LAKE ARROWHEAD COMMUNITY SERVICES DISTRICT

M E M O R A N D U M

DATE: **March 24, 2020**

TO: **BOARD OF DIRECTORS**
Lake Arrowhead Community Services District

FROM: **MARC LIPPERT, Public Programs Supervisor**

CATHERINE CERRI, General Manager

SUBJECT: **ANNUAL WATER AUDIT**

A. RECOMMENDATION

This is an information item only.

B. REASON FOR RECOMMENDATION

This is an information item only.

C. BACKGROUND INFORMATION

Senate Bill 555 requires all urban retail water suppliers to annually submit a water audit to assess water loss. LACSD has been conducting these audits annually using the software provided by the American Water Works Association (A WWA). This top-down method takes into consideration many aspects of the system and provides the score called the Infrastructure Leakage Index (ILl). The District's Data Validity Score for the audit reporting period of 2018/2019 increased to 65 from the previous audit period of 2017/2018 Which was a score of 64. The audit reflects three (3) areas to address for the next audit. 1) Volume from own sources, which is related to the metering of water from the treatment plants into the distribution system, 2) Customer metering inaccuracies 3) Billed metered. The District has been addressing the metering services with the AMI system and replacing old infrastructure with new. Because of the District's due diligence our Data Validity Score rose one (1) point and our score is in line with the median.

The table below represents the data compiled by the AWWA from audits across the state. The table reflects that the District has made improvements from the previous year.

Performance Indicator	*Median	LACSD 2017/2018	LACSD 2018/2019
Infrastructure Leakage Index	1.5	0.92	0.68
Real Losses (gallons/connection/day)	26.6	19.19	13.45
Apparent Losses (gallons/connection/day)	8.3	0.97	0.95
Data Validity Score	**64**	**64**	**65**

***2017/2018 data**

D. FISCAL INFORMATION

This is an information item only.

E. ATTACHMENTS

AWWA Article "Reporting Water Losses"
LACSD 2018/2019 Water Audit

Reporting Water Losses

Highlights from California's second year of water loss audits

By Kate Gasner and Sarah Reed-Guy

FOR THE SECOND YEAR IN A ROW, urban retail water suppliers in California submitted level 1 validated water audits to the California Department of Water Resources in compliance with Senate Bill 555, commonly known as the Water Loss Management Act. The water audit describes each distribution system's water losses — both real and apparent — and Level 1 validation is a process by which audit inputs are reviewed and data maintenance practices are acknowledged.

The 2018 submissions include water audits that describe the 2017 calendar year and the 2017-2018 fiscal year. As of early October 2018, 325 urban retail water suppliers submitted a level 1 validated water audit, representing nearly 79 percent of all water agencies required to report.

Last year's submission rate was higher at 93 percent of required water suppliers reporting. However, those submissions were a product of the Water Loss Technical Assistance Program, funded by the Environmental Protection Agency and the California State Water Resources Board and administered through the California-Nevada Section. This two-year program educated water suppliers on water audit methodology and provided the first round of level 1 validations at no cost to the supplier. This year, submissions required water suppliers to pursue validation on their own, either by having staff successfully secure a water audit validator certificate or by hiring a certified consultant.

Table 1: Key Performance Indicators for 2018 Water Audits

All Audits — Key Performance Indicators Summary (N = 325)

	Key Performance Indicator	Median	Mean	Min	Max
Volumetric	Water Losses per Service Connection per Day (gal)	36.5	43.1	-37.9	244.5
	Apparent Losses per Service Connection per Day (gal)	8.3	11.6	-6.3	205.4
	Real Losses per Service Connection per Day (gal)	26.6	32.9	-41.4	240.3
	Real Losses per Service Connection per Day per PSI	0.3	0.5	-0.7	4.8
	Infrastructure Leakage Index (ILI)	1.5	2.0	-3.2	21.5
Financial	Annual Cost of Apparent Losses	$183,718	$523,843	-$109,883	$24,433,925
	Annual Cost of Real Losses	$166,055	$516,307	-$1,883,349	$24,299,856
	Non-Revenue Water as a % of Total Operating Cost	3.7%	4.1%	-3.7%	43.9%
	Data Validity Score	64	64	43	89

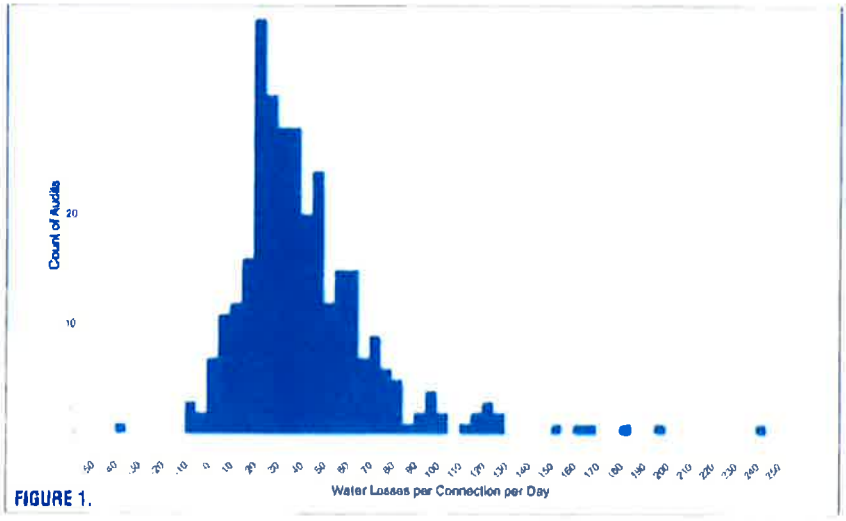

FIGURE 1.

Water Audit Results

The 2018 validated water audit submissions provide the most recent snapshot of water loss and utility operations for large California water utilities. Table 1 summarizes the key performance indicators for the complete dataset of level 1 validated audits. All audit results — including those with outlier performance — are presented here.

Please note that it is not safe to assume each audit's leakage estimation is accurate. Level 1 validation does not guarantee a perfect calculation of water losses for each utility, but it does confirm that each utility is compiling the best audit possible given their current data sources.

Each performance indicator varies widely, highlighting the spread of water loss audit results throughout the state. The distribution of total water losses per connection per day is presented in Figure 1. Though it is critical to distinguish between apparent losses and real losses for cost considerations and action planning, we present the total water loss indicator here to summarize audit results.

The middle 50 percent of reporting water suppliers report between 24 and 56 water losses per connection per day. The highest quarter of reporting water suppliers report water losses across a much wider range, between 56 and 245 water losses per connection per day.

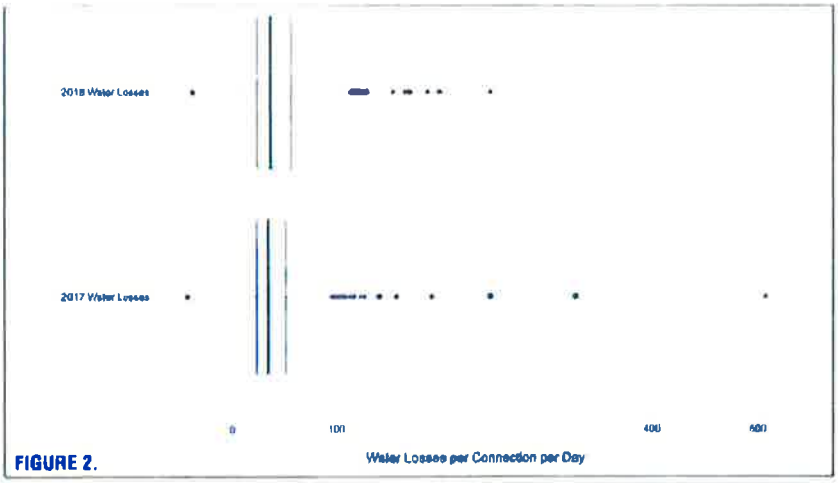

FIGURE 2.

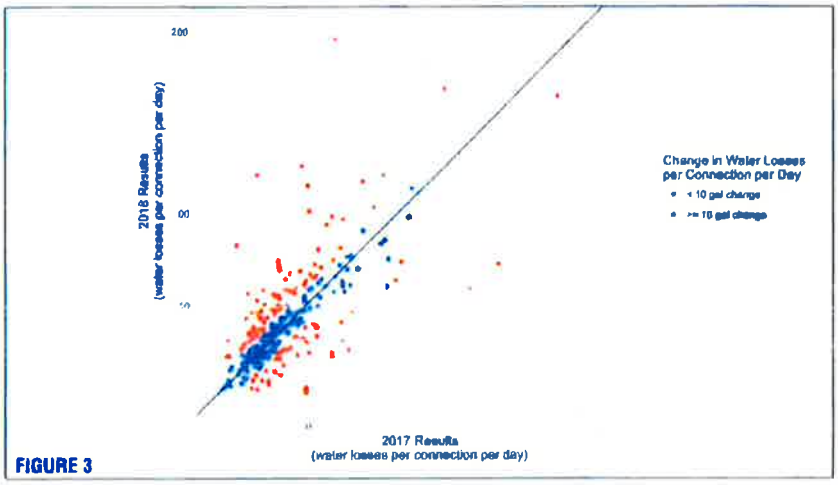

FIGURE 3

Variation in Water Losses

Comparing the two years of level 1 validated water audit submissions, the population statistics remain similar. Figure 2 shows box plots for each year's submission, presenting similar concentration of results around comparable medians (34.1 water losses per connection per day for 2017 submissions and 36.5 water losses per connection per day for 2018 submissions).

However, that consistency does not hold when examining changes between submissions for individual suppliers. Figure 3 shows results for each water supplier with both 2017 and 2018 submissions. A data point on the line presents a water supplier with the same results in each year of submission. Data points highlighted in blue did not change more than 10 gallons per connection per day; data points highlighted in red changed at least 10 gallons per connection per day between submissions.

Variable water audits present challenges for water suppliers and regulatory agencies alike. Without more insight into the suppliers' water loss efforts or data improvement work, we cannot easily distinguish between different sources of this variability. Some changes will be result of improving data sources and some changes will reflect shifts in water loss performance. As 2019 ushers in a phase of performance target setting, we encourage attention and sensitivity to the prevalence of variability in audit results.

Kate Gasner is a director for Water Systems Optimization, where she manages water loss control programs for utilities throughout the country.

Sarah Reed-Guy works as a data analyst and associate project manager at Water Systems Optimization.

FURTHER READING

Sturm, R., Gasner, K., and Andrews, L. (2015). *Water Loss in the United States: A Review of Water Loss Control Efforts*. Water Research Foundation Project 4372B. http://www.waterrf.org/PublicReportLibrary/4372B.pdf

AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0

Click to access definition
Click to add a comment

Water Audit Report for: Lake Arrowhead Community Services District (CA3610005)
Reporting Year: 2019 7/2018 - 6/2019

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

All volumes to be entered as: ACRE-FEET 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.

Master Meter and Supply Error Adjustments

WATER SUPPLIED

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

				Pcnt:	Value:	
Volume from own sources:	5	1,124.300	acre-ft/yr			acre-ft/yr
Water imported:	7	171.910	acre-ft/yr	0.00%		acre-ft/yr
Water exported:	n/a		acre-ft/yr			acre-ft/yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 1,296.210 acre-ft/yr

AUTHORIZED CONSUMPTION

Click here: for help using option buttons below

				Pcnt:	Value:	
Billed metered:	7	1,137.807	acre-ft/yr			
Billed unmetered:	n/a	0.000	acre-ft/yr			
Unbilled metered:	10	6.992	acre-ft/yr			
Unbilled unmetered:	5	16.203	acre-ft/yr			acre-ft/yr

Enter a positive value, otherwise a default percentage of 1.25% (of billed metered) is applied and a grading of 5 is applied but not displayed

AUTHORIZED CONSUMPTION: 1,161.002 acre-ft/yr

Use buttons to select percentage of water supplied OR value

WATER LOSSES (Water Supplied - Authorized Consumption) 135.208 acre-ft/yr

Apparent Losses

				Pcnt:	Value:	
Unauthorized consumption:		3.241	acre-ft/yr	0.25%		acre-ft/yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	5	2.869	acre-ft/yr	0.25%		acre-ft/yr
Systematic data handling errors:	5	2.845	acre-ft/yr	0.25%		acre-ft/yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: 8.954 acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 126.254 acre-ft/yr

WATER LOSSES: 135.208 acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: 158.403 acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	9	129.0	miles
Number of active AND inactive service connections:	8	8,381	
Service connection density:		65	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

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

Average operating pressure:	5	85.0	psi

COST DATA

Total annual cost of operating water system:	10	$6,852,461	$/Year	
Customer retail unit cost (applied to Apparent Losses):	9	$3.63	$/100 cubic feet (ccf)	
Variable production cost (applied to Real Losses):	5	$382.52	$/acre-ft	☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 65 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Variable production cost (applied to Real Losses)