

Appendix D – AWWA Water Loss Audits



AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0
American Water Works Association
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Water Audit Report for: **City of Roseville (3110008)**
 Reporting Year: **2019** 1/2019 - 12/2019

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.

WATER SUPPLIED

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

Volume from own sources:	+	?	7	28,372.970	acre-ft/yr
Water imported:	+	?	5	1,264.500	acre-ft/yr
Water exported:	+	?	3	1,336.300	acre-ft/yr

Master Meter and Supply Error Adjustments

Pcnt:	+	?	7	3.744	acre-ft/yr
Value:	+	?	2		acre-ft/yr
	+	?	1		acre-ft/yr

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

WATER SUPPLIED: 28,297.426 acre-ft/yr

AUTHORIZED CONSUMPTION

Billed metered:	+	?	6	26,276.770	acre-ft/yr
Billed unmetered:	+	?	10	132.020	acre-ft/yr
Unbilled metered:	+	?	8	0.080	acre-ft/yr
Unbilled unmetered:	+	?	8	23.320	acre-ft/yr

AUTHORIZED CONSUMPTION: 26,432.190 acre-ft/yr

Click here: ? for help using option buttons below

Pcnt: Value: acre-ft/yr

Use buttons to select percentage of water supplied
 OR
 value

Pcnt: 0.25% Value: acre-ft/yr

1.00% acre-ft/yr

0.25% acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption)

1,865.236 acre-ft/yr

Apparent Losses

Unauthorized consumption: 70.744 acre-ft/yr
 Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	+	?	4	265.423	acre-ft/yr
Systematic data handling errors:	+	?	5	65.692	acre-ft/yr

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

Apparent Losses: 401.858 acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 1,463.378 acre-ft/yr

WATER LOSSES: 1,865.236 acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: 1,888.636 acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	+	?	9	633.4	miles
Number of <u>active</u> AND <u>inactive</u> service connections:	+	?	9	45,395	
Service connection density:	?			72	conn./mile main

Are customer meters typically located at the curbside or property line? (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line: 0 (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: 83.2 psi

COST DATA

Total annual cost of operating water system:	+	?	10	\$14,408,821	\$/Year
Customer retail unit cost (applied to Apparent Losses):	+	?	9	\$1.30	\$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+	?	5	\$208.00	\$/acre-ft

Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 70 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: Billed metered



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Water Audit Report for: City of Roseville (3110008)
Reporting Year: 2018 1/2018 - 12/2018

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.

WATER SUPPLIED

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

Volume from own sources:	+ ?	7	28,312.300	acre-ft/yr
Water imported:	+ ?	5	1,106.030	acre-ft/yr
Water exported:	+ ?	3	1,123.700	acre-ft/yr

Master Meter and Supply Error Adjustments

Pcnt:	Value:	acre-ft/yr
+ ? 8	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	1.810
+ ? 1	<input type="radio"/> <input type="radio"/> <input checked="" type="radio"/>	
+ ? 1	<input type="radio"/> <input type="radio"/> <input type="radio"/>	

WATER SUPPLIED: 28,292.820 acre-ft/yr

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

AUTHORIZED CONSUMPTION

Billed metered:	+ ?	5	26,007.220	acre-ft/yr
Billed unmetered:	+ ?	10	74.700	acre-ft/yr
Unbilled metered:	+ ?	8	47.560	acre-ft/yr
Unbilled unmetered:	+ ?	8	22.394	acre-ft/yr

Click here: ?
for help using option buttons below

Pcnt: Value: acre-ft/yr

AUTHORIZED CONSUMPTION: 26,151.874 acre-ft/yr

Use buttons to select percentage of water supplied
OR
value

WATER LOSSES (Water Supplied - Authorized Consumption)

2,140.946 acre-ft/yr

Apparent Losses

Unauthorized consumption: + ? 70.732 acre-ft/yr

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

Customer metering inaccuracies:	+ ?	3	263.180	acre-ft/yr
Systematic data handling errors:	+ ?	5	65.018	acre-ft/yr

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

Apparent Losses: 398.930 acre-ft/yr

Pcnt: 0.25% Value:

1.00% Value:

0.25% Value:

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 1,742.016 acre-ft/yr

WATER LOSSES: 2,140.946 acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: 2,210.900 acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	+ ?	9	627.5	miles
Number of <u>active AND inactive</u> service connections:	+ ?	9	44,467	
Service connection density:	?		71	conn./mile main

Are customer meters typically located at the curbside or property line?

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: + ? 6 psi

COST DATA

Total annual cost of operating water system:	+ ?	10	\$14,859,449	\$/Year
Customer retail unit cost (applied to Apparent Losses):	+ ?	9	\$1.17	\$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+ ?	5	\$179.67	\$/acre-ft

Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

*** YOUR SCORE IS: 68 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: Billed metered



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Water Audit Report for: City of Roseville (3110008)
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 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.

WATER SUPPLIED

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

Volume from own sources:	+ ?	7	28,449.624	acre-ft/yr
Water imported:	+ ?	5	964.400	acre-ft/yr
Water exported:	+ ?	3	1,207.900	acre-ft/yr

Master Meter and Supply Error Adjustments

Pcnt:	Value:	
+ ?	8	-143.610
+ ?	1	
+ ?	1	

WATER SUPPLIED: **28,349.734** acre-ft/yr

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

AUTHORIZED CONSUMPTION

Billed metered:	+ ?	5	25,483.030	acre-ft/yr
Billed unmetered:	+ ?	10	159.840	acre-ft/yr
Unbilled metered:	+ ?	n/a		acre-ft/yr
Unbilled unmetered:	+ ?	8	23.920	acre-ft/yr

Click here: ?
for help using option buttons below

Pcnt: Value: 23.920 acre-ft/yr

AUTHORIZED CONSUMPTION: ? **25,666.790** acre-ft/yr

Use buttons to select percentage of water supplied OR value

WATER LOSSES (Water Supplied - Authorized Consumption)

2,682.944 acre-ft/yr

Apparent Losses

Unauthorized consumption: + ? **70.874** acre-ft/yr

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

Customer metering inaccuracies:	+ ?	3	257.404	acre-ft/yr
Systematic data handling errors:	+ ?	5	63.708	acre-ft/yr

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

Apparent Losses: ? **391.986** acre-ft/yr

Pcnt: Value: 0.25% 23.920 acre-ft/yr

1.00% 0.25% 23.920 acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: ? **2,290.957** acre-ft/yr

WATER LOSSES: **2,682.944** acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: ? **2,706.864** acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	+ ?	9	615.0	miles
Number of <u>active AND inactive</u> service connections:	+ ?	9	43,618	
Service connection density:	?		71	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: + ? 5 83.6 psi

COST DATA

Total annual cost of operating water system:	+ ?	10	\$14,825,646	\$/Year
Customer retail unit cost (applied to Apparent Losses):	+ ?	9	\$1.18	\$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+ ?	5	\$112.40	\$/acre-ft

Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 67 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: Billed metered



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Water Audit Report for: City of Roseville
Reporting Year: 2016 1/2016 - 12/2016

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:	<input type="button" value="+"/> <input type="button" value="?"/> 7	25,813.000	acre-ft/yr	<input type="button" value="+"/> <input type="button" value="?"/> 3	<input type="text" value=""/>	<input type="text" value=""/>	acre-ft/yr
Water imported:	<input type="button" value="+"/> <input type="button" value="?"/> 3	915.250	acre-ft/yr	<input type="button" value="+"/> <input type="button" value="?"/> 1	<input type="text" value=""/>	<input type="text" value=""/>	acre-ft/yr
Water exported:	<input type="button" value="+"/> <input type="button" value="?"/> 3	911.700	acre-ft/yr	<input type="button" value="+"/> <input type="button" value="?"/> 1	<input type="text" value=""/>	<input type="text" value=""/>	acre-ft/yr

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

WATER SUPPLIED: 25,816.550 acre-ft/yr

AUTHORIZED CONSUMPTION

Billed metered:	<input type="button" value="+"/> <input type="button" value="?"/> 5	22,956.000	acre-ft/yr
Billed unmetered:	<input type="button" value="+"/> <input type="button" value="?"/> 9	212.000	acre-ft/yr
Unbilled metered:	<input type="button" value="+"/> <input type="button" value="?"/> 8	296.200	acre-ft/yr
Unbilled unmetered:	<input type="button" value="+"/> <input type="button" value="?"/> 7	21.880	acre-ft/yr

Click here: for help using option buttons below

Pcnt: Value:

 acre-ft/yr

AUTHORIZED CONSUMPTION: 23,486.080 acre-ft/yr

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

WATER LOSSES (Water Supplied - Authorized Consumption)

2,330.470 acre-ft/yr

Apparent Losses

Unauthorized consumption: 64.541 acre-ft/yr
Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	<input type="button" value="+"/> <input type="button" value="?"/> 3	234.871	acre-ft/yr
Systematic data handling errors:	<input type="button" value="+"/> <input type="button" value="?"/> 5	57.390	acre-ft/yr

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

Apparent Losses: 356.802 acre-ft/yr

Pcnt: Value:

0.25% acre-ft/yr

1.00% acre-ft/yr

0.25% acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 1,973.668 acre-ft/yr

WATER LOSSES: 2,330.470 acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: 2,648.550 acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	<input type="button" value="+"/> <input type="button" value="?"/> 10	600.0	miles
Number of active AND inactive service connections:	<input type="button" value="+"/> <input type="button" value="?"/> 8	42,655	
Service connection density:	<input type="button" value="?"/> 7	71	conn./mile main

Are customer meters typically located at the curbstops or property 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: 6 86.2 psi

COST DATA

Total annual cost of operating water system:	<input type="button" value="+"/> <input type="button" value="?"/> 10	\$9,313,891	\$/Year
Customer retail unit cost (applied to Apparent Losses):	<input type="button" value="+"/> <input type="button" value="?"/> 8	\$1.54	\$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	<input type="button" value="+"/> <input type="button" value="?"/> 5	\$109.00	\$/acre-ft <input type="checkbox"/> Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 67 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: Billed metered



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Water Audit Report for:
Reporting Year:

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.

WATER SUPPLIED

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

Volume from own sources:	<input type="button" value="+"/>	<input type="button" value="7"/>	<input type="text" value="22,991.000"/>	acre-ft/yr
Water imported:	<input type="button" value="+"/>	<input type="button" value="9"/>	<input type="text" value="853.500"/>	acre-ft/yr
Water exported:	<input type="button" value="+"/>	<input type="button" value="9"/>	<input type="text" value="781.900"/>	acre-ft/yr

Master Meter and Supply Error Adjustments

<input type="button" value="+"/>	<input type="button" value="7"/>	<input type="text" value=""/>	Pcnt:	<input type="text" value=""/>	Value:	<input type="text" value=""/>	acre-ft/yr
<input type="button" value="+"/>	<input type="button" value="7"/>	<input type="text" value=""/>	<input type="radio"/>	<input type="radio"/>	<input type="text" value=""/>	<input type="text" value=""/>	acre-ft/yr
<input type="button" value="+"/>	<input type="button" value="7"/>	<input type="text" value=""/>	<input type="radio"/>	<input type="radio"/>	<input type="text" value=""/>	<input type="text" value=""/>	acre-ft/yr

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

WATER SUPPLIED: acre-ft/yr

AUTHORIZED CONSUMPTION

Billed metered:	<input type="button" value="+"/>	<input type="button" value="7"/>	<input type="text" value="20,499.000"/>	acre-ft/yr
Billed unmetered:	<input type="button" value="+"/>	<input type="button" value="9"/>	<input type="text" value="222.000"/>	acre-ft/yr
Unbilled metered:	<input type="button" value="+"/>	<input type="button" value="8"/>	<input type="text" value="182.000"/>	acre-ft/yr
Unbilled unmetered:	<input type="button" value="+"/>	<input type="button" value="7"/>	<input type="text" value="32.080"/>	acre-ft/yr

Click here: for help using option buttons below

<input type="text" value=""/>	Pcnt:	<input type="text" value=""/>	Value:	<input type="text" value="32.080"/>	acre-ft/yr
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Use buttons to select percentage of water supplied OR value

AUTHORIZED CONSUMPTION: acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption)

acre-ft/yr

Apparent Losses

Unauthorized consumption: acre-ft/yr

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

Customer metering inaccuracies:	<input type="button" value="+"/>	<input type="button" value="5"/>	<input type="text" value="208.899"/>	acre-ft/yr
Systematic data handling errors:	<input type="button" value="+"/>	<input type="button" value="5"/>	<input type="text" value="51.248"/>	acre-ft/yr

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

Apparent Losses: acre-ft/yr

<input type="text" value="0.25%"/>	Pcnt:	<input type="radio"/>	<input type="radio"/>	Value:	<input type="text" value=""/>	acre-ft/yr
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<input type="text" value="1.00%"/>	<input type="radio"/>	<input type="radio"/>	<input type="text" value=""/>	acre-ft/yr
<input type="text" value="0.25%"/>	<input type="radio"/>	<input type="radio"/>	<input type="text" value=""/>	acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

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

WATER LOSSES: acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	<input type="button" value="+"/>	<input type="button" value="7"/>	<input type="text" value="10"/>	<input type="text" value="583.0"/>	miles
Number of <u>active AND inactive</u> service connections:	<input type="button" value="+"/>	<input type="button" value="7"/>	<input type="text" value="8"/>	<input type="text" value="41,832"/>	
Service connection density:	<input type="button" value="7"/>	<input type="text" value=""/>	<input type="text" value="72"/>	conn./mile main	

Are customer meters typically located at the curbside or property line? (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line: ft

Average operating pressure: psi

COST DATA

Total annual cost of operating water system:	<input type="button" value="+"/>	<input type="button" value="7"/>	<input type="text" value="8"/>	<input type="text" value="\$5,579,612"/>	\$/Year
Customer retail unit cost (applied to Apparent Losses):	<input type="button" value="+"/>	<input type="button" value="7"/>	<input type="text" value="8"/>	<input type="text" value="\$0.72"/>	\$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	<input type="button" value="+"/>	<input type="button" value="7"/>	<input type="text" value="8"/>	<input type="text" value="\$242.69"/>	\$/acre-ft <input type="checkbox"/> Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

*** YOUR SCORE IS: 72 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: Billed metered