



**DATE:** November 13, 2017

**TO:** Council Sustainability Committee

**FROM:** Director of Utilities & Environmental Services

**SUBJECT** Water Loss Audit – Senate Bill 555 Compliance

### **RECOMMENDATION**

That the Committee reviews and comments on this report.

### **SUMMARY**

Senate Bill 555 (SB 555) requires California water suppliers to audit their distribution system and report their annual water loss to the Department of Water Resources (DWR) by October 1, 2017. The City prepared and submitted its report, which showed 6.6% non-revenue water, as percent by cost of operating system, before the deadline. Details of the City's 2016 water loss audit are included in this report.

### **BACKGROUND**

To improve water loss reporting in California, SB 1420 (2014) was passed requiring water suppliers to submit water loss audits as part of urban water management plans (UWMP) prepared once every five years. In October 2015, with California amid one of the worst droughts in state history, Governor Brown approved SB 555, which further built upon SB 1420, and requires California's water suppliers to audit their distribution systems and report their annual water loss to DWR by October 1, 2017. The intent of the bill is to ensure that California communities use existing water supplies as efficiently as possible.

SB 555 also requires DWR to post all validated water loss audit reports on its website, in a manner that allows for comparisons across water suppliers. It is anticipated that this information will be available in early 2018. Longer term, SB 555 also requires the State Water Resources Control Board (SWRCB or "State Board") to adopt rules requiring water suppliers to meet performance standards for water losses by July 1, 2020. These standards have yet to be defined.

In general, the amount of water lost due to leakage in the distribution system of the State's water suppliers is not well known. This is largely due to the fact that not all water suppliers perform regular water loss audits. If water audits are not conducted, it is difficult for a water agency to know the extent of its losses and unlikely that the agency will implement practices to reduce these losses.

## **Types of Water Losses**

There are several types of water losses, and it is important to differentiate between them when reviewing the results of a water loss audit.

*Total Water Losses:* the difference between total water supplied and total water consumed. Total Water Losses include all water that is not identified as authorized metered water use or authorized unmetered use.

*Non-Revenue Water:* the sum of Total Water Losses and unbilled unmetered water, including water used for firefighting and flushing of the distribution system. “Unaccounted-for-water” is another common term used to describe this kind of water loss.

*Apparent Losses:* the volume of water that reaches consumers but is not properly accounted for due to inaccurate metering, systematic data handling errors, and unauthorized consumption (theft). Apparent Losses, also known as “paper” losses, reflect uncaptured revenue.

*Real Losses:* the volume of water that is physically lost from the system due to leakage and unintentional tank overflow. Leakage can occur on distribution and trunk mains, service connections, fire hydrants, valves, other appurtenances, and storage reservoirs.

## **DISCUSSION**

The City of Hayward has a longstanding and active commitment to monitoring and addressing distribution system water losses. Historically, unaccounted for water has been a relatively small percentage in relation to total water deliveries, ranging typically from 6% to 9%. However, this percentage increased beyond an acceptable level in 2010, prompting the City to take aggressive actions.

To better understand the nature of the loss, the City completed a detailed water audit, utilizing AWWA methodology, which uses known factors, such as system input volume, authorized consumption, and revenue water, to determine real and apparent water losses.

Losses peaked at 14% in 2011. A comprehensive leak detection and repair effort was implemented to locate leaks throughout the distribution system, starting with water mains. When no significant leaks were located because of this first effort, the City decided to expand the leak detection project to include all service connections. Likewise, the expanded project did not find any significant leaks. Staff suggested that pressure management may be necessary to minimize water loss, since some of the loss may have potentially resulted from high system pressure in certain locations. Through these efforts and other measures, real losses have been significantly reduced. The water audit for 2015 indicates total losses, apparent and real, of 8%, with real losses of 4%.

**2016 Water Loss Audit:**

As per the State’s requirement, the City recently completed a water audit using 2016 data. The audit was performed by entering water supply and water consumption data points into a standard model, and assigning a data validity grade to each. Details of the audit are summarized below.

		<b>MG/year</b>	<b>Actual or Assumed</b>
<i>Water Supplied</i>	SFPUC Purchased Water	4,558.1	Actual
<i>Water Consumed</i>	Billed Metered*	4,204.0	Actual
	Unbilled Unmetered**	11.4	Assumed (0.25%)**
<i>Water Losses</i>	Supplied less Consumed	342.7	

\*Billed metered – all metered consumption billed to retail customers

\*\*Unbilled unmetered - includes activities such as firefighting, water main flushing, etc.

\*\*\*AWWA suggested default value for all California utilities

**Water Losses**

Water losses are further calculated into categories, including non-revenue water, apparent losses, and real losses. Each category is detailed below.

**Non-Revenue Water: 354.1 MG/year (7.8% of Water Supplied)**

To calculate non-revenue water, which is defined as water which does not provide revenue potential to the utility, the model sums total water losses (342.7 MG/year) and unbilled unmetered consumption (11.4 MG/year).

**Apparent Losses: 170.3MG/year (3.74% of Water Supplied)**

To calculate apparent losses, the model factors in three data points:

1. **Unauthorized consumption.** Accounts for any way to receive water that thwarts the water utility’s ability to collect revenue for the water, including water illegally withdrawn from hydrants, illegal connections, bypasses to customer consumption meters, or tampering with meters or meter reading equipment.
  - a. **Calculation method:** Assumed at 0.25% of total water supplied.
  - b. **2016 Value:** 11.4 MG/year
  
2. **Customer metering inaccuracies.** Accounts for collective under-registration of customer water meters in recognition of meter wear over time.
  - a. **Calculation method:** Estimated percentage under-registration (3.4%) multiplied by consumption.
  - b. **2016 Value:** 148.4 MG/year

3. Systematic data handling errors. Accounts for any type of data lapse that results in understated customer water consumption in summary billing reports.
  - a. Calculation method: Assumed at 0.25% of billed authorized consumption
  - b. 2016 Value: 10.5 MG/year

Real Losses: **172.4 MG/year** (3.78% of Water Supplied)

To calculate real losses, the model subtracts apparent losses (170.3MG/year) from total water losses (342.7 MG/year), to arrive at 172.4 MG/year.

### **Cost Data**

The model also uses cost data to assign a cost to water losses. Data points include total annual operating cost, customer retail unit cost, and variable production cost.

Total Annual Operating Cost: **\$48,070,471/year**

These costs include those for operations, maintenance and any annually incurred costs for long-term upkeep of the distribution system.

Customer Retail Unit Cost: **\$9.38/ccf**

This cost represents the charge that customers pay for water service. Since most utilities have a rate structure that includes a variety of different costs based upon class of customer, a weighted average of individual costs and number of accounts in each class is used to determine this single composite cost. In the City's case, this also includes additional charges for sewer for commercial customers, since these charges are based upon the volume of water consumed. This cost is applied to the volume of apparent losses, since these losses represent water reaching customers but not paid for.

Variable Production Cost: **\$5,592.85/MG**

This is the cost to produce and supply the next million gallons of water and is determined by calculating the summed unit costs for wholesale purchased water and power used for pumping from the source to the customer. This cost is applied to the volume of real losses.

### **Performance Indicators**

There are several performance indicators calculated through the water loss audit process. As mentioned previously, DWR has yet to determine the rules requiring water suppliers to meet certain performance standards (required by July 1, 2020).

Annual Cost of Apparent Losses	\$2.14M
Annual Cost of Real Losses	\$964K
Non-revenue water as percent by volume of Water Supplied	7.8%
Non-revenue water as percent by cost of operating system	6.6%
Apparent Losses per service connection per day	13.14 gallons
Real Losses per service connection per day	13.29 gallons

## **STRATEGIC INITIATIVES**

This agenda item is a routine operational item and does not relate to one of the Council's Strategic Initiatives.

## **ECONOMIC & FISCAL IMPACT**

The results of the audit include information about the costs associated with water loss. These costs are factored into system operating expenses, and to the extent they can be reduced, the revenue requirement for the water system would also be reduced, and customers would benefit from potentially lower water rate increases. Industry standards generally suggest that having a non-revenue water as percent by cost of operating system less than 10% is acceptable. The City's audit resulted in 6.6% non-revenue water as percent by cost of operating system. Zeroing in on leaks in this percentage range can have a diminishing return effect, resulting in higher costs to locate and fix the leaks than taking no action and redirecting resources to other areas with greater impact, such as pressure reduction management.

## **SUSTAINABILITY FEATURES**

While this year's water supply outlook is favorable, water is natural resource and must be managed as such. The water loss audit is a valuable tool that allows the City to monitor water loss and informs proactive and effective actions to minimize it. SB 555 now requires the submittal of a validated audit, but this practice is one that the City has been and will continue to be committed to.

## **PUBLIC CONTACT**

All water loss audits, including the City's, will be posted to DWR's website in early 2018.

## **NEXT STEPS**

The City will continue to monitor water loss and has budgeted approximately \$400K in the Water Replacement Capital Fund for various projects to address distribution system leak detection and pressure reducing strategy development. The City is also currently replacing water meters as part of a comprehensive meter replacement and Advanced Metering Infrastructure (AMI) project. The project is approximately halfway complete. A new meter inventory will decrease customer metering inaccuracies, and thereby reduce apparent and real losses. The project will also provide more detailed consumption information, which increases the data validity of authorized consumption.

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Approved by:



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