Water Loss Control in Los Angeles

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www.ladwp.com

Presentation Agenda

1. Water Loss Control Program Background
2. Improving Data Validity and Targeting Apparent Losses
3. Targeting Real Losses
4. Data Trends & Program Conclusions

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1. Program History

Water Loss Control Program History

- 2010-2011 Water Loss Audit and Component Analysis
- State regulatory requirements
**Water Loss Task Force Action Plan**

1. System Input Volume
2. Database Management
3. Meter Testing and Replacement
4. Leak Detection and Prevention
5. Unmetered and Unauthorized Consumption

[www.ladwp.com/waterconservation](http://www.ladwp.com/waterconservation)

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**Sources of Supply**

**Wet Year**
- LA Aqueduct: 58%
- MWD Imports: 31%
- Ground Water: 9%
- Recycled Water: 2%

**Dry Year**
- LA Aqueduct: 10%
- MWD Imports: 75%
- Ground Water: 13%
- Recycled Water: 2%

Local Groundwater, Stormwater, Conservation & Recycling
Data Validity and Apparent Losses

Supply Meter Preventative Maintenance

67 LADWP supply metering devices, including:
- Flow Meters and Totalizers
- Pressure Transducers, Cells, and Floats

35 flow meters at MWD connections

- Develop Preventative Maintenance Program for Annual Calibration & Maintenance

Meter Types:
- Venturi
- Magnetic
- Ultrasonic
- Propeller
## Preventative Maintenance Program Cost

<table>
<thead>
<tr>
<th>Maintenance and Calibration Program</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Time Costs</td>
<td>$280,000</td>
</tr>
<tr>
<td>Ongoing Costs</td>
<td>$233,000</td>
</tr>
<tr>
<td>Total Program Costs</td>
<td>$513,000</td>
</tr>
</tbody>
</table>

### How does this benefit the city of Los Angeles?

5 → 6

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### Supply Meter Accuracy Testing

- **Tank Drop Test**
- **In-Place Comparative Test**

![Tank Drop Test Image](Image)

![In-Place Comparative Test Image](Image)

### Meter Accuracy Testing Program Costs

<table>
<thead>
<tr>
<th>Testing Program</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Time Costs</td>
<td>$218,000</td>
</tr>
<tr>
<td>Ongoing Costs</td>
<td>$273,000</td>
</tr>
<tr>
<td>Total Program Costs</td>
<td>$491,000</td>
</tr>
</tbody>
</table>

![Meter Testing Program Image](Image)

Source Meter Testing Program

<table>
<thead>
<tr>
<th>Testing Year</th>
<th>Planning</th>
<th>Annual Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>2</td>
<td>75%</td>
<td>25%</td>
</tr>
<tr>
<td>3</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>4</td>
<td>25%</td>
<td>75%</td>
</tr>
</tbody>
</table>
How does this benefit the city of Los Angeles?

Improves DVG: 6 → 7

Customer Meter Accuracy Improvements

- Bench testing 1,000+ small meters annually
- Goal to replace 30,000 small meters annually
Customer Meter Testing Program Costs

<table>
<thead>
<tr>
<th>Meter Testing Program</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Time Costs</td>
<td>$146,000</td>
</tr>
<tr>
<td>Ongoing Costs</td>
<td>$513,000</td>
</tr>
<tr>
<td>Total Program Costs</td>
<td>$659,000</td>
</tr>
</tbody>
</table>

How does this benefit the city of Los Angeles?
## Customer Meter Replacement Costs

<table>
<thead>
<tr>
<th>Small Meter Replacement Program</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Time Costs</td>
<td>$34,000</td>
</tr>
<tr>
<td>Ongoing Costs</td>
<td>$6,362,000</td>
</tr>
<tr>
<td>Total Program Costs</td>
<td>$6,396,000</td>
</tr>
</tbody>
</table>

How does this benefit the city of Los Angeles?

- **Reduces Apparent Losses**
- **Potential Revenue Savings: $1 M**
# Cost Summary

<table>
<thead>
<tr>
<th>Implemented Actions</th>
<th>One Time Costs</th>
<th>Ongoing Costs</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meter Calibration</td>
<td>$280,000</td>
<td>$233,000</td>
<td>Improves DVG</td>
</tr>
<tr>
<td>Supply Meter Accuracy Testing</td>
<td>$218,000</td>
<td>$273,000</td>
<td>Improves DVG</td>
</tr>
<tr>
<td>Customer Meter Testing</td>
<td>$146,000</td>
<td>$513,000</td>
<td>Maintains DVG</td>
</tr>
<tr>
<td>Customer Meter Replacement</td>
<td>$34,000</td>
<td>$6,396,000</td>
<td>Apparent Losses</td>
</tr>
<tr>
<td>Total Costs</td>
<td>$678,000</td>
<td>$7,415,000</td>
<td></td>
</tr>
</tbody>
</table>

## Real Losses

3.
LADWP’s Water Distribution System

- 473 square miles
- 7,327 miles of mains
- 737,583 services
- 111 Pressure Zones
- 60,804 Hydrants
- 1,320 AF of water delivered per day
- 4 million people served

Real Loss Component Analysis Results

Majority is background leakage:
- Pressure management
- Infrastructure renewal and rehabilitation

Reported breaks:
- Reduce response time

Some potential to reduce hidden losses:
- Active leak detection
Increased Mainline Replacement

Mainline Replacement Program Costs

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>FY 21-22</td>
<td>158</td>
<td>118</td>
<td>118</td>
<td>119</td>
<td>113</td>
<td>170</td>
<td>184</td>
<td>216</td>
<td>232</td>
<td>249</td>
<td>266</td>
</tr>
<tr>
<td>FY 22-23</td>
<td>263</td>
<td>300</td>
<td>350</td>
<td>270</td>
<td>270</td>
<td>270</td>
<td>270</td>
<td>270</td>
<td>270</td>
<td>270</td>
<td>270</td>
</tr>
</tbody>
</table>

Annual Program Cost: $260 Million

How does this benefit the city of Los Angeles?

How does this benefit the city of Los Angeles?

- Reduces Real Losses
- Water Savings: ?

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Pressure Monitoring & Hydraulic Modeling

- Pilot began in December 2016
- Evaluating various technologies
- Targeting 13 leakiest zones

Pressure Monitoring & Modeling Costs

<table>
<thead>
<tr>
<th>Pressure Monitoring Phase 1</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Time Costs</td>
<td>$5,500,000</td>
</tr>
<tr>
<td>Ongoing Costs</td>
<td>$2,100,000</td>
</tr>
<tr>
<td>Total Annual Costs</td>
<td>$7,600,000</td>
</tr>
</tbody>
</table>
Pressure Management: Phased Approach

Step 1: Install Pressure Loggers
Step 2: Monitor and Review Data
Step 3: Input Data into a Hydraulic Model
Step 4: Model Impact of Pressure Changes
Step 5: Select Pressure Management Options Based on Data and Modeling Results

- Decrease System Pressure
- Install Automated Regulator Valves
- Reduce Pressure Transients
- Create Smaller System Zones

How does this benefit the city of Los Angeles?

Water Savings: 94%
- Total Supplied Volume
- Real Losses 6%
- Background Losses 64%
- Reported Breaks 23%
- Hidden Losses 13%

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Leak Detection Pilot Program

Pilot Project Objectives

- Verify Accuracy and Effectiveness
- Evaluate Ease of Use
- Evaluate Large Scale Deployment

Evaluate Multiple Technologies

- Fixed leak detection and monitoring
- Manual leak survey

Leak Detection Pilot Program Cost

<table>
<thead>
<tr>
<th></th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed leak detection</td>
<td></td>
</tr>
<tr>
<td>One Time Costs</td>
<td>$304,000</td>
</tr>
<tr>
<td>Ongoing Costs</td>
<td>$720,000</td>
</tr>
<tr>
<td>Total Annual Costs</td>
<td>$1,024,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual leak survey</td>
<td></td>
</tr>
<tr>
<td>One Time Costs</td>
<td>$20,000</td>
</tr>
<tr>
<td>Ongoing costs</td>
<td>$175,000</td>
</tr>
<tr>
<td>Total Annual Costs</td>
<td>$195,000</td>
</tr>
</tbody>
</table>
Leak Detection: An Emerging Technology

Pros
- Identifies leaks
- Easy to operate
- Good user interface

Cons
- Cannot determine the size of the leak
- Too many false positives
- Theft is prevalent
- Installation can be difficult

How does this benefit the city of Los Angeles?

- Total Supplied Volume: 94%
- Real Losses: 6%
- Background Losses: 64%
- Hidden Losses: 13%
- Reported Breaks: 23%

Water Savings: ?

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**Maximum Theoretical Savings**

- **Reported Breaks, 23%**
  - Water Savings: 7,000 AF
  - Revenue Savings: $9 million

- **Hidden Losses, 13%**
  - Water Savings: 4,000 AF
  - Revenue Savings: $5 million

- **Background Leakage, 64%**
  - Water Savings: 19,000 AF
  - Revenue Savings: $25 million

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**Cost Summary**

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<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mainline Replacement</td>
<td>-</td>
<td>$260,000,000</td>
<td>Real Losses</td>
</tr>
<tr>
<td>Pressure Management</td>
<td>$5,101,000</td>
<td>$2,109,000</td>
<td>Real Losses/Background Losses</td>
</tr>
<tr>
<td>Leak Detection Phase 1</td>
<td>$304,000</td>
<td>$720,000</td>
<td>Real Losses/Hidden Losses</td>
</tr>
<tr>
<td>Leak Detection Phase 2</td>
<td>$20,000</td>
<td>$175,000</td>
<td>Real Losses/Hidden Losses</td>
</tr>
<tr>
<td><strong>Total Costs</strong></td>
<td><strong>$5,425,000</strong></td>
<td><strong>$263,000,000</strong></td>
<td></td>
</tr>
</tbody>
</table>
Los Angeles Non-Revenue Water Trends

Non-revenue Water vs. Percent of Total Potable Water Use

Fiscal Year Ending June 30
National Trends: Real Losses

Real Loss Per Con Per Day

2013 2014 2015 2016 2017
WADI  Georgia  CA Audit

Recommendations: Phased Approach

Phase 1  Phase 2  Phase 3
Utility Specific Actions  Utility Specific Actions  Utility Specific Actions

Cost Effective Water Savings

www.ladwp.com  WADI= Water Audit Data Initiative, American Water Works Association