

## **APPENDIX F: AWWA Water Audits 2015 - 2019**



# AWWA Free Water Audit Software: Reporting Worksheet

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American Water Works Association  
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**Water Audit Report for:** City of Santa Cruz Water Department  
**Reporting Year:** 2015 1/2015 - 12/2015

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

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

Volume from own sources:	+ ?	7	2,446.010	MG/Yr
Water imported:	+ ?		0.000	MG/Yr
Water exported:	+ ?		0.000	MG/Yr

### Master Meter and Supply Error Adjustments

Pcnt:	Value:	
+ ?	7	0.000 MG/Yr
+ ?		MG/Yr
+ ?		MG/Yr

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

**WATER SUPPLIED:** **2,446.010** MG/Yr

### AUTHORIZED CONSUMPTION

Billed metered:	+ ?	7	2,226.580	MG/Yr
Billed unmetered:	+ ?	10	0.49	MG/Yr
Unbilled metered:	+ ?	9	5.240	MG/Yr
Unbilled unmetered:	+ ?	9	15.360	MG/Yr

Click here: ?  
for help using option buttons below

Pcnt:	Value:	
		15.360 MG/Yr

Use buttons to select percentage of water supplied OR value

**AUTHORIZED CONSUMPTION:** **2,247.670** MG/Yr

### WATER LOSSES (Water Supplied - Authorized Consumption)

**198.340** MG/Yr

#### Apparent Losses

Unauthorized consumption: + ? **6.115** MG/Yr

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

Customer metering inaccuracies:	+ ?	5	41.740	MG/Yr
Systematic data handling errors:	+ ?	7	0.001	MG/Yr

Pcnt:	Value:	
0.25%		MG/Yr

		41.740 MG/Yr
		0.001 MG/Yr

**Apparent Losses:** **47.856** MG/Yr

#### Real Losses (Current Annual Real Losses or CARL)

**Real Losses = Water Losses - Apparent Losses:** **150.484** MG/Yr

**WATER LOSSES:** **198.340** MG/Yr

### NON-REVENUE WATER

**NON-REVENUE WATER:** **218.940** MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

### SYSTEM DATA

Length of mains:	+ ?	9	271.8	miles
Number of <u>active AND inactive</u> service connections:	+ ?	8	25,038	
Service connection density:	?		92	conn./mile main

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

Average length of customer service line: + ?

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

Average operating pressure: + ? 8 90.8 psi

### COST DATA

Total annual cost of operating water system:	+ ?	10	\$24,731,254	\$/Year
Customer retail unit cost (applied to Apparent Losses):	+ ?	8	\$5.33	\$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+ ?	7	\$599.00	\$/Million gallons <input type="checkbox"/> Use Customer Retail Unit Cost to value real losses

### WATER AUDIT DATA VALIDITY SCORE:

\*\*\* YOUR SCORE IS: 75 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



# AWWA Free Water Audit Software: Reporting Worksheet

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**Water Audit Report for:** City of Santa Cruz Water Department  
**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: 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**

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

Volume from own sources:	+ ?	7	2,557.117	MG/Yr
Water imported:	+ ?			MG/Yr
Water exported:	+ ?			MG/Yr

**Master Meter and Supply Error Adjustments**

	Pcnt:	Value:	
+ ?	7	<input type="text" value=""/>	MG/Yr
+ ?		<input type="text" value=""/>	MG/Yr
+ ?		<input type="text" value=""/>	MG/Yr

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

**WATER SUPPLIED:** 2,557.117 MG/Yr

**AUTHORIZED CONSUMPTION**

Billed metered:	+ ?	7	2,272.308	MG/Yr
Billed unmetered:	+ ?	10	31.173	MG/Yr
Unbilled metered:	+ ?	9	15.516	MG/Yr
Unbilled unmetered:	+ ?	9	11.295	MG/Yr

Click here: ?  
for help using option buttons below

Pcnt:	Value:	
		<input type="text" value="11.295"/> MG/Yr

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

**AUTHORIZED CONSUMPTION:** 2,330.292 MG/Yr

**WATER LOSSES (Water Supplied - Authorized Consumption)**

226.825 MG/Yr

**Apparent Losses**

Unauthorized consumption: + ? 6.393 MG/Yr

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

Customer metering inaccuracies:	+ ?	7	39.145	MG/Yr
Systematic data handling errors:	+ ?		5.681	MG/Yr

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

**Apparent Losses:** 51.219 MG/Yr

Pcnt:	Value:	
0.25%	<input type="text" value=""/>	MG/Yr
<input type="text" value=""/>	<input type="text" value="39.145"/>	MG/Yr
0.25%	<input type="text" value=""/>	MG/Yr

**Real Losses (Current Annual Real Losses or CARL)**

Real Losses = Water Losses - Apparent Losses: 175.606 MG/Yr

**WATER LOSSES:** 226.825 MG/Yr

**NON-REVENUE WATER**

**NON-REVENUE WATER:** 253.636 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

**SYSTEM DATA**

Length of mains:	+ ?	9	271.8	miles
Number of <u>active AND inactive</u> service connections:	+ ?	7	24,245	
Service connection density:	?		89	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 (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 91.0 psi

**COST DATA**

Total annual cost of operating water system:	+ ?	10	\$23,023,541	\$/Year
Customer retail unit cost (applied to Apparent Losses):	+ ?	10	\$5.94	\$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+ ?	5	\$615.41	\$/Million gallons <input type="checkbox"/> Use Customer Retail Unit Cost to value real losses

**WATER AUDIT DATA VALIDITY SCORE:**

\*\*\* YOUR SCORE IS: 75 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: Variable production cost (applied to Real Losses)
- 3: Billed metered



# AWWA Free Water Audit Software: Reporting Worksheet

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**Water Audit Report for:** City of Santa Cruz Water Department (4410010)  
**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: MILLION GALLONS (US) PER YEAR**

To select the correct data grading for each input, determine the highest grade below 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:	+ ?	8	2,653.930	MG/Yr
Water imported:	+ ?	4	3.986	MG/Yr
Water exported:	+ ?			MG/Yr

**Master Meter and Supply Error Adjustments**

	Pcnt:	Value:	
+ ?	8	<input type="radio"/> <input checked="" type="radio"/>	0.000 MG/Yr
+ ?	8	<input type="radio"/> <input checked="" type="radio"/>	0.000 MG/Yr
+ ?		<input checked="" type="radio"/> <input type="radio"/>	MG/Yr

**WATER SUPPLIED:** 2,657.916 MG/Yr

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

**AUTHORIZED CONSUMPTION**

Billed metered:	+ ?	7	2,412.263	MG/Yr
Billed unmetered:	+ ?	10	0.000	MG/Yr
Unbilled metered:	+ ?	9	9.585	MG/Yr
Unbilled unmetered:	+ ?	9	16.459	MG/Yr

**AUTHORIZED CONSUMPTION:** 2,438.307 MG/Yr

Click here: ?  
for help using option buttons below

Pcnt:	Value:	
<input type="radio"/> <input checked="" type="radio"/>	<input type="text" value="16.459"/>	MG/Yr

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

**WATER LOSSES (Water Supplied - Authorized Consumption)**

219.609 MG/Yr

**Apparent Losses**

Unauthorized consumption: + ? 6.645 MG/Yr

Enter a positive value, otherwise a default percentage of 0.25% is applied and a grading of 5 is applied but not displayed

Customer metering inaccuracies:	+ ?	7	52.109	MG/Yr
Systematic data handling errors:	+ ?		6.031	MG/Yr

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

**Apparent Losses:** 64.784 MG/Yr

Pcnt:	Value:	
<input type="radio"/> <input checked="" type="radio"/>	<input type="text" value="16.459"/>	MG/Yr

<input type="radio"/> <input checked="" type="radio"/>	52.109	MG/Yr
0.25%	<input type="radio"/> <input checked="" type="radio"/>	MG/Yr

**Real Losses (Current Annual Real Losses or CARL)**

Real Losses = Water Losses - Apparent Losses: 154.825 MG/Yr

**WATER LOSSES:** 219.609 MG/Yr

**NON-REVENUE WATER**

**NON-REVENUE WATER:** 245.653 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

**SYSTEM DATA**

Length of mains:	+ ?	9	271.0	miles
Number of <u>active AND inactive</u> service connections:	+ ?	7	24,656	
Service connection density:	?		91	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 (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 91.0 psi

**COST DATA**

Total annual cost of operating water system:	+ ?	10	\$24,242,500	\$/Year
Customer retail unit cost (applied to Apparent Losses):	+ ?	10	\$9.67	\$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+ ?	5	\$570.19	\$/Million gallons <input type="checkbox"/> Use Customer Retail Unit Cost to value real losses

**WATER AUDIT DATA VALIDITY SCORE:**

\*\*\* YOUR SCORE IS: 77 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: Variable production cost (applied to Real Losses)
- 3: Billed metered

# AWWA Free Water Audit Software: Reporting Worksheet

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Water Audit Report for: **City of Santa Cruz Water Department (4410010)**  
 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: 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**

Volume from own sources:	+	?	5	2,647.653	MG/Yr
Water imported:	+	?	5		MG/Yr
Water exported:	+	?	5	8.982	MG/Yr

**Master Meter and Supply Error Adjustments**

Pcnt:	?	9	Value:		MG/Yr
	+	?			MG/Yr
	+	?			MG/Yr

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

**WATER SUPPLIED:**      **2,638.671** MG/Yr

**AUTHORIZED CONSUMPTION**

Billed metered:	+	?	7	2,369.474	MG/Yr
Billed unmetered:	+	?	10	0.350	MG/Yr
Unbilled metered:	+	?	9	25.450	MG/Yr
Unbilled unmetered:	+	?	9	11.101	MG/Yr

Click here: ?  
for help using option buttons below

Pcnt:	?	9	Value:		MG/Yr
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Use buttons to select percentage of water supplied OR value

**AUTHORIZED CONSUMPTION:**      **2,406.375** MG/Yr

**WATER LOSSES (Water Supplied - Authorized Consumption)**

**232.296** MG/Yr

**Apparent Losses**

Unauthorized consumption: **6.597** MG/Yr  
 Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	+	?	7	54.104	MG/Yr
Systematic data handling errors:	+	?		5.924	MG/Yr

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

**Apparent Losses:**      **66.624** MG/Yr

Pcnt:	0.25%	?	Value:		MG/Yr
-------	-------	---	--------	--	-------

	?	9	54.104	MG/Yr
	0.25%	?		MG/Yr

**Real Losses (Current Annual Real Losses or CARL)**

Real Losses = Water Losses - Apparent Losses:      **165.672** MG/Yr

**WATER LOSSES:**      **232.296** MG/Yr

**NON-REVENUE WATER**

**NON-REVENUE WATER:**      **268.847** MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

**SYSTEM DATA**

Length of mains:	+	?	9	270.7	miles
Number of active AND inactive service connections:	+	?	7	24,671	
Service connection density:	?			91	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**      **91.3** psi

**COST DATA**

Total annual cost of operating water system:	+	?	10	\$29,221,709	\$/Year
Customer retail unit cost (applied to Apparent Losses):	+	?	10	\$10.88	\$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+	?	5	\$506.50	\$/Million gallons <input type="checkbox"/> 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: Variable production cost (applied to Real Losses)
- 3: Billed metered



# AWWA Free Water Audit Software: Reporting Worksheet

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**Water Audit Report for:** City of Santa Cruz Water Department (4410010)  
**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: 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

Volume from own sources:	+ ?	5	2,673.244	MG/Yr
Water imported:	+ ?	n/a	0.328	MG/Yr
Water exported:	+ ?	5	68.433	MG/Yr

### Master Meter and Supply Error Adjustments

Pcnt:	+ ?	9	0	MG/Yr
Value:	+ ?	9	0	MG/Yr
Pcnt:	+ ?	9	0	MG/Yr
Value:	+ ?	9	0	MG/Yr

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

**WATER SUPPLIED:** 2,604.811 MG/Yr

### AUTHORIZED CONSUMPTION

Billed metered:	+ ?	6	2,344.106	MG/Yr
Billed unmetered:	+ ?	10	0.328	MG/Yr
Unbilled metered:	+ ?	9	15.413	MG/Yr
Unbilled unmetered:	+ ?	8	19.235	MG/Yr

**AUTHORIZED CONSUMPTION:** 2,379.082 MG/Yr

Click here: ?  
for help using option buttons below

Pcnt:	+ ?	9	19.235	MG/Yr
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Use buttons to select percentage of water supplied  
**OR**  
value

Pcnt:	+ ?	9	0.25%	MG/Yr
-------	-----	---	-------	-------

Value:	+ ?	9	53.977	MG/Yr
--------	-----	---	--------	-------

### WATER LOSSES (Water Supplied - Authorized Consumption)

225.729 MG/Yr

#### Apparent Losses

Unauthorized consumption: 6.512 MG/Yr

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

Customer metering inaccuracies:	+ ?	6	53.977	MG/Yr
Systematic data handling errors:	+ ?	9	5.860	MG/Yr

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

**Apparent Losses:** 66.349 MG/Yr

#### Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 159.380 MG/Yr

**WATER LOSSES:** 225.729 MG/Yr

### NON-REVENUE WATER

**NON-REVENUE WATER:** 260.377 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

### SYSTEM DATA

Length of mains:	+ ?	9	270.7	miles
Number of <u>active AND inactive</u> service connections:	+ ?	8	24,745	
Service connection density:	+ ?	9	91	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 91.0 psi

### COST DATA

Total annual cost of operating water system:	+ ?	10	\$29,187,880	\$/Year
Customer retail unit cost (applied to Apparent Losses):	+ ?	10	\$11.07	\$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+ ?	5	\$553.46	\$/Million gallons

Use Customer Retail Unit Cost to value real losses

### WATER AUDIT DATA VALIDITY SCORE:

**\*\*\* YOUR SCORE IS: 66 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: Billed metered**

**3: Variable production cost (applied to Real Losses)**