

This presentation premiered at WaterSmart Innovations

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The Largest Water Loss Technical Assistance Program in the Nation

What's Been Done, & What's Next

WaterSmart Innovations 2017

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AWWA Director



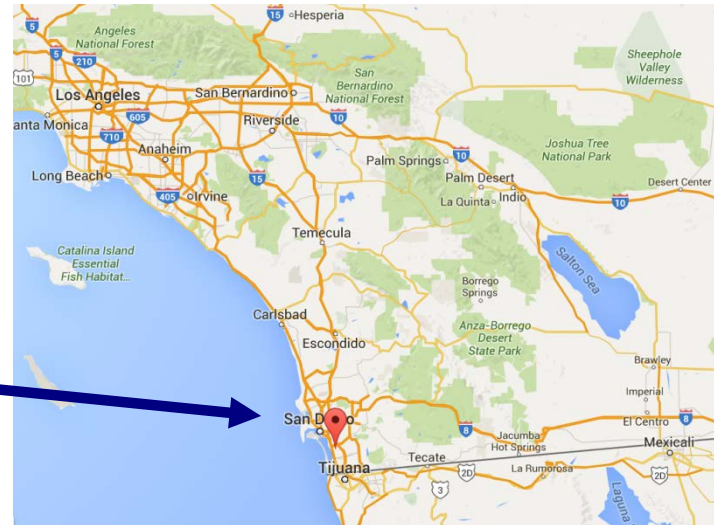
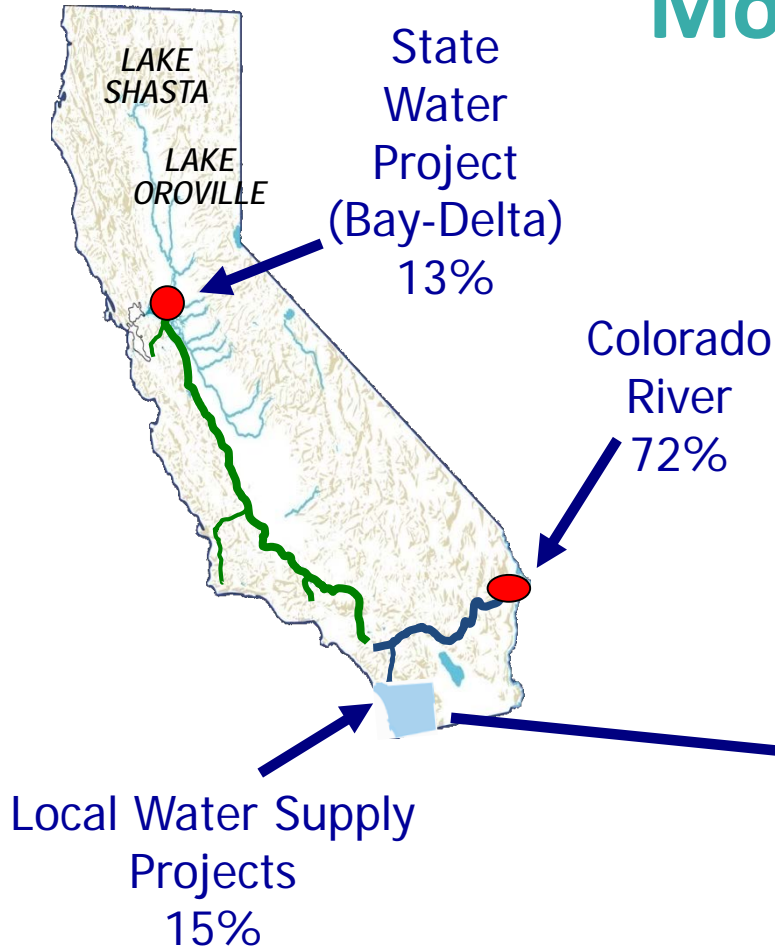
Main Points

- Program Drivers
 - Historical perspective and regulatory snapshot

- What's Been Done
 - Program Development and the Water Loss TAP

- Next steps
 - Analysis, WAV, Target Setting and Beyond

Moving Water – From End to End



5 year average 2013-2017

Past Conservation Actions – Statewide

- Statewide Water Delivery Systems
- California Urban Water Conservation Council
 - Voluntary
 - Best Management Practices
- Urban Water Management Plans
 - Supply and Demand Forecasts
 - Every 5 years
 - Supply Development Projects
 - Shortage Contingency Plans



State Focus on Water Efficiency

2009 (SB 7x7)

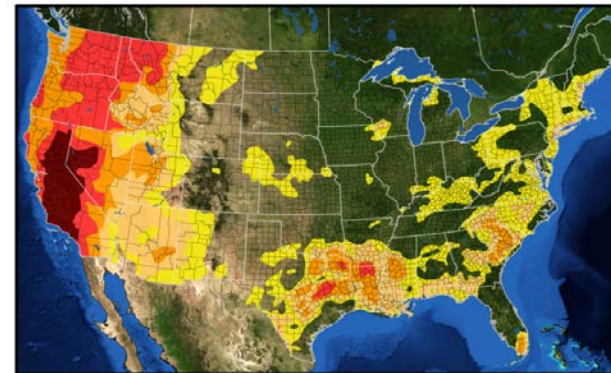
Mandatory 20% water use reduction by 2020; progress report in 2015

2014 (SB 1420)

Requires water audit, using M36 and AWWA software
Every 5 years, with Urban Water Management Plan (starting July 2016)

U.S. Drought Monitor | September 8, 2015

Issued: 9/10/15 | Data: NDMC | Map: The Vane | thevane.gawker.com | [@wxdam](https://twitter.com/wxdam)

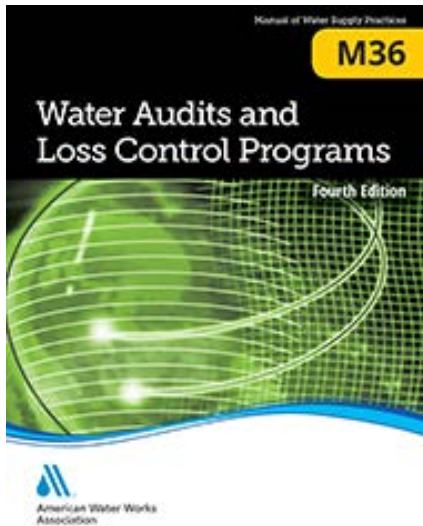


Legend: **00** Abnormally Dry **01** Moderate Drought **02** Severe Drought **03** Extreme Drought **04** Exceptional Drought

2015 (SB 555)

Audit required annually
Expert validation
Steps to increase validity
Performance standards (by 2020)

State Regulation – SB 555



- Rules & technical standards (January 1, 2017)
- State assistance to urban water providers
- Validated water loss audits (October 1 annually) accompanied steps taken to:
 - increase data validity
 - reduce loss volumes
- Audits to be posted to website
- Water loss performance standard by 2020

The Water Balance

SYSTEM INPUT VOLUME	AUTHORIZED CONSUMPTION	BILLED AUTHORIZED CONSUMPTION	BILLED METERED CONSUMPTION	REVENUE WATER
			BILLED UNMETERED CONSUMPTION	
		UNBILLED AUTHORIZED CONSUMPTION	UNBILLED METERED CONSUMPTION	\$\$\$ NONREVENUE WATER
			UNBILLED UNMETERED CONSUMPTION	
	WATER LOSSES	\$\$\$ APPARENT LOSSES \$\$\$	CUSTOMER METER INACCURACIES	💧
			UNAUTHORIZED CONSUMPTION	
DATA HANDLING ERRORS				
		💧 REAL LOSSES 💧		

AWWA FREE Water Audit Software

AWWA Free Water Audit Software: Reporting Worksheet

Water Audit Report for: **Northern San Leandro Combined Water Sewer Storm**
Reporting Year: **2013** / 1/2013 - 12/2013

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate the input data by grading each component (r/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain the input data.

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Enter grading in column 'E' and 'J' -

WATER SUPPLIED					
Volume from own sources:	+ ? 5	1,000.000	MG/Yr		+ ?
Water imported:	+ ?		MG/Yr		+ ?
Water exported:	+ ? 1	100.000	MG/Yr		+ ?
WATER SUPPLIED:		825.000	MG/Yr		

AUTHORIZED CONSUMPTION					
Billed metered:	+ ? 8	700.000	MG/Yr		+ ?
Billed unmetered:	+ ? 9	50.000	MG/Yr		+ ?
Unbilled metered:	+ ?		MG/Yr		+ ?
Unbilled unmetered:	+ ?	10.313	MG/Yr		+ ?
Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed					
AUTHORIZED CONSUMPTION:		760.313	MG/Yr		

WATER LOSSES (Water Supplied - Authorized Consumption) **64.688** MG/Yr

Apparent Losses

Unauthorized consumption: + ? 10 **3.000** MG/Yr

Unauthorized consumption volume entered is greater than the recommended default value

Customer metering inaccuracies: + ? 5 **7.071** MG/Yr

Systematic data handling errors: + ? 4 **5.000** MG/Yr

Apparent Losses: ? **15.071** MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: ? **49.617** MG/Yr

WATER LOSSES: **64.688** MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: ? **75.000** MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains: + ? 7 **100.0** miles

Number of active AND inactive service connections: + ? 6 **1,000**

Service connection density: ? **10** conn./mile main

Are customer meters typically located at the curbstop or property line? Yes (length of ser boundary, the

Average length of customer service line: + ?

Average length of customer service line has been set to zero and a data grading score of 10 has been ap

Average operating pressure: + ? 6 **60.0** psi

COST DATA

Total annual cost of operating water system: + ? 5 **\$1,000,000** \$/Year

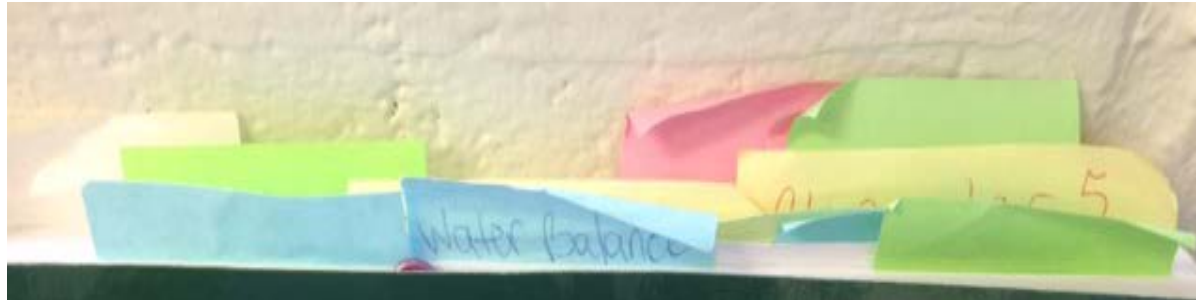
Customer retail unit cost (applied to Apparent Losses): + ? 7 **\$3.50** \$/1000 gallons (US)

Variable production cost (applied to Real Losses): + ? 7 **\$3,000.00** \$/Million gallons

- Industry Standard (M36)
- Free
- Defaults provided
- ~ 20 potential inputs
- ~10 inputs for typical utility use
- awwa.org/waterlosscontrol



Which Value Goes Where?



Water Discharge Data July 2012-June 2013

Month	Unbilled Fire Hydrant Maintenance	Unbilled Knocked off Fire Hydrants	Service Leaks Renewal and Repair	Billed Main Leaks	Water Quality Flushing	Main Construction Activities	Fire Flow Testing	(AWR) Tank Release	Tank Leakage and Spill	Valve Maintenance and Activities	Total Water Discharge per Month	RWQCB I-Acre Foot or Greater
Jul 12	7,150	0	0	0	156,145	0	0	529,300	0		736,191	
Aug 12	6,500	148,290	0	0	0	0	0	312,250	0	7,600	556,688	
Sep 12	3,850	0	25	11,500	85,688	103,040	0	246,000	0	0	567,845	
Oct 12	3,000	107,358	22,395	200	16,282	21,400	0	639,700	0	2,348	844,405	
Nov 12	1,102	0	100	200	0	200,000	0	863,500	0	0	1,074,262	
Dec 12	550	222,435	0	5,000	83,435	0	0	246,000	0	0	619,037	
Jan 13	1,900	0	0	1,000	0	0	0	246,000	0	0	299,310	
Feb-13	8,300	204,890	0	0	0	0	0	246,000	0	0	810,623	
Mar-13	5,000	325,140	28	2,700	0	0	0	338,000	0	0	720,278	
Apr-13	10,300	0	0	0	30,840	0	0	523,500	0	0	678,422	
May-13	10,302	174,130	10,900	38,760	68,151	0	0	918,080	0	0	1,260,287	
Jun-13	9,500	431,690	0	0	20,820	0	0	246,000	0	0	802,399	
Total	67,454	1,613,933	33,448	59,360	461,361	324,440	0	5,354,330	0	9,948	8,974,443	

Water Discharge Data July 2012-June 2013

Water balance

What is the "units" of measure? How is each being figure calculated (if not metered)?

consider Reader? Apparent water losses R.O. Hydrants Real water losses Service Leaks Main Leaks Tank Leaks Unbilled/Unmetered

Does measuring "metered" water to differentiate "metered" water volumes from "unmetered" water? When both?

"Discharge" can't be measured flow

For water loss calculation, correct? Tankers only measuring else?

Commonly whole amount reported

not returned to the distribution system

System

Water hydrant maintenance; Water flowed during maintenance to determine that hydrant works and is free from obstruction. Planned 5429.50 (Unbilled/un metered)

Knocked off Fire Hydrants: Water discharge that takes place when a hydrant is damaged or knocked off by vehicles or other means. Unplanned 5423.50 (Apparent water loss-unauthorized consumption) of not metered

Service Leaks, Renewal and Repairs: Water discharged from leaking, damaged or repaired services, air valves and sample points. Unplanned 5425.50 (Real water loss)

Main Leaks: Water discharged from water main breaks, damaged water mains and repair. Unplanned 5423.50 (Real water loss)

Water Quality Flushing: Water discharged during any type of water quality flushing. This includes planned and unplanned flushing activities. 5403.54 (Unbilled/un metered)

Main Construction Activities: Water flowed during hydrostatic discharges when flushing new water mains. Water loss during tie-ins and other construction activities. Planned 5401.50 (Unbilled/un metered)

Fire Flow Testing: Water flowed from fire hydrants during any fire flow tests. Fire flow testing is typically initiated by the Engineering Department. Planned 5400.50 (Unbilled/un metered)

Tank Release: Water removed from tanks due to water quality issues, tank cleaning and maintenance activities. Planned 5400.50 (Unbilled/un metered)

Flushing Program

Call Ask Michael Garrod if you don't if it's change

I. AUTHORIZED CONSUMPTION			
A. Billed Metered* (p. 23)	B. Billed Unmetered	C. Unbilled Metered (p. 29)	D. Unbilled Unmetered (pp. 29-37)
Customers Meters	City Street Sweeping	City Vac Trucks? <i>7.5</i>	Hydrant Maintenance <i>(less than 100 gal)</i>
- Residential	City Sewer Flushing	City Vac Trucks? <i>7.5</i>	Fire Fighting and Training
- Commercial	City Graffiti Removal	Tank Releases <i>Unanticipated</i>	Service Renewals/Inspections* & repairs
- Institutional	City Parks - RS to research?	Water Quality Flushing <i>5.0</i>	Valve Maintenance and Replacement
Construction Meters	Billed Damaged Fire Hydrants	Proactive/Reactive consumer driven	Main Construction Activity* <i>Mike Wallace</i>
- Private Construction	Billed Service Renewal and Repairs		Field Meter Testing
- Public Construction (Other Agencies)	Unbilled Billed Main Leaks		Hydrostatic Discharge <i>captured by the Hydrostatic Discharge</i>
Authority Meters (see attached)	Contractor hits primarily		Authority Vector Trucks
- Facilities			Water Consumption at Authority facilities not included in customer billing system
- Facility Irrigation			** excludes Authority activities where a construction meter was used.
Construction Meters	Distrib provided		
Excludes: Water Sold to Neighboring Utilities ("Water Exported")			

II. WATER LOSSES	
A. Apparent Losses (pp. 38-50)	B. Real Water Losses = Water Losses minus Apparent Losses
Meter inaccuracy	Unauthorized Consumption <i>U.B.</i> Main Breaks and Leaks
Master Meters	Illegal Connections <i>U.B.</i> Service Repairs and Leaks
Customer Meters	Open bypasses
Systematic Data Handling Error	Buried or inaccessible meters
Systematic Data Transfer Error	Misuse (Illegal Use) of fire hydrants
Systematic Data Analysis Error	Unmetered fire lines??
Data Policy/Procedure Impacts	Meter tampering
	Illegal opening of valves
	Failure to activate a billing account after water use has been initiated

Unanticipated

Revenue Water

Non-Renew Water

**If a permanent meter exists and supplies a permanent structure (such as a public facility), it is best if the property is assigned an account in the customer billing system and is read and billed regularly - even if the billing charge is zero. This falls into the category of "Billed Metered." Process water at treatment plants should be metered and exist in a billed account because water treatment plants are permanent structures.*

WRF 4372 - 2010 Water Data Analysis and Validation:

- Simple steps of data validation were applied

California – CUWCC BMP1.2	Count	Percent of Full Data Set
Number of Utilities Reporting Water Audit Result	125	100%
Number of Utilities Reporting Negative Water Losses	5	4%
Number of Utilities Reporting ILI<1	36	29%
Number of Utilities Reporting ILI>20	3	2%
Number of Utilities Reporting Erroneous Infrastructure Data	1	1%
Final Data Set After Removal of Erroneous Water Audit Reports	80	64%

- Results highlight the problems utilities are facing when completing an audit for the first time!

2016 UWMP Submitted Data - Unfiltered

		2016 n = 292	2016 n = 292	2016 n = 292	
STATISTIC		<i>min</i>	<i>median</i>	<i>max</i>	UNIT
<i>financial</i>	Customer Retail Unit Cost	\$0.00	\$3.93	\$180,097.61	\$ / 1,000 gal
	Variable Production Cost	\$0.00	\$1,315.45	\$25,007,000.00	\$ / million gal
	NRW as % of Operating Cost	0.00%	3.54%	242305%	% of operating cost
<i>volumetric</i>	Apparent Losses	-4.34	6.36	122.3	gal/ serv conn / day
	Real Losses (serv conns)	-35	19.46	334.54	gal/ serv conn / day
	Real Losses (pressure)	-0.66	0.371	5.31	gal/ serv conn / day / psi
	ILI	-3.03	1.18	17.84	CARL / UARL
	Data Validity Score	2.35	75.33	98.27	points out of 100



Data Grading Matrix

For each input, determine the highest grade where the input meets or exceeds all criteria for that grade and all grades below it.

Master Meter Error Adjustments

			←----- Enter grading in column 'E' and 'J' ----->	Pcnt:	Value:
Volume from own sources:	<input type="button" value="+"/>	<input <="" td="" type="button" value="?"/> <td><input type="text"/></td> <td>n/a (not applicable). Select this grading only if the water utility purchases/imports all of its water resources (i.e. has no sources of its own)</td> <td></td>	<input type="text"/>	n/a (not applicable). Select this grading only if the water utility purchases/imports all of its water resources (i.e. has no sources of its own)	
Water imported:	<input type="button" value="+"/>	<input <="" td="" type="button" value="?"/> <td><input type="text"/></td> <td>1. Less than 25% of water production sources are metered, remaining sources are estimated. No regular meter accuracy testing or electronic calibration conducted.</td> <td></td>	<input type="text"/>	1. Less than 25% of water production sources are metered, remaining sources are estimated. No regular meter accuracy testing or electronic calibration conducted.	
Water exported:	<input type="button" value="+"/>	<input <="" td="" type="button" value="?"/> <td><input type="text"/></td> <td>2. 25% - 50% of treated water production sources are metered; other sources estimated. No regular meter accuracy testing or electronic calibration conducted.</td> <td></td>	<input type="text"/>	2. 25% - 50% of treated water production sources are metered; other sources estimated. No regular meter accuracy testing or electronic calibration conducted.	
WATER SUPPLIED:				3. Conditions between 2 and 4	
Billed metered:	<input type="button" value="+"/>	<input <="" td="" type="button" value="?"/> <td><input type="text"/></td> <td>4. 50% - 75% of treated water production sources are metered, other sources estimated. Occasional meter accuracy testing or electronic calibration conducted.</td> <td></td>	<input type="text"/>	4. 50% - 75% of treated water production sources are metered, other sources estimated. Occasional meter accuracy testing or electronic calibration conducted.	
Billed unmetered:	<input type="button" value="+"/>	<input <="" td="" type="button" value="?"/> <td><input type="text"/></td> <td>5. Conditions between 4 and 6</td> <td></td>	<input type="text"/>	5. Conditions between 4 and 6	
Unbilled metered:	<input type="button" value="+"/>	<input <="" td="" type="button" value="?"/> <td><input type="text"/></td> <td>6. At least 75% of treated water production sources are metered, or at least 90% of the source flow is derived from metered sources. Meter accuracy testing and/or electronic calibration of related instrumentation is conducted annually. Less than 25% of tested meters are found outside of +/- 6% accuracy.</td> <td></td>	<input type="text"/>	6. At least 75% of treated water production sources are metered, or at least 90% of the source flow is derived from metered sources. Meter accuracy testing and/or electronic calibration of related instrumentation is conducted annually. Less than 25% of tested meters are found outside of +/- 6% accuracy.	
Unbilled unmetered:	<input type="button" value="+"/>	<input <="" td="" type="button" value="?"/> <td><input type="text"/></td> <td>7. Conditions between 6 and 8</td> <td></td>	<input type="text"/>	7. Conditions between 6 and 8	
Percentage of 1.25% (of billed metered)			<input type="text"/>	8. 100% of treated water production sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted annually, less than 10% of meters are found outside of +/- 6% accuracy	
Normalized Consumption:		<input <="" td="" type="button" value="?"/> <td><input type="text"/></td> <td>9. Conditions between 8 and 10</td> <td></td>	<input type="text"/>	9. Conditions between 8 and 10	
Normalized Consumption)			<input type="text" value="0.000"/>	10. 100% of treated water production sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted semi-annually, with less than 10% found outside of +/- 3% accuracy. Procedures are reviewed by a third party knowledgeable in the M36 methodology.	
Authorized consumption:	<input type="button" value="+"/>	<input <="" td="" type="button" value="?"/> <td><input type="text"/></td> <td></td> <td></td>	<input type="text"/>		
			<input type="text" value="0.000"/>	Pcnt: 0.25%	Value: <input type="text"/>

Statewide Water Loss Management Program

Phase 1

Phase 2

Phase 3

Establish Annual M36 Water Auditing

Achieve Minimum Standard of Audit Reliability

Manage Water Loss Performance for Long-Term Reduction

Requirement

Implement established requirement for annual M36 Water Audits

Data Management

Augment DWR Data Management & Review Process
 Establish posting system and communication protocols

Benchmarking

Suite of Performance and Process Measures
 System specific improvement over time in a cost-effective manner

Outreach

Educate Regulatory Community on M36 Method and appropriate use of performance indicators
 Establish Statewide Water Loss Control Committee

Validation

Establish minimum standards of validation for quality assurance
 Determine by Agency or 3rd Party
 Establish validation program until certification program is in place

Compliance

No universal targets
 Excessive thresholds established

Training & Tech Asst

Develop State Manual and Training Framework
 Provide extended, progressive training to utilities

Certification

Design and implement a Water Audit Validator Certificate program for sustained quality control
 CA-NV Section Administers Water Auditor Validator Certification Program

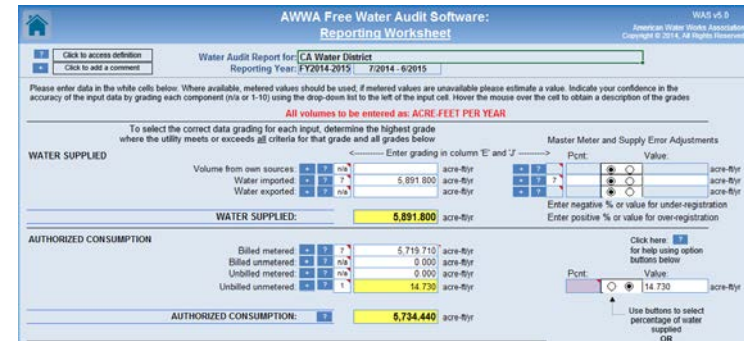
Annual audit submission threshold exceedances
 System specific progress review during Urban Water Management Plan submissions

Phase One - Water Loss Technical Assistance Program

Water Loss TAP

Goal is to provide:

- Training on AWWA Water Audit Methodology
- Level 1 Validation of Water Audits
- 452 Urban Water Agencies



WAVE 1

in-person work session

WAVE 2

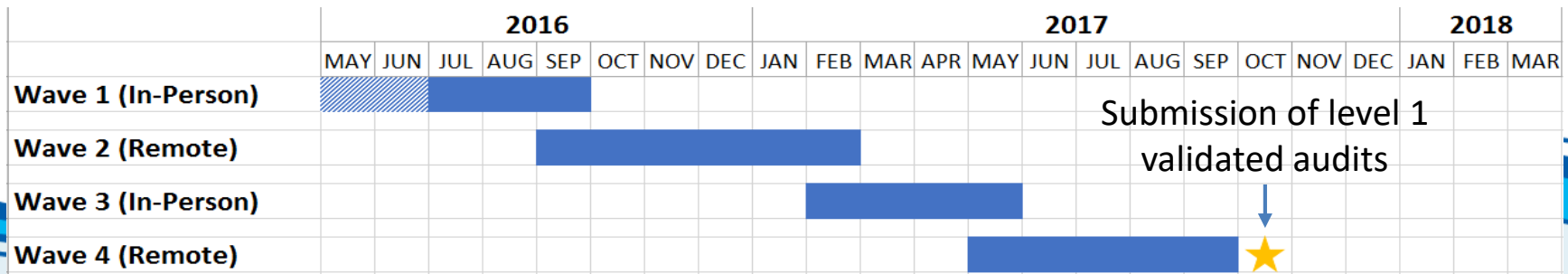
teleconference work session

WAVE 3

in-person work session

WAVE 4

final validation
 Teleconference work session



Water Loss TAP



[OVERVIEW](#)

[UTILITY STATUS](#)

[RESOURCES](#)

[CONTACT US](#)

[NAWL 2017](#)

The Water Loss Technical Assistance Program (Water Loss TAP) aids urban water suppliers in complying with California Senate Bill 555, requiring utilities to submit a completed and Level 1 validated water loss audit annually to the California Department of Water Resources (DWR).

The Water Loss TAP is brought to you by the California-Nevada Section AWWA. This project has been funded by the Environmental Protection Agency and the State Water Resources Control Board. The contents of this website do not necessarily reflect the views and policies of the EPA or the SWRCB, nor does the EPA or the SWRCB endorse trade names or recommend the use of commercial products if mentioned in this website.

Timeline

July 2016

October 2017



**In Person
Work Session**



**Remote Work
Session**



**In Person
Work Session**



**Remote
Validation
Session**

New Learner (NL)

Water Auditing 101: designed to build a strong foundation for water auditing and data validation.

- Limited prior involvement with AWWA M36 Water Auditing.
- Results in Level 1 Validated Water Audit for October 2017 submittal to DWR.

Check your track here

Early Adopter (EA)

Water Auditing 201: designed to focus on data validation and advanced water loss analysis.

- Previous engagement with AWWA M36 Water Auditing.
- Results in Level 1 Validated Water Audit for October 2017 submittal to DWR.

Final Upload to DWR (after validation)

[Instructions for DWR Upload](#)

Update: Final Validation Documents for calls conducted on or before 9/15 are expected to be emailed to your utility by around 9/27. For calls after 9/15, documents will be emailed within 5-10 business days.

News

[North American Water Loss - Register now!](#)

[Summer 2017 Update](#)

[SWRCB Letter Urging Wave 4 Sign-up](#)

[Winter 2017 Update](#)

[Water Loss TAP Update-Oct/Nov16](#)

[Water Loss TAP Update-September16](#)

[Water Loss TAP Update-August16](#)

[DWR Letter](#)

Sign Up for Your Wave 4 Call

Upload Wave 4 Supporting Documents

Water Loss TAP Progress

1500 Registered Individuals

435 Registered Systems

400 Wave 4 Signups

35 Utilities not yet signed up for Wave 4 . . .
Don't let that be you!



WAVE 1

Action Steps

Wave 1 is a day-long in-person work session (classroom) that covers the basics of water auditing and introduces water audit data validation.

Objectives

- Introduce Water Loss TAP
- Begin technical assistance
- Create utility water audit teams

Technical Assistance Themes

New Learners: *Water Audit Fundamentals*

Early Adopters: *Introducing Data Validity*



July 2016 - September 2016

- Register your utility and water audit team for the Water Loss TAP ([Register here](#))
- RSVP to attend an in person work session
Not sure which track you are? Not sure if you've already RSVP'd? [Check here](#)
- Attend the work session (8AM - 3:30PM)

Materials to bring:

1. Laptop Computer with the AWWA Free Water Audit Software v5.0 (optional: your most recent Water Audit, as submitted with your Urban Water Management Plan completed using this software - we will not work with your audit's specific data during the Wave 1 session, but this can serve as a good reminder of your audit volumes and practices to date).
2. Work Session Slides ([Downloadable here](#))
3. Lunch on your own (breakfast and snacks provided)
4. Questions on Water Audit Methodology and Validation

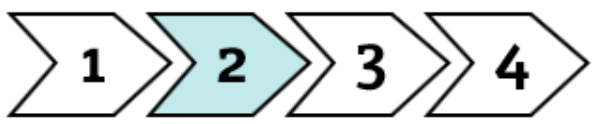


WAVE 2

Action Steps

Wave 2 is a teleconference work session in which water auditing experts and each utility's water audit team examine the utility's FY14-15 or CY15 water audit in a two-hour interview.

- Objectives
- Review the FY14-15 or CY15 water audit
 - Discuss water audit data and data validity scores
 - Amendments as needed



October 2016 - February 2017

- Compile** your FY14-15 or CY15 water audit and supporting documents
- Schedule** a teleconference session
- Send** your water audit and supporting documents to the Program Management Team (PMT) *one month* before your work session
- Attend your work session
- Implement any amendments or actions from your teleconference work session





WAVE 3



March 2017 - May 2017

Wave 3 is a day-long in-person work session (classroom) that reinforces the water audit methodology before more deeply exploring water audit data validation and the connection between water auditing and water loss control.

Objectives

- *Continue technical assistance*
- *Connect water audits to water loss control*
- *Prepare for Wave 4*

Action Steps



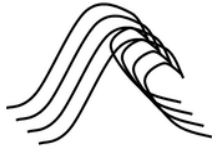
RSVP to attend an in person work session. Not sure which track you are? [Check here](#)



Attend the work session. (8AM - 3:30PM)

Materials to bring:

1. Your Wave 2 call follow-up document and Wave 2 reflections
2. Lunch on your own (breakfast and snacks provided)
3. A laptop per utility team is recommended.
4. Something to take notes on to prepare for Wave 4 validation.



WAVE 4



May 2017 - September 2017

Action Steps

Wave 4 is a teleconference session in which water auditing experts and each utility's water audit team perform a Level 1 validation of the FY or CY water audit that will be submitted to DWR.

NOTE: The DWR rules for SB555 compliance are not yet final and may be subject to change. It is anticipated that the rules will be made final following the DWR public hearing on June 21st, 2017. As such, a final determination is pending on which FY period is acceptable.

Objectives

- *Level 1 validate FY or CY water audit*
- *Prepare for submitting Level 1 validated water audits to DWR*

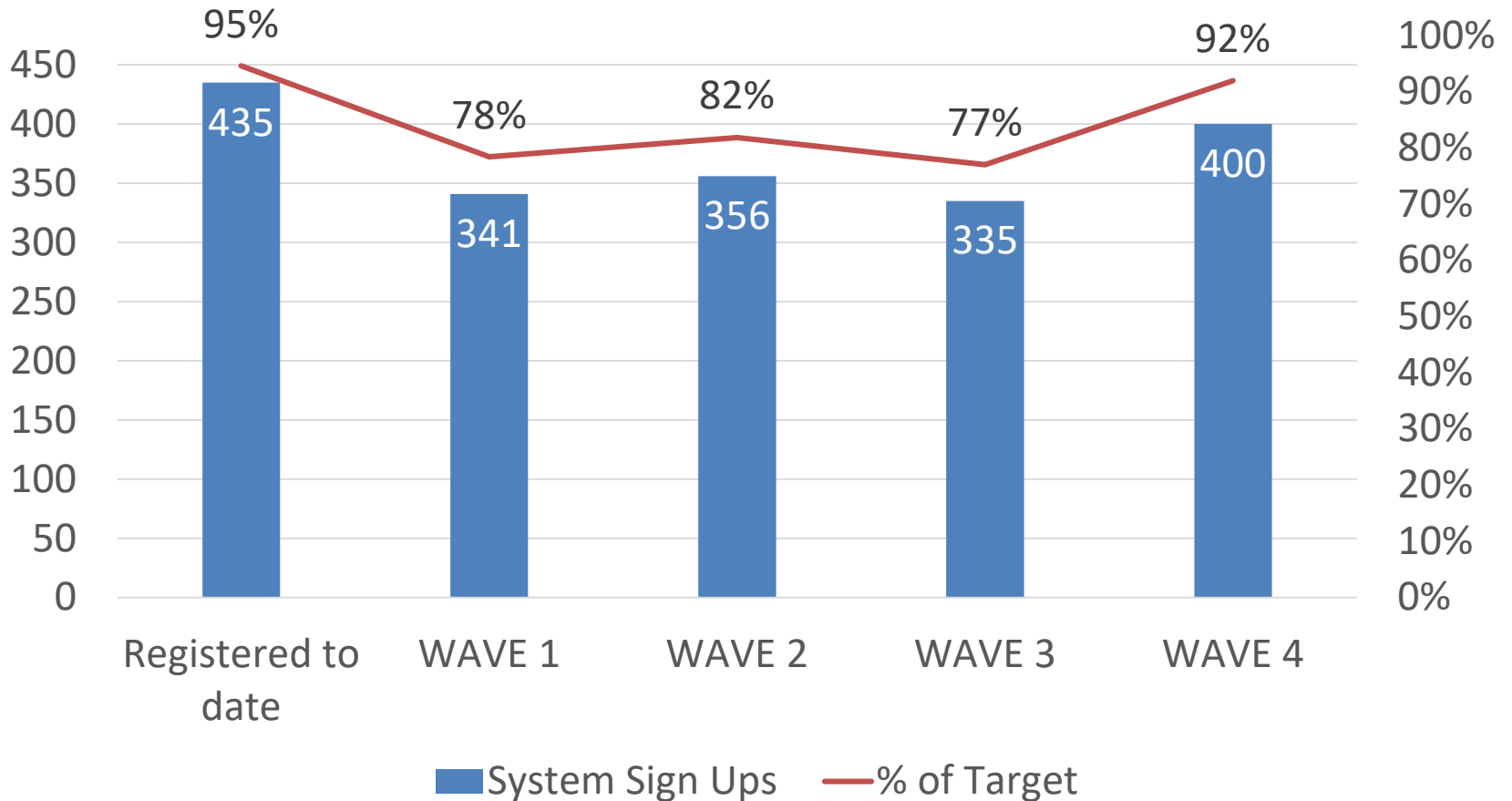
- Compile your most recent water audit and supporting documents, informed by the Wave 2 work session
- Schedule** a teleconference validation session
- Send** your water audit and supporting documents to the PMT *at least* two weeks before your validation session
- Participate in your validation session
- Receive post-session document & audit from PMT
- Submit** your Level 1 validated water audit package to DWR (when the State Portal is up)



Program Reach

Total of ~460 Water Audits

Water Loss TAP - Program Participation





Program Impact

1. How would you describe your experience participating in the TAP to date?

DAUNTING AT FIRST MUCH MORE COMFORTABLE
 NOW I CONFIDENT WE CAN PERFORM AN ACCURATE AUDIT

1. How would you describe your experience participating in the TAP to date?

The experience has been great. All of the technical assistance engagements have been worthwhile and truly valuable as water utilities embark on SBSSS Compliance.

2. What improvements or suggestions do you have for the program?

Awesome experience. I gained clarity on a number of the training was very helpful. I would encourage other members to attend.

participating in the TAP to date?

1. How would you describe your experience participating in the TAP to date?

Excellent learning process, where I am learning to take a fresh look at our workflows.

1. How would you describe your experience participating in the TAP to date?

Very educational, extremely helpful

After wave 2, ~~our~~ ^{the} confidence in our data was higher. Wave 2 experience exceeded our expectations. The only ^{positive} surprise was the amount of knowledge gained.

1. Did your Wave 2 experience meet your expectations? Any surprises?

Exceeded Expectations - Drove home the importance of efforts of program

1. How would you describe your experience participating in the TAP to date?

Its been very insightful. Its like a complete shift in philosophy - retraining us on how to consider the audit process, whats important and a big wake up call on

Data Quality and Validation

- **Data quality** – the validity, or trustworthiness, of the data
- **Data validation** – a quality control process conducted to verify, and improve as needed, the data inputs and gradings of the water audits submitted by water utilities.
- **Water Loss Audit validation** – does not make data inputs or gradings “right” or “wrong”, but merely aligns them with the actual conditions that occurred in the operation of the utility for the audit year
 - Level 1 -- Top down Data Review
 - Level 2 -- Top down Data Mining Review
 - Level 3 -- Bottom up Field Investigation

What's Next?

Water Audit Validator Program Development

WAV Certificate Program

- Committee formed & program development underway
- Informed by the Georgia QWLA certification program, customized to California
- Water Loss Auditing \neq Water Audit Validation
different training and demonstrated knowledge
- Development goal: Spring 2018

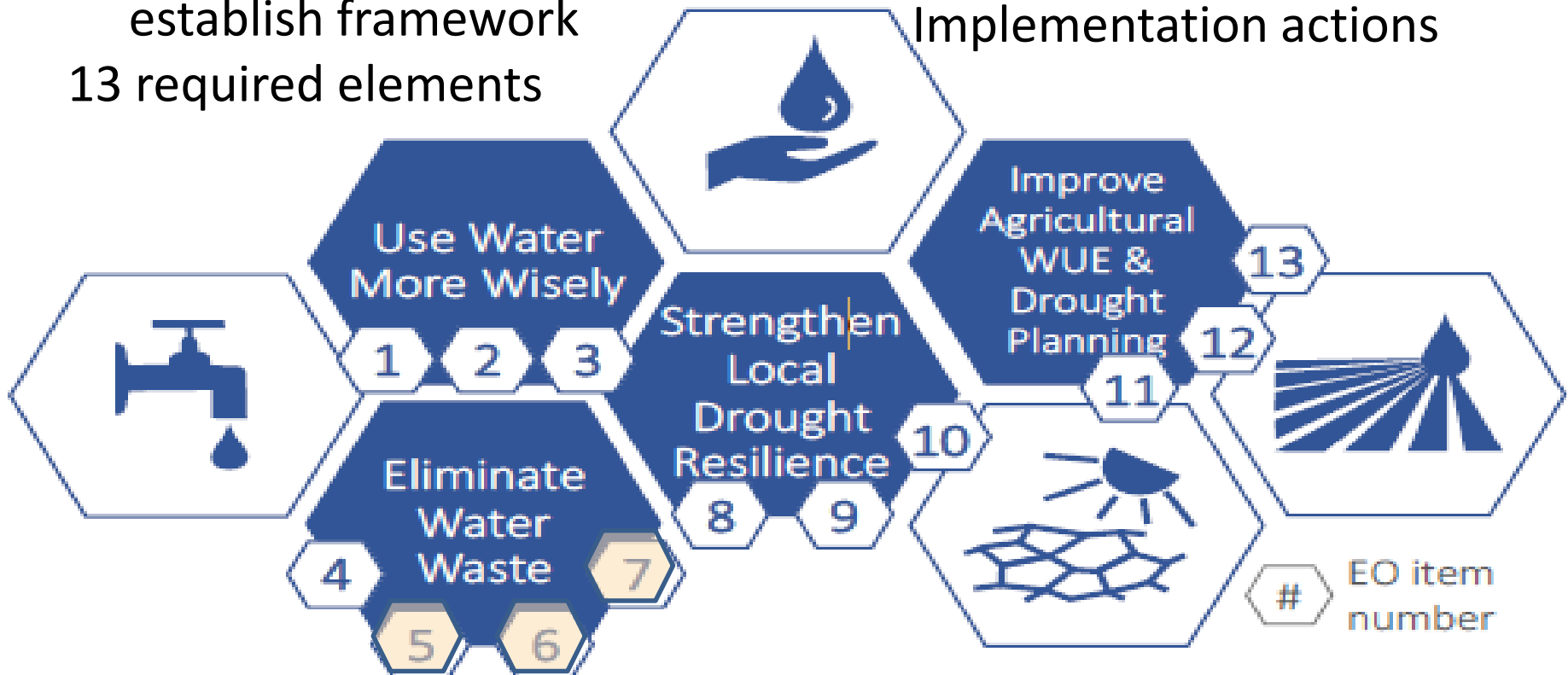
Water Conservation a California Way of Life

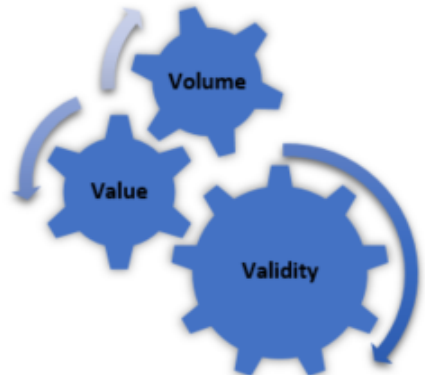
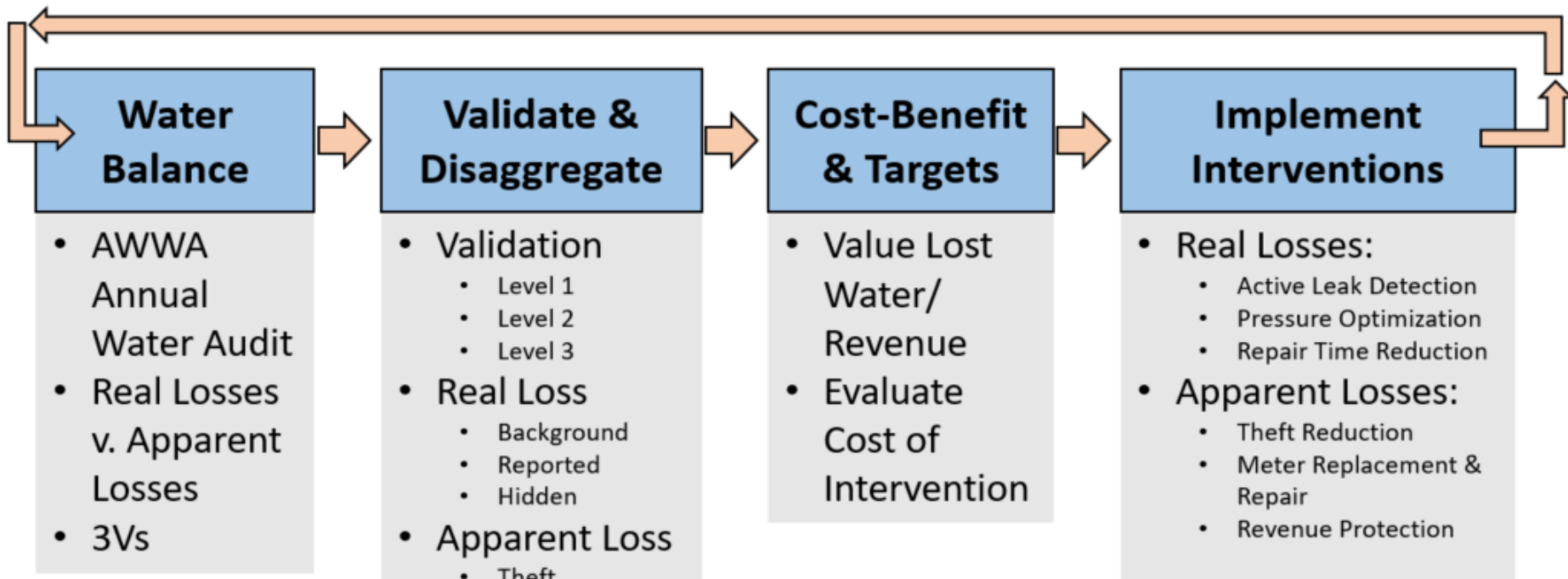
2016 (EO B-37-16)

State agencies directed to
 establish framework
 13 required elements

2017 (Implementation Report)

4 inter-related objectives
 Implementation actions





Agency Actions

- Improved understanding of who owns what data
- Validating legacy software/calculations (assumptions, metering lag time adjustments, SCADA setpoints)
- Training staff in the Water Audit methodology
- Meter testing programs
- AMI/AMR projects
- Increased metering of own water uses
- Pressure management projects
- Leak detection technology pilot projects

Urban Retail Water System

Wholesale Systems

Small Systems

Recycled Water Systems

Source of Supply



Water Loss Control Collaboration

- Coordination between industry associations, regulators, utilities
- Water Loss TAP (Stakeholder/steering Committee)
- Water Audit (SB 555) Rulemaking Group (*New: Title 23, Division 2, Chapter 7, § 700.0*)
- Water Loss Control Committee CA-NV AWWA Section
- Water Auditor Certificate (WAV) development subcommittee
- Leak detection, pressure management, meter testing training
- Executive Order/ Urban Advisory Group (retail, wholesale and small system)
- California Energy Commission devices study
- Public Utilities Commission rate case inclusion
- WRF projects to further refine the process, real loss component analysis, data validity criteria, water loss control program design



SAVE THE DATE

December 3 - 5, 2017

Paradise Point Resort · San Diego, CA

The North American Water Loss Conference (NAWL) will assemble policy and technical experts on non-revenue water management in North America.

Presented by:  American Water Works Association
California-Nevada Section

In cooperation with the American Water Works Association, the Alliance for Water Efficiency and the NAWL 2017 Conference Planning Committee.



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Sponsorships will be available.

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www.northamericanwaterloss.org

CALIFORNIA WATER LOSS CONTROL COLLABORATIVE



Water Loss TAP WAV Certificate Program



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