

AWWA Free Water Audit Software v5.0

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

This spreadsheet-based water audit tool is designed to help quantify and track water losses associated with water distribution systems and identify areas for improved efficiency and cost recovery. It provides a "top-down" summary water audit format, and is not meant to take the place of a full-scale, comprehensive water audit format.

Auditors are strongly encouraged to refer to the most current edition of AWWA M36 Manual for Water Audits for detailed guidance on the water auditing process and targetting loss reduction levels

The spreadsheet contains several separate worksheets. Sheets can be accessed using the tabs towards the bottom of the screen, or by clicking the buttons below.

Please begin by providing the following information

Name of Contact Person: Rhonda K. Diaz
 Email Address: rhdiaz@las-cruces.org
 Telephone | Ext.: 575-528-3549
 Name of City / Utility: Las Cruces Utility
 City/Town/Municipality: Las Cruces
 State / Province: New Mexico (NM)
 Country: USA
 Year: 2017 Calendar Year

Audit Preparation Date: 1/24/2018
 Volume Reporting Units: Acre-feet
 PWSID / Other ID: 3511707

The following guidance will help you complete the Audit

All audit data are entered on the [Reporting Worksheet](#)

Value can be entered by user
 Value calculated based on input data
 These cells contain recommended default values

Use of Option (Radio) Buttons: Pcnt: 0.25% Value:

Select the default percentage by choosing the option button on the left

To enter a value, choose this button and enter a value in the cell to the right

The following worksheets are available by clicking the buttons below or selecting the tabs along the bottom of the page

<p><u>Instructions</u></p> <p>The current sheet. Enter contact information and basic audit details (year, units etc)</p>	<p><u>Reporting Worksheet</u></p> <p>Enter the required data on this worksheet to calculate the water balance and data grading</p>	<p><u>Comments</u></p> <p>Enter comments to explain how values were calculated or to document data sources</p>	<p><u>Performance Indicators</u></p> <p>Review the performance indicators to evaluate the results of the audit</p>	<p><u>Water Balance</u></p> <p>The values entered in the Reporting Worksheet are used to populate the Water Balance</p>	<p><u>Dashboard</u></p> <p>A graphical summary of the water balance and Non-Revenue Water components</p>
<p><u>Grading Matrix</u></p> <p>Presents the possible grading options for each input component of the audit</p>	<p><u>Service Connection Diagram</u></p> <p>Diagrams depicting possible customer service connection line configurations</p>	<p><u>Definitions</u></p> <p>Use this sheet to understand the terms used in the audit process</p>	<p><u>Loss Control Planning</u></p> <p>Use this sheet to interpret the results of the audit validity score and performance indicators</p>	<p><u>Example Audits</u></p> <p>Reporting Worksheet and Performance Indicators examples are shown for two validated audits</p>	<p><u>Acknowledgements</u></p> <p>Acknowledgements for the AWWA Free Water Audit Software v5.0</p>

If you have questions or comments regarding the software please contact us via email at: wlc@awwa.org



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: **Las Cruces Utility (3511707)**
 Reporting Year: **2017** / **1/2017 - 12/2017**

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

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where

WATER SUPPLIED

----- Enter grading in column 'E' and 'J' ----->			
Volume from own sources:	+ ?	7	21,944.464 acre-ft/yr
Water imported:	+ ?	n/a	0.000 acre-ft/yr
Water exported:	+ ?	n/a	0.000 acre-ft/yr

Master Meter and Supply Error Adjustments

		Pcnt:	Value:	
+ ?	7	<input type="radio"/>	<input checked="" type="radio"/>	34.000 acre-ft/yr
+ ?		<input checked="" type="radio"/>	<input type="radio"/>	acre-ft/yr
+ ?		<input checked="" type="radio"/>	<input type="radio"/>	acre-ft/yr

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

WATER SUPPLIED: 21,910.464 acre-ft/yr

AUTHORIZED CONSUMPTION

Billed metered:	+ ?	8	17,992.644 acre-ft/yr
Billed unmetered:	+ ?	10	0.000 acre-ft/yr
Unbilled metered:	+ ?	9	20.008 acre-ft/yr
Unbilled unmetered:	+ ?	8	226.830 acre-ft/yr

Click here: ?
 for help using option buttons below

		Pcnt:	Value:	
+ ?		<input type="radio"/>	<input checked="" type="radio"/>	226.830 acre-ft/yr

Use buttons to select percentage of water supplied
 OR
 value

AUTHORIZED CONSUMPTION: ? 18,239.482 acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption)

3,670.982 acre-ft/yr

Apparent Losses

Unauthorized consumption: + ? 54.776 acre-ft/yr
 Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	+ ?	9	1,028.206 acre-ft/yr
Systematic data handling errors:	+ ?	8	91.199 acre-ft/yr

Apparent Losses: ? 1,174.182 acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: ? 2,496.800 acre-ft/yr

WATER LOSSES: 3,670.982 acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: ? 3,917.820 acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	+ ?	8	713.0 miles
Number of <u>active AND inactive</u> service connections:	+ ?	8	36,724
Service connection density:	?		52 conn./mile main

Are customer meters typically located at the curbside 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: + ? 9 75.0 psi

COST DATA

Total annual cost of operating water system:	+ ?	10	\$14,638,804	\$/Year
Customer retail unit cost (applied to Apparent Losses):	+ ?	9	\$4.86	\$/1000 gallons (US)
Variable production cost (applied to Real Losses):	+ ?	10	\$194.66	\$/acre-ft <input type="checkbox"/> Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 81 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: Unauthorized consumption
- 3: Billed metered



AWWA Free Water Audit Software: System Attributes and Performance Indicators

WAS v5.0

American Water Works Association.

Water Audit Report for: **Las Cruces Utility (3511707)**
 Reporting Year: **2017** | **1/2017 - 12/2017**

*** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 81 out of 100 ***

System Attributes:

	Apparent Losses:	1,174.182	acre-ft/yr
+	Real Losses:	2,496.800	acre-ft/yr
=	Water Losses:	3,670.982	acre-ft/yr

? Unavoidable Annual Real Losses (UARL): 786.84 acre-ft/yr

Annual cost of Apparent Losses: \$1,859,478

Annual cost of Real Losses: \$486,027

Valued at **Variable Production Cost**

Return to Reporting Worksheet to change this assumption

Performance Indicators:

Financial: { Non-revenue water as percent by volume of Water Supplied: 17.9%
 Non-revenue water as percent by cost of operating system: 16.4% Real Losses valued at Variable Production Cost

Operational Efficiency: { Apparent Losses per service connection per day: 28.54 gallons/connection/day
 Real Losses per service connection per day: 60.70 gallons/connection/day
 Real Losses per length of main per day*: N/A
 Real Losses per service connection per day per psi pressure: 0.81 gallons/connection/day/psi

From Above, Real Losses = Current Annual Real Losses (CARL): 2,496.80 acre-feet/year

? Infrastructure Leakage Index (ILI) [CARL/UARL]: 3.17

* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline



AWWA Free Water Audit Software: User Comments

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

Use this worksheet to add comments or notes to explain how an input value was calculated, or to document the sources of the information used.

General Comment:	
Audit Item	Comment
Volume from own sources:	All active production meters were tested at least once from 2015 to 2017.
Vol. from own sources: Master meter error adjustment:	SCADA logs meter data on a continuous basis. Data is reviewed daily by Water Production and monthly by Engineering Operations. The system does not have the capability to employ changes in tank and storage facilities to calculate "Volume from own sources". However, the City well operators check individual well operation and data daily, to detect any variances and makes corrections as needed.
Water imported:	N/A
Water imported: master meter error adjustment:	N/A
Water exported:	N/A
Water exported: master meter error adjustment:	N/A
Billed metered:	LCU believes that all customers have volume based billing reads. To date, 8,468 AMI Meters have been installed throughout the system. Johnson Controls, Inc. (JCI) conducted an energy audit on the LCU water system and we are currently reviewing changing out 28,963 AMI meters, which sets us up to set meter replacement goals based on accuracy test results, so we have assigned a rating of 8.
Billed unmetered:	LCU is currently operating in a way that exceeds the standards set forth for a grade of 10. At least 99% of all accounts are metered and billed for consumption.
Unbilled metered:	LCU grants no exemptions from payment. Municipal departments budget for water use, and are metered and billed monthly. Johnson Controls, Inc. (JCI) conducted an energy audit on the LCU water system and we are currently reviewing changing out all meters to AMI, which sets us up to set meter replacement goals based on accuracy test results, so we have assigned a rating of 9.

Audit Item	Comment
Unbilled unmetered:	There are some uses, such as firefighting and training, hydrant flushing, fire flow and pressure testing, which are estimated.
Unauthorized consumption:	LCU actively evaluates accounts with zero usage to identify tampering and bypass, and assesses tampering fees.
Customer metering inaccuracies:	Includes updates made based on meter accuracy testing by Johnson Controls, Inc. (JCI)
Systematic data handling errors:	New account activation and billing operations policy and procedures are reviewed annually. Computerized billing system includes an array of reports to confirm billing data and system functionality. Checks are conducted routinely to flag and explain zero consumption accounts and consumption lost to billing lapses is well quantified and reducing year by year, so we have assigned a rating of 8.
Length of mains:	Sound written policy exists for managing water main extensions and replacements. Length of new mainlines are indicated in building permits. Information from new subdivision is initially in paper form and is converted to GIS format and are used to store and manage data.
Number of active AND inactive service connections:	Policies and procedures for new account activation and overall billing operations are written, well-structured and reviewed annually. Well-managed computerized information management system exists and periodic field checks and internal system audits are conducted.
Average length of customer service line:	N/A
Average operating pressure:	A current SCADA system exists to monitor water distribution system and collect data, including real time pressure readings at representative sites across the system.
Total annual cost of operating water system:	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Data audited annually.
Customer retail unit cost (applied to Apparent Losses):	To maintain a 10 in this category, the water rate structure must be sufficient for the utility's revenue needs, which it currently does not.
Variable production cost (applied to Real Losses):	



AWWA Free Water Audit Software: Water Balance

WAS v5.0

American Water Works Association.

Water Audit Report for:	Las Cruces Utility (3511707)	
Reporting Year:	2017	1/2017 - 12/2017
Data Validity Score:	81	

		Water Exported <i>0.000</i>	Billed Water Exported			Revenue Water 0.000	
Own Sources (Adjusted for known errors) 21,910.464	System Input 21,910.464	Water Supplied 21,910.464	Authorized Consumption 18,239.482	Billed Authorized Consumption 17,992.644	Billed Metered Consumption (water exported is removed) 17,992.644	Revenue Water 17,992.644	
				Unbilled Authorized Consumption 246.838	Billed Unmetered Consumption 0.000	Non-Revenue Water (NRW) 3,917.820	
Water Imported 0.000	System Input 21,910.464	Water Supplied 21,910.464	Water Losses 3,670.982	Apparent Losses 1,174.182	Unbilled Metered Consumption 20.008	Non-Revenue Water (NRW) 3,917.820	
				Real Losses 2,496.800	Unbilled Unmetered Consumption 226.830		
				Leakage on Transmission and/or Distribution Mains <i>Not broken down</i>	Unauthorized Consumption 54.776		
				Leakage and Overflows at Utility's Storage Tanks <i>Not broken down</i>	Customer Metering Inaccuracies 1,028.206		
				Leakage on Service Connections <i>Not broken down</i>	Systematic Data Handling Errors 91.199		



AWWA Free Water Audit Software: Dashboard

WAS v5.0

American Water Works Association.

The graphic below is a visual representation of the Water Balance with bar heights proportional to the volume of the audit components

Water Audit Report for: **Las Cruces Utility (3511707)**

Reporting Year: **2017** **1/2017 - 12/2017**

Data Validity Score: **81**

- Show me the VOLUME of Non-Revenue Water
- Show me the COST of Non-Revenue Water

