCP Rehab Program
Metropolitan Water District

- Special district of the State of California
- Formed in 1928, under authority of MWD Act
- Primary purpose: provide supplemental water at wholesale rates to its member agencies
- 26 member public agencies
  - 14 cities
  - 11 municipal water districts
  - One county water authority
- Governed by 37-member Board of Directors
Metropolitan Water District of So. California

- Six-County Service Area: 5,200 square miles
- Population: 19 million
- Gross Domestic Product: $1 Trillion
- Projected growth: ~220,000 people/year
- MWD provides 40 to 60 percent of Southern California’s water supply
Metropolitan Pipelines

- **Approx. 793 total miles**

**Composition:**
- Steel: 364 mi
- Reinforced Concrete: 234 mi
- PCCP: 163 mi
- Other: 32 mi
• PCCP Challenges for MWD
  – Assessment Program for PCCP
    • Assessment
    • Protection
    • Determine when to fix distressed PCCP
    • Determine method for fixing distressed PCCP
  – Systematic Rehabilitation of Most at Risk PCCP
PCCP Assessment Strategy

• Began comprehensive program in 1996
• Program Components
  – Inspect
  – Protect
  – Evaluate
  – Repair
Electromagnetic Inspections

• Electromagnetic conducted annually
  – Analysis identifies wirebreak locations (+/- 6”)
  – Analysis quantifies number of wire breaks
• 35-40 miles inspected yearly
• One cycle of inspection (163 miles) takes 5 years
• All 163 miles – inspected 2-3 times
Protection - Stray Current

- Cathodic protection systems on other oil & gas lines affect MWD pipelines
- Stray current leads to metal loss on PCCP
- High levels of stray currents
- To Protect PCCP MWD conducts corrosion surveys every 1-2 years
Protection - Stray Current Drain Installations

- Prevent metal loss
- Over 80 stray current installation last 3 years
- Project costs over $5 million
Evaluation of RFEC Results

- Zone 1 – Monitor
- Zone 2 – Plan repair
- Zone 3 & 4 – Urgent Repair

Figure ES.1: Performance Curve for the 78-Inch Class 650A/650B Pipe Design
Urgent Repairs - Methods

- Steel Cylinders
- Collapsed Cylinders
- Carbon Fiber
- Repair in accordance with long term strategy (i.e., longer reaches not individual pieces)
Urgent Repairs - Example

- Rehabilitated ~5000 ft of PCCP
- Urgent Repair on several sections required
- Multiple Pipes with wire breaks
Urgent Repairs

- Since 1999
- ~20,000 feet repaired on 12 feeders
- Range spent on individual pipelines - $0 to $24 M
- 70% of repair cost on 5 feeders
- Total repair costs - $82 M
New Strategy – Systematic Replacement

• Systematic Replacement of 5 most at risk pipelines
  – Cost of systematic rehabilitation is less than piecemeal approach
  – Extensive repair history
  – Located in corrosive soils
  – Proximity to stray currents
  – Systematically rehabilitate entire pipeline

• Little or no deterioration in the other 22 pipelines

• Continue to Monitor all PCCP Pipelines which are not experiencing significant degradation
PCCP Lines To Be Rehabilitated

- Calabasas Feeder
- Sepulveda Feeder
- Rialto Pipeline
- Allen-McColloch Pipeline
- Second Lower Feeder

- PCCP – 27 lines
- Rehabilitate 5 lines
- 20 year program

- Total PCCP = 163 miles
- Rehabilitation = 100 miles
PCCP Rehabilitation Challenges

- Shutdowns / Member Agency Demands
- Minimize Hydraulic Losses
- Environmental Clearance
- Valve Size, Type and Procurement strategy
  - Want to install valves and not have to store them
- Length of Program
Shutdown Challenges

- Long Term Shutdown Requirements
  - Few service connection needing daily flow
  - 6 month outages possible

Solution: Bi-Directional Flow
Shutdown Challenges – Rialto/AMP

- Long Term Shutdown Requirements
  - 6 month outages needed
  - Several service connections need daily flow
  - Treatment plant needs flow

Potential Solution: Parallel Portion of Pipeline
Construction Methodology

• Line PCCP w/ Steel Cylinders
• Identify Access Pits
  – Reduce Traffic Impacts
  – Minimize Utility Relocations
  – Space pits to allow welding
  – Ensure worker safety
• Reline with Collapsed Cylinders
Rehabilitate Entire Line

• Replace Sectionalizing Valves
• Replace Meters
• Replace Vacuum and Air Release Valves
• Add additional Sectionalizing Valves
  – Increase operational flexibility
  – Reduce dewatering time and amount water discharged to dewater line
Overall Program Benefits

- Proactive approach to rehabilitation of distressed PCCP
- Systematic, Comprehensive Plan
- Reduced cost by systematic replacement instead of monitor and piecemeal replacement
- Reduced risk of failure & service interruptions
- Planned Capital Expenditures
- Increase long term reliability