

DHHL and the Hawaii Water Audit Program - Hoolehua PWS 230 Results



Hawaiian Homes Commission - HHC Agenda Item G-4

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With thanks to Neil Fujii, Department of Land and Natural Resources/Commission on Water Resources management, for many of the slides



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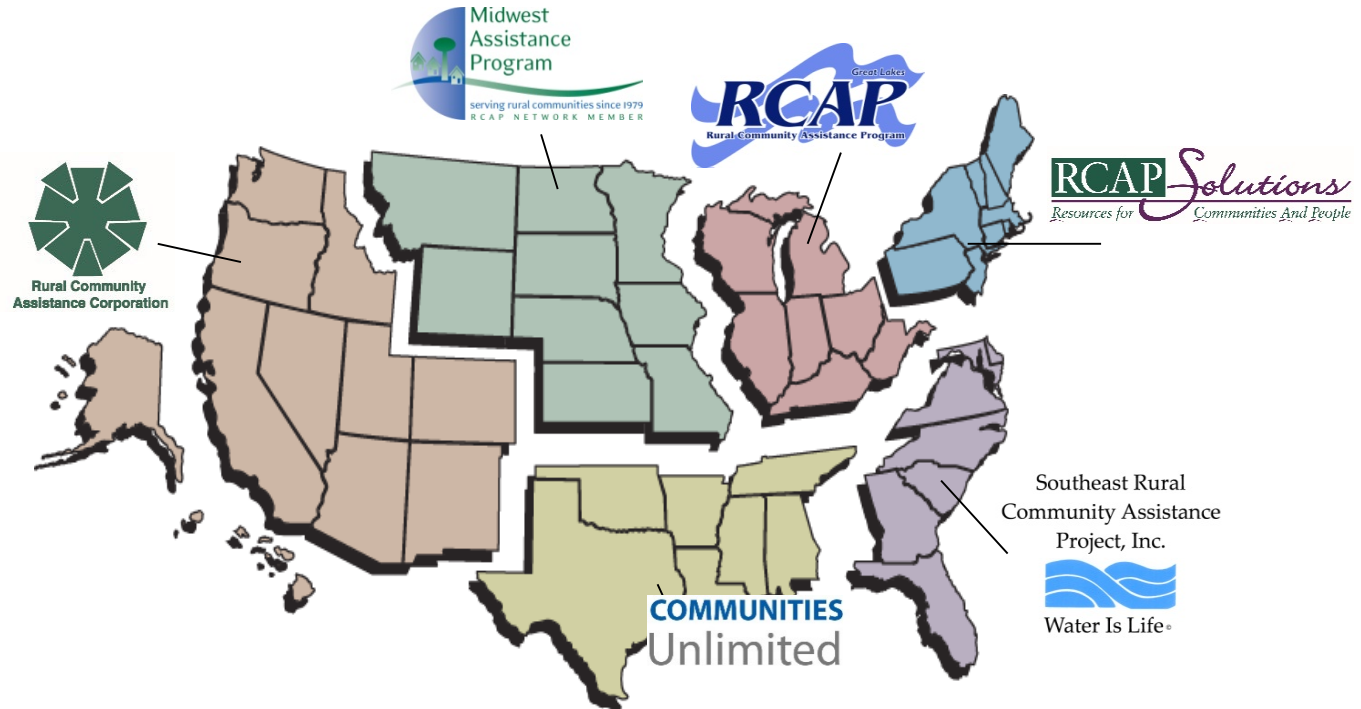
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Water, wastewater, housing, community development, loans (CDFI).

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Overview

- What is a Water Audit?
- How is it useful?
- What are the State Requirements for Water Audits?
- DHHL Hoolehua Public Water System: Audit Findings and Results
- Future use for Hoolehua and other DHHL Water Systems

What is a Water Audit?

- A tool for helping manage your water system resources
- **Water IN the system (Volume)**– Sources and purchased
- **Water OUT (Volume)** – Water Used; and Water Loss

Types of Water Loss

Real Losses



- Leaks, water line breaks
- Storage Tanks overflows
- Theft, stolen water

Apparent Losses



- Meter inaccuracies
- Meters - mis-read
- Recording / data handling errors
- Billing/ accounting errors

Why use Water Audits?

- **Water conservation and energy efficiency**
- **Cost/Benefit** analyses – Maximizing revenues, minimizing expenditures and losses
- **Protecting Precious Water Resources**

In Hawaii, it's a State Requirement

- Act 169, SLH 2016, Relating to Water Audits
- **Department of Land and Natural Resources / Commission on Water Resource Management (CWRM)** developed and implemented Program




Act 169, SLH 2016, Relating to Water Audits

Water Conservation Page:

<https://dlnr.hawaii.gov/cwrmp/conservation/>


<https://files.hawaii.gov/dlnr/cwrmp/Act%20169%20GM%202171.pdf>

AWWA Water Balance

WATER SUPPLIED Source Water Imported Water	AUTHORIZED CONSUMPTION	BILLED AUTHORIZED CONSUMPTION	BILLED METERED CONSUMPTION	REVENUE WATER Positive \$\$\$
			BILLED UNMETERED CONSUMPTION	
		UNBILLED AUTHORIZED CONSUMPTION	UNBILLED METERED CONSUMPTION	NONREVENUE WATER Negative \$\$\$ 
		UNBILLED UNMETERED CONSUMPTION		
	WATER LOSSES	\$\$\$ APPARENT LOSSES \$\$\$	CUSTOMER METER INACCURACIES	
			UNAUTHORIZED CONSUMPTION	
		DATA HANDLING ERRORS		
		 REAL LOSSES 		

What are the Volumes and Values of water losses?

AWWA Free Water Audit Software



**AWWA Free Water Audit Software:
Reporting Worksheet**

WAS v5.0
American Water Works Association.
Copyright © 2014, All Rights Reserved.

? Click to access definition

+ Click to add a comment

Water Audit Report for: << Please enter system details and contact information on the Instructions tab >>

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

PLEASE CHOOSE REPORTING UNITS FROM THE INSTRUCTIONS SHEET BEFORE ENTERING DATA

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

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

WATER SUPPLIED

Volume from own sources:	+	?	▾		
Water imported:	+	?	▾		
Water exported:	+	?	▾		

	+	?	▾		
	+	?	▾		
	+	?	▾		

WATER SUPPLIED:

0.000

Master Meter and Supply Error Adjustments

	+	?	▾		
	+	?	▾	● ○	
	+	?	▾	● ○	
	+	?	▾	● ○	

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

AUTHORIZED CONSUMPTION

Billed metered:	+	?	▾		
Billed unmetered:	+	?	▾		
Unbilled metered:	+	?	▾		
Unbilled unmetered:	+	?	▾		0.000

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

AUTHORIZED CONSUMPTION:

0.000

Click here: ? for help using option buttons below

	Pcmt:		Value:		
	1.25%	● ○			

Use buttons to select percentage of water supplied OR value

	Pcmt:		Value:		
	0.25%	● ○			

WATER LOSSES (Water Supplied - Authorized Consumption)

WATER LOSSES (Water Supplied - Authorized Consumption):

0.000

Apparent Losses

Unauthorized consumption:	+	?	▾		0.000
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Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	+	?	▾		0.000
Systematic data handling errors:	+	?	▾		0.000

Apparent Losses:

0.000

Real Losses (Current Annual Real Losses or CARL)

Real Losses (Current Annual Real Losses or CARL):

0.000

Instructions
Reporting Worksheet
Performance Indicators
Comments
Water Balance
Dashboard
Grading Matrix
Service Connection Diagram
Definitions
Loss Control

Data Quality is key to usefulness

- The Findings of the Audit are only as good as the **Data quality and Assumptions** that goes into it.
- Audit process requires and includes **Data Validation**
- Even data with high uncertainty, can help you improve - i.e. identify how you can improve your data, which can lead to more useful results.

How is a Water Audit used?

Water Loss Control Program

Determine Loss Volumes

- AWWA water audit

ID Apparent & Real Loss volumes



Distinguish Types of Losses

- Breakdown of types of leakage, theft, other Real losses.
- Sources of Apparent Loss



Evaluate Economics

- Associate a cost w. losses
- Identify costs of intervention strategies



Implement Interventions

- meter management
- leak detection
- Water line repair/replacement
- repair time improvement
- pressure management
- Administrative procedural improvements



Hoolehua Water Audits

- **Hoolehua**
 - **First audit** was completed and submitted **July 1 2020 (CY 2019)**
 - **Second audit** was completed and submitted **June 2, 2021 (CY 2020)**
 - **Audits required every year (July 1)**



Findings of Hoolehua Water Audits



Hoolehua Water Audit 2020

Supplied and Consumption



AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

American Water Works Association.

?	Click to access definition
+	Click to add a comment

Water Audit Report for: **Hoolehua (HI PWS ID 230)**
Reporting Year: **2020** 1/2020 - 12/2020

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: 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.

WATER SUPPLIED

	+	?	Grade	Value	Unit
Volume from own sources:	+	?	3	179.154	MG/Yr
Water imported:	+	?	n/a	0.000	MG/Yr
Water exported:	+	?	3	10.416	MG/Yr

WATER SUPPLIED: **168.738** MG/Yr

Master Meter and Supply Error Adjustments

	+	?	Grade	Pcnt	Value	Unit
	+	?	3	<input type="radio"/>	<input checked="" type="radio"/>	MG/Yr
	+	?		<input checked="" type="radio"/>	<input type="radio"/>	MG/Yr
	+	?	1	<input checked="" type="radio"/>	<input type="radio"/>	MG/Yr

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

AUTHORIZED CONSUMPTION

Billed metered:	+	?	5	162.055	MG/Yr
Billed unmetered:	+	?	n/a	0.000	MG/Yr
Unbilled metered:	+	?	3	1.710	MG/Yr
Unbilled unmetered:	+	?	5	0.422	MG/Yr

AUTHORIZED CONSUMPTION: **164.187** MG/Yr

Click here: [?](#)
for help using option buttons below

Pcnt:	Value:	Unit
<input type="radio"/>	<input checked="" type="radio"/>	0.422 MG/Yr

Use buttons to select percentage of water supplied **OR** value

WATER LOSSES (Water Supplied - Authorized Consumption)

4.551 MG/Yr

Apparent Losses

Unauthorized consumption: **0.422** MG/Yr

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

Customer metering inaccuracies:	+	?	3	8.619	MG/Yr
Systematic data handling errors:	+	?	5	0.405	MG/Yr

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

Pcnt:	Value:	Unit
0.25% <input checked="" type="radio"/>	<input type="radio"/>	MG/Yr

5.00% <input checked="" type="radio"/>	<input type="radio"/>	MG/Yr
0.25% <input checked="" type="radio"/>	<input type="radio"/>	MG/Yr



Hoolehua Water Audit 2020

Water Losses and Non-Revenue Water

WATER LOSSES (Water Supplied - Authorized Consumption)

4.551 MG/Yr

Apparent Losses

Unauthorized consumption: MG/Yr

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

Customer metering inaccuracies: MG/Yr

Systematic data handling errors: MG/Yr

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

Apparent Losses: MG/Yr

Check input values; APPARENT LOSSES should be less than WATER LOSSES

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: MG/Yr

WATER LOSSES: MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

Pcnt: Value:

5.00% MG

0.25% MG



Findings of Hoolehua Water Audits

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: Unbilled metered

3: Customer metering inaccuracies

Findings of Hoolehua Water Audits

- **Data accuracy rating** limits usefulness
 - This results in **low data validity scoring** (low confidence in underlying data), and **lowers usefulness of findings**

Findings of Hoolehua Water Audits

- **Data accuracy** limits usefulness
- **Meter data inaccuracy**
 - **Source (well) meters**
 - **Customer (service) meters** may be under-reading - loss of revenue
 - **Export meters** are for the most part old, accuracy unknown - likely inaccurate.

Other important findings of Hoolehua Water Audits

- Providing water to various agencies – (Fire Dept, Highway, Parks, others) - don't know precisely how much
- Billing errors – More in-depth analysis of billing data presents opportunity for developing protocols to identify and correct errors in the billing process.
- New Administrative Rules – more clarity in billing requirements for certain customers.

Next Steps for Hoolehua

- **Data Quality and Collection**

 - Metering – Part of CIP**

 - **New source meters**
 - **New customers meters (Smart meters – AMI)**

- **New water lines – will improve “real” losses (leaks)**

Next Steps for Hoolehua

- **Billing improvements**
- **GIS Improvements** – Daily Operations and long term planning

Future potential DHHL use of Water Audits

- Hoolehua – continue to make **cost** and **water use improvements** by improving **data**
- Other DHHL Water Systems – PWS's and non potable systems

Other suggested actions to improve DHHL water systems

- **Water Branch** – centralizing water utility functions
- **Water audits** (Anahola, Kawaihae, other non potable / non public water systems) – could be done.

This is not the End – This is the Beginning!!

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