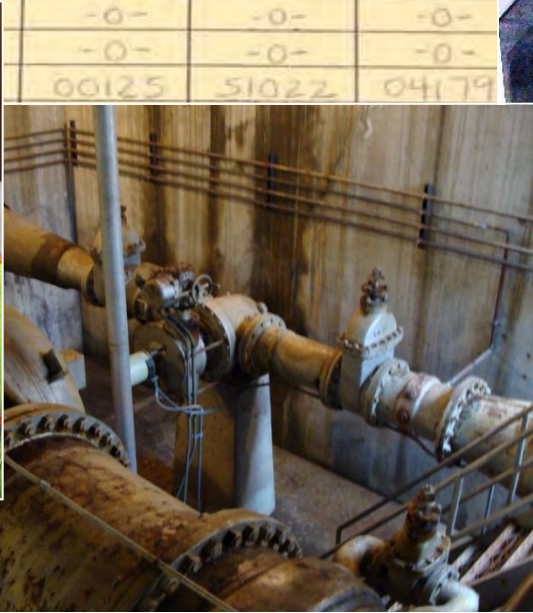


# LADWP's Water Loss Audit and Component Analysis Project



**AMWA Conference  
October 21, 2014**



# The Nation's Largest Publicly Owned Utility



Bay Delta

Sierra Mountains

LA Aqueduct

State Water Project

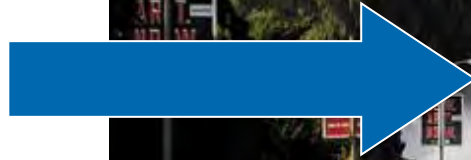
Colorado River Aqueduct

Local Groundwater, Stormwater, Conservation & Recycling

# Why did we do this Water Loss project?

- Fulfills requirements of California Urban Water Conservation Council (CUWCC) Best Management Practice (BMP) 1.2
- Assembly Bill 1420 – Water agencies must comply with CUWCC BMPs to qualify for State Grants and Loans
- ***Discovering and addressing system water losses saves water and money!***

**Loss of water!!!**



# Project Costs

<b>Consultant (Water Systems Optimization)</b>	<b>\$300,000</b>
<b>U.S. Bureau of Reclamation Grant</b>	<b>\$100,000</b>
<b>LADWP Staff Labor Costs</b>	<b>&gt;\$1 million</b>
<b>Equipment and Materials</b>	<b>\$150,000</b>

- 💧 Project took a little over 1 year to complete



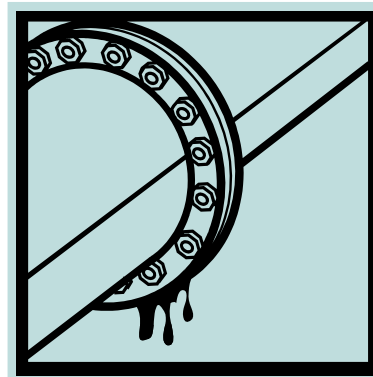
# What is a Water Loss Audit and Component Analysis?

**WATER SUPPLY – WATER DEMAND = WATER LOSS**

- ◆ A typical Water Loss Audit includes:
  - System input and demand volume validation
  - Analysis of real and apparent losses
  - American Water Works Association (AWWA) Water Balance assessment
- ◆ A Component Analysis breaks down real losses

into:

- Reported Leaks
- Unreported Leaks
- Background Leaks



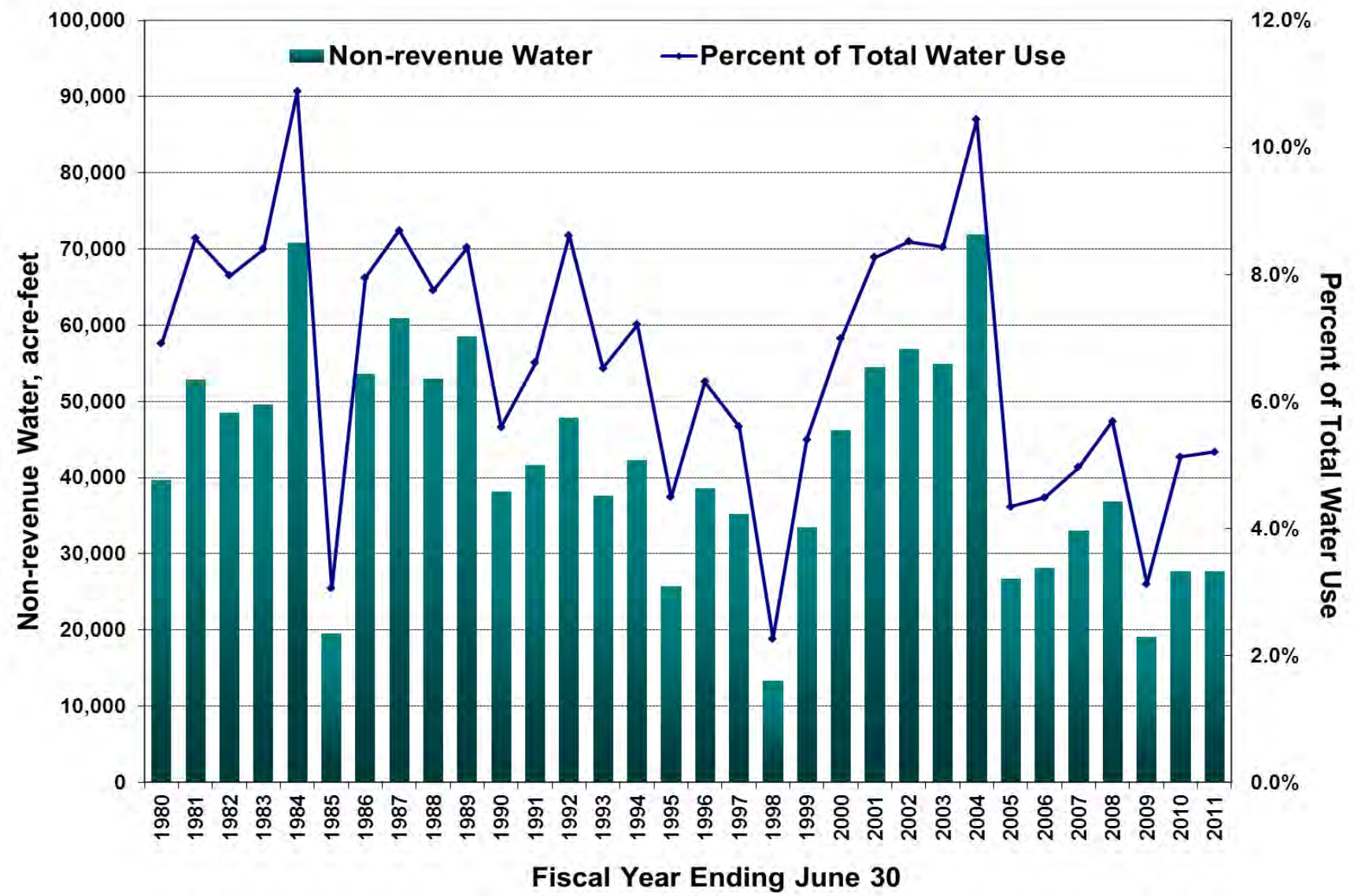


# American Water Works Association Water Balance

<b>System Input Volume</b>	<b>Authorized Consumption</b>	<b>Billed Authorized Consumption</b>	<b>Billed Metered Consumption</b>
			<b>Billed Unmetered Consumption</b>
		<b>Unbilled Authorized Consumption</b>	<b>Unbilled Metered Consumption</b>
			<b>Unbilled Unmetered Consumption</b>
	<b>Water Losses</b>	<b>Apparent Losses</b>	<b>Unauthorized Consumption</b>
			<b>Customer Meter Inaccuracies</b>
		<b>Real Losses</b>	<b>Leakage on Transmission and Distribution Mains</b>
			<b>Leakage and Overflows at Storage Tanks</b>
			<b>Leakage on Service Connections up to Point of Customer Meter</b>



# Historical Tracking of Non-Revenue Water





# District Metered Areas: Real Loss Validation

- Identified 3 small service zones to analyze
  - Monitored the inflow and water usage in each zone
  - Performed leak detection

Zone Name	Boyle Heights	Westwood	Tujunga
Length of Distribution Network (miles)	46.91	21.48	25.98
Total Number of Service Connections	6,285	1,814	1,657
Average Pipe Diameter (inches)	6.9	7.0	6.6
Average Pipe Age (years)	73.5	65.7	41.3



# Locations of the District Metered Areas

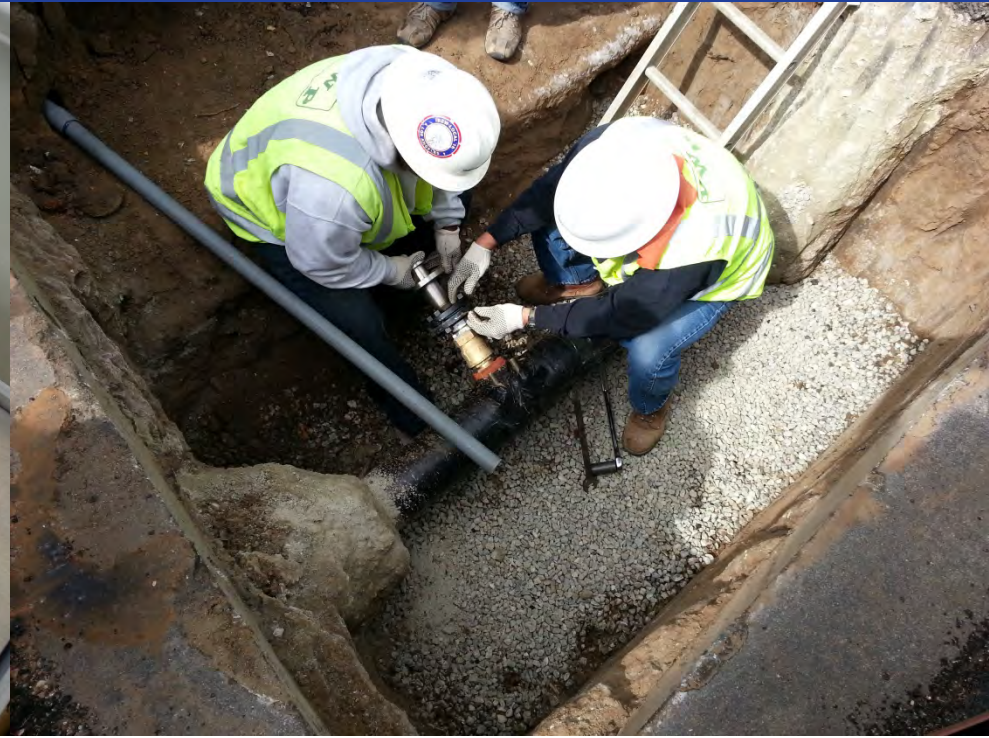


**Tujunga**

**Westwood**

**Boyle Heights**

# Installation of the Meters and Data Loggers



- 💧 Meters were installed through hot tap (no water shut off)
- 💧 Data loggers and batteries were installed in toolboxes with locks and located above ground to protect them from water damage

# Meter Reading and Data Collection

## 💧 Meter Reading in the 3 Zones:

- Some meters were full of dirt
- Discovered customer meter tampering and theft
- Identified potential theft on fire service meters
- Discovered unidentified, mislocated, and paved-over service meters



# Leak Detection

- Identified the following leaks:
  - Boyle Heights – 11 leaks (service, hydrant, & valve leaks)
  - Westwood – 1 hydrant leak
  - Tujunga – no leaks



# Results: The Good News!

For Fiscal Year 2010-2011, as a Percentage of Water Supplied:

<b>Non-Revenue Water:</b>	<b>5.2%</b>
Real Losses (leakage)	3.5%
Apparent Losses (meter inaccuracies and theft)	1.6%
Unbilled Authorized Consumption (fire flows)	0.1%

Low overall water loss, but still some work to do





# Infrastructure Leakage Index (ILI)

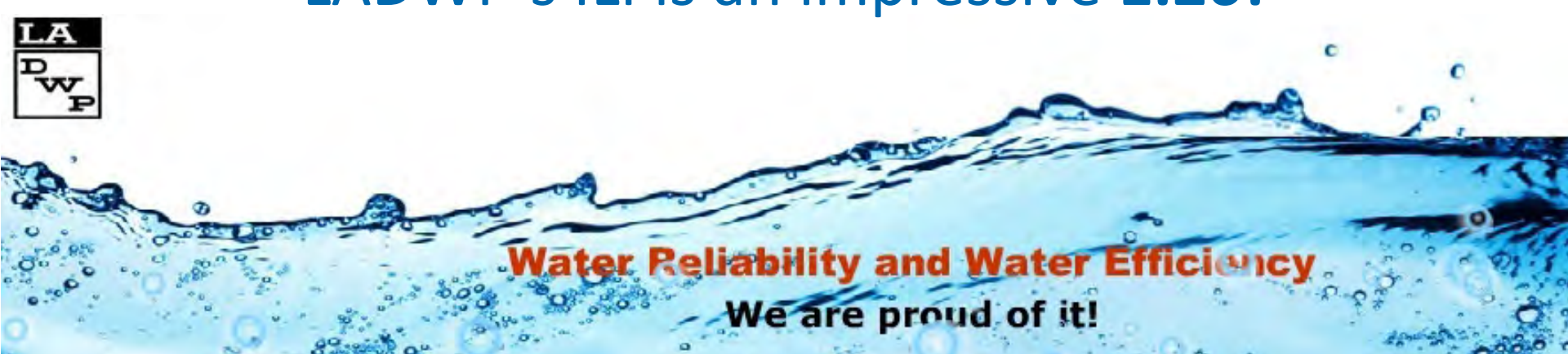
- 💧 The Infrastructure Leakage Index (ILI) is the new standard of water loss
- 💧 ILI is defined as:

Current Annual Real Losses

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Unavoidable Annual Real Losses

- 💧 An ILI close to 1 indicates an efficient system  
LADWP's ILI is an impressive **1.26!**



**Water Reliability and Water Efficiency**

**We are proud of it!**



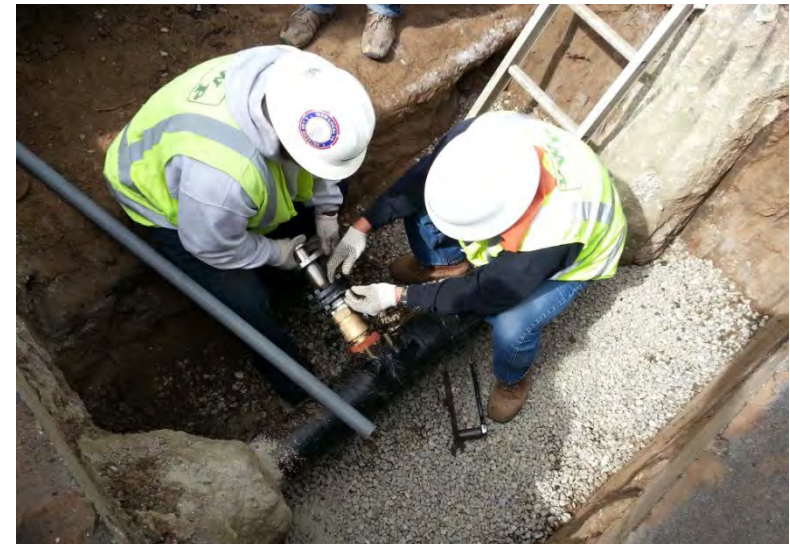
# LADWP: A Low Leak Utility

- National average leak rate is 21-25 leaks per 100 miles
- LADWP's leak rates:
  - 2009 – 21 leaks per 100 miles (at national average)
  - 2011 – 19 leaks per 100 miles
  - 2013 – 15 leaks per 100 miles



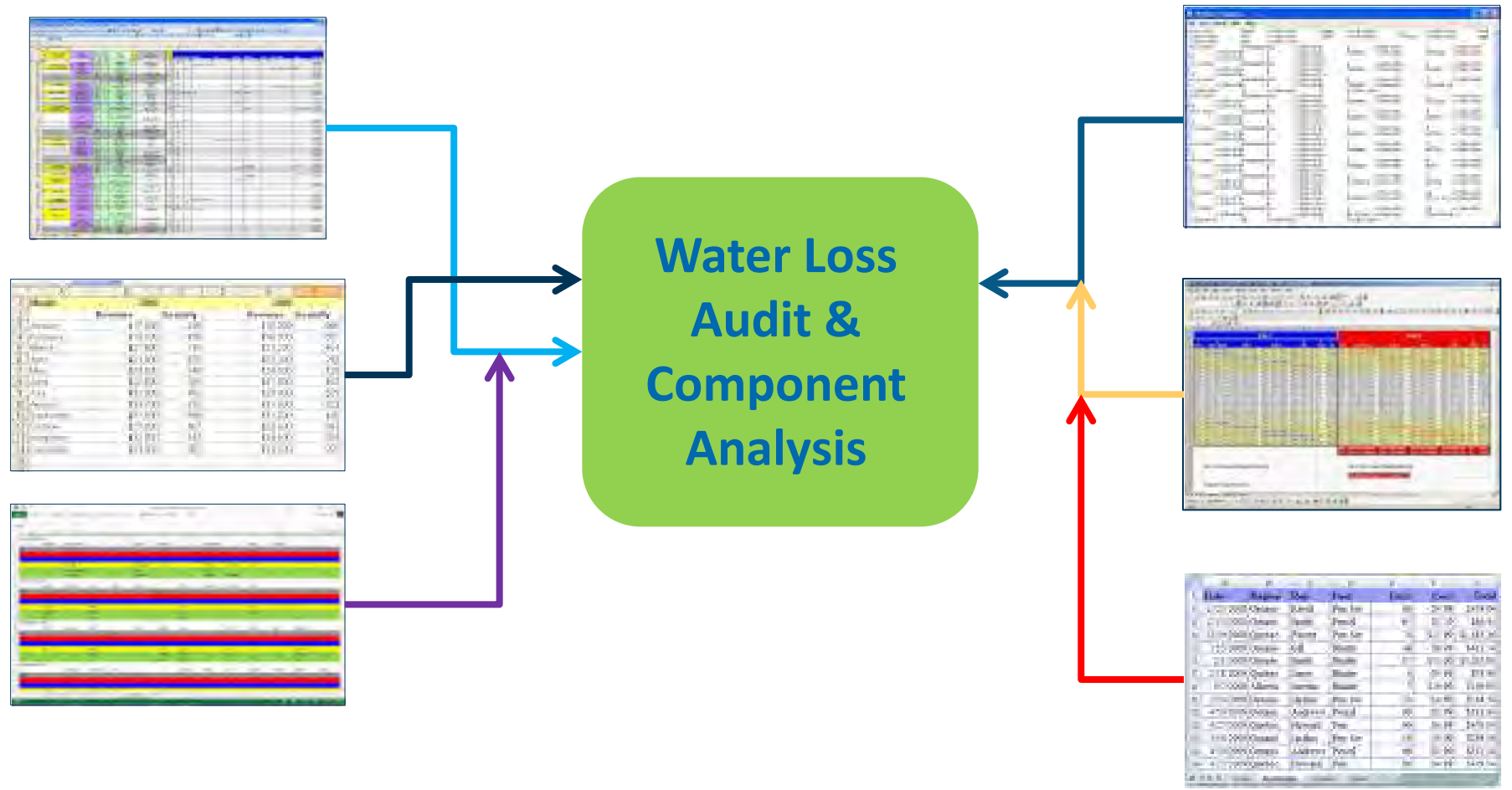
# Key Findings and Recommendations

- 💧 Pressure management improvement
- 💧 Active leak detection program
- 💧 Meter sizing optimization
- 💧 Large meter overhaul schedule
- 💧 Address database inconsistencies
- 💧 Improve water supply meter accuracies



# Lessons Learned

💧 Improve data retrieval methods



# Lessons Learned

- 💧 Read fire service meters on a regular basis to prevent theft



# Lessons Learned

- Perform District Metered Area analyses with Advanced Metering Infrastructure (AMI)





# Lessons Learned

- 💧 Have all the right staff at the table

## Water Loss Audit & Component Analysis Team

**Water  
Distribution**

**Water  
Operations**

**Water  
Quality**

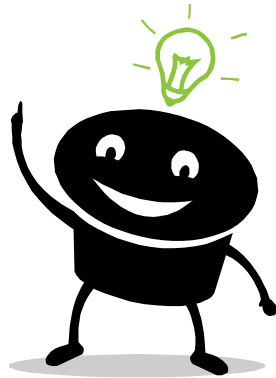
**Water  
Engineering &  
Technical  
Services**

**Water  
Resources**

**Customer  
Service/IT**

# Next Steps

- 💧 Water Loss Task Force formed
  - All divisions involved in previous study included
  - Kick-off meeting – October 2014



- 💧 CUWCC reporting requirements
  - Water loss audit due annually
  - Component analysis due every 4 years



Questions?

Los Angeles  Department of Water & Power



**KEEP SAVING  
WATER, L.A.!**

Thank You!