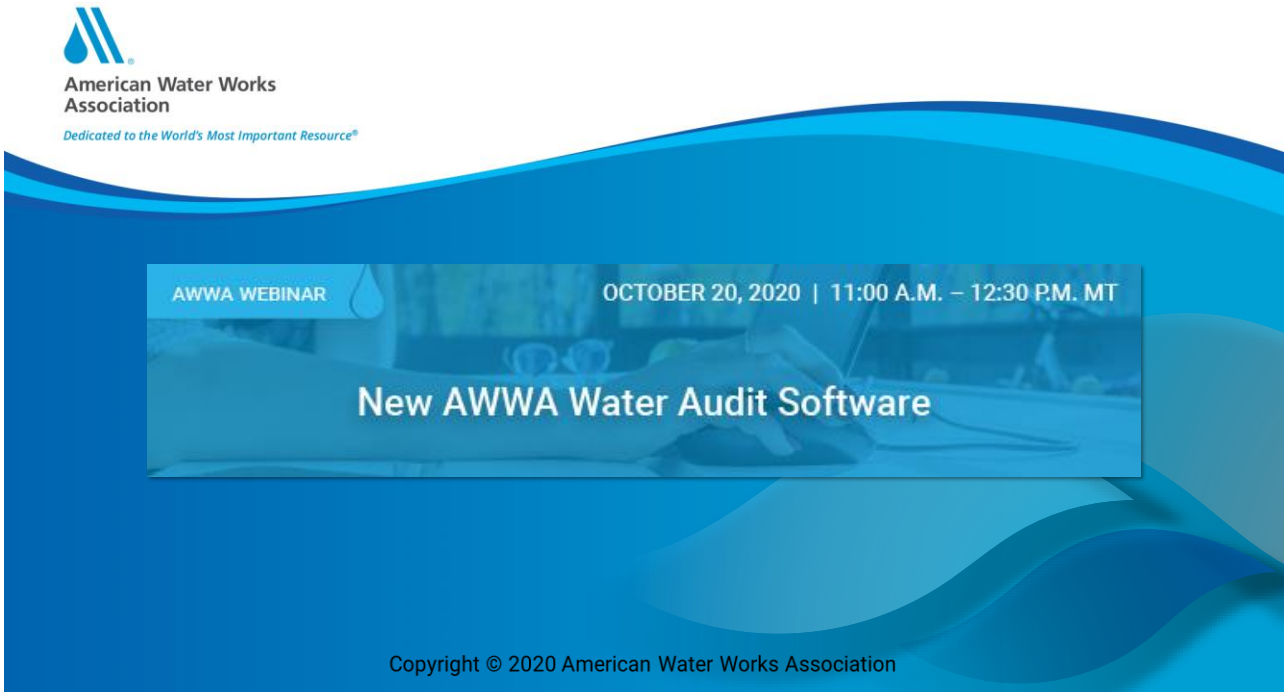
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AWWA WEBINAR
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2

WEBINAR MODERATOR

Frank Kurtz

Standards Engineer

American water Works Association

Frank Kurtz is a standards engineer with the American Water Works Association (AWWA). He provides guidance to AWWA technical and educational committees to produce a wide range of AWWA standards, manuals, and training materials on topics covering water infrastructure. He is the staff technical advisor for AWWA standards committees on water meters, storage tanks, and transmission pipelines, as well as various other AWWA technical committees. He also represents AWWA on standards committees of the American Concrete Institute and the NSF International.

3

3

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PANEL OF EXPERTS

Will Jernigan, PE
CFO, Director of Water Efficiency; Cavanaugh
Chair; AWWA Water Loss Software Committee
Chair; North American Water Loss Conference

Sofia Marcus, PE
Program Manager – LADWP
Water Loss Task Force
LADWP

7

7

AGENDA

I.	Taking the V6 for a Spin: The New AWWA Free Water Audit Software is Here	Will Jernigan
II.	Taking the New V6 for a Spin at LADWP	Sofia Marcus

8

8

ASK THE EXPERTS

Will Jernigan, PE
Cavanaugh

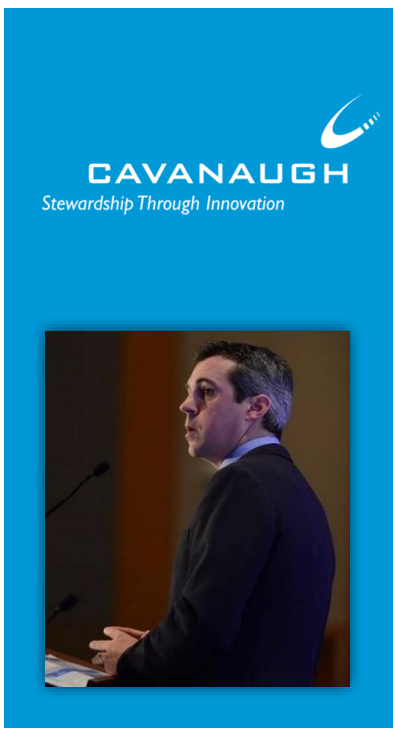
Sofia Marcus, PE
LADWP

Enter your **question** into the **question pane** on the right-hand side of the screen.

Please specify to whom you are addressing the question.

9

9



TAKING THE V6 FOR A SPIN
THE NEW AWWA FREE WATER AUDIT SOFTWARE IS HERE

Will Jernigan, P.E.
Chair / AWWA Water Loss Software Committee
Chair / North American Water Loss Conference
CFO, Director of Water Efficiency / Cavanaugh

25 YEARS 1995-2020 DELIVERING STEWARDSHIP THROUGH INNOVATION CAVANAUGH

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LEARNING OBJECTIVES

- Learn the key upgrades from FWAS v5 to v6
- Learn how the new Interactive Data Grading works
- Test drive the new v6

11

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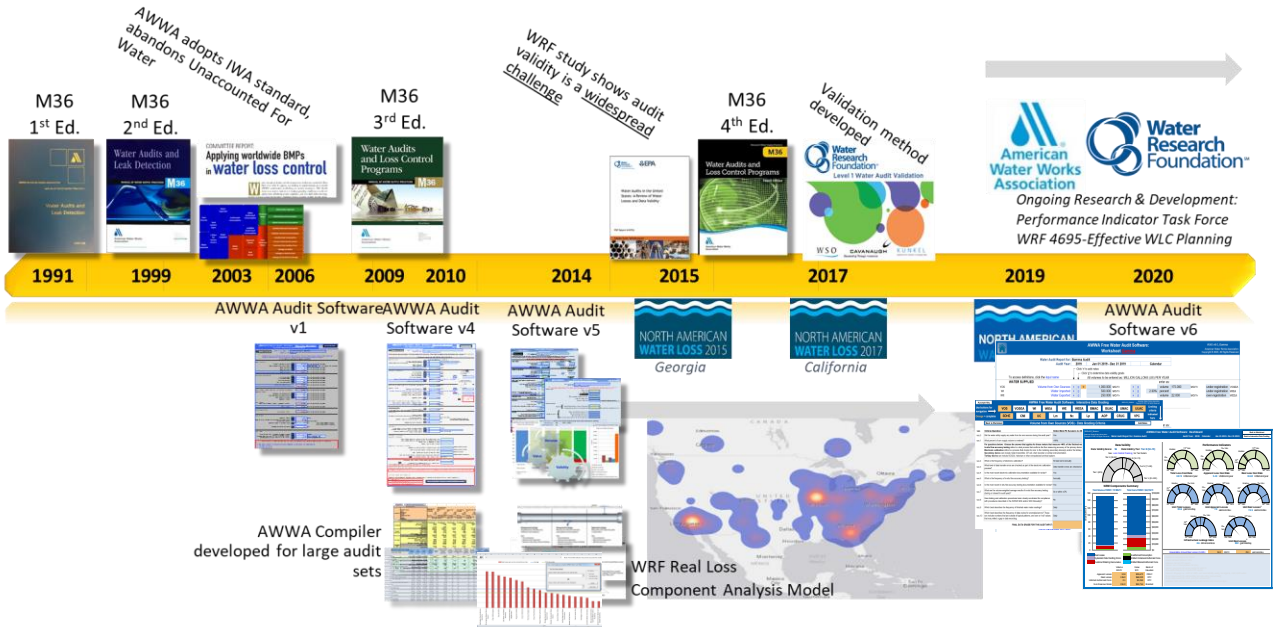

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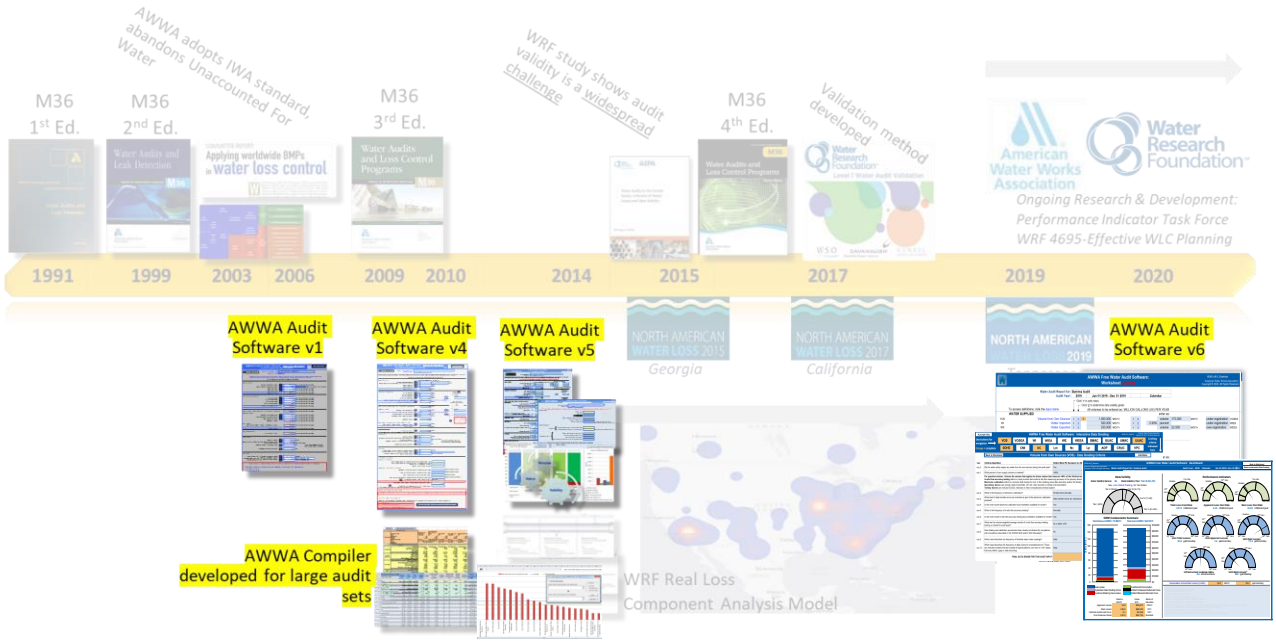
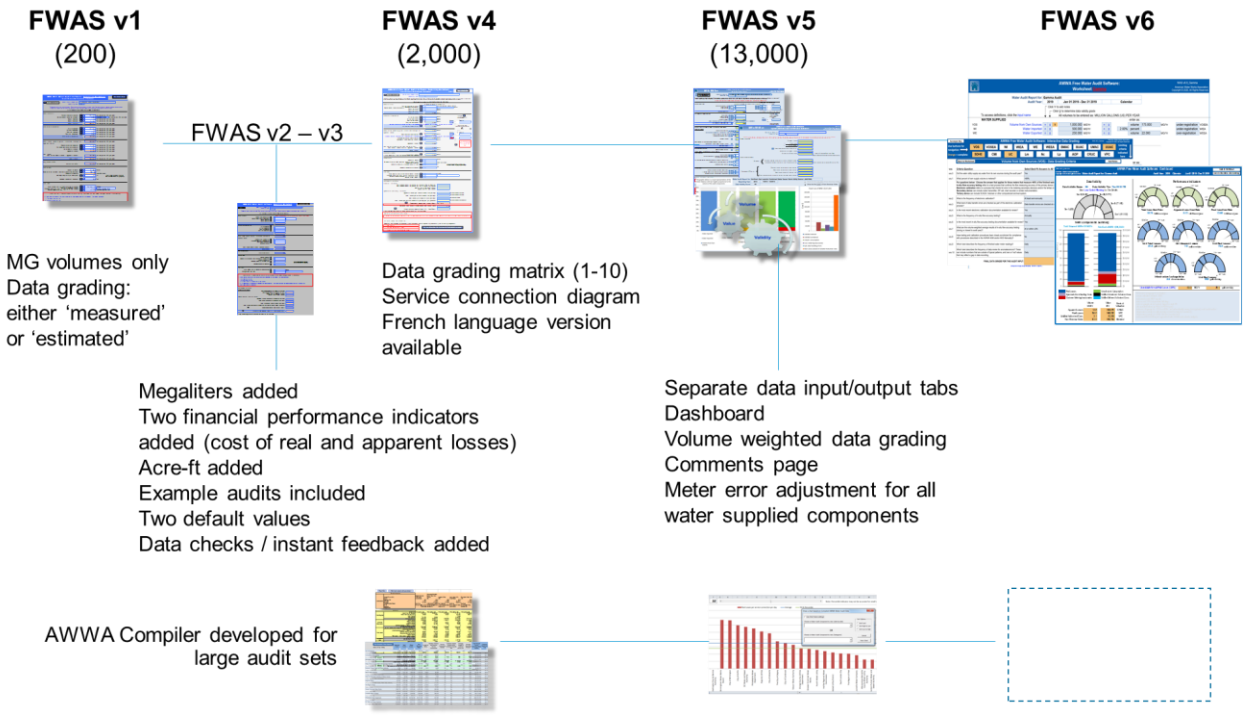
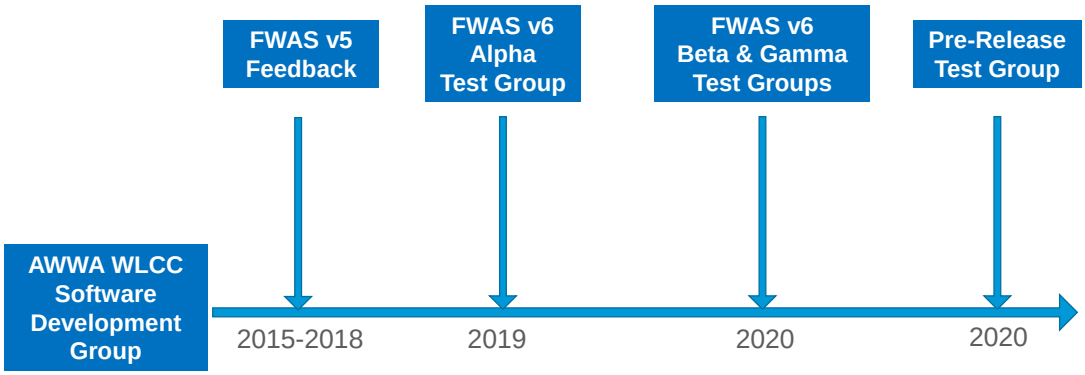

AWWA adopts IWA standard, abandons Unaccounted For Water
WRF study shows audit validity is a widespread challenge
Validation method developed
M36 1st Ed.
M36 2nd Ed.
M36 3rd Ed.
M36 4th Ed.
Applying worldwide BMPs in water loss control
American Water Works Association
Water Research Foundation
Ongoing Research & Development:
Performance Indicator Task Force
WRF 4695-Effective WLC Planning
1991
1999
2003
2006
2009
2010
2014
2015
2017
2019
2020
AWWA Audit Software v1
AWWA Audit Software v4
AWWA Audit Software v5
AWWA Audit Software v6
NORTH AMERICAN WATER LOSS 2015
Georgia
NORTH AMERICAN WATER LOSS 2017
California
NORTH AMERICAN WATER LOSS 2019
AWWA Compiler developed for large audit sets
WRF Real Loss Component Analysis Model

13


FWAS v1
(200)
FWAS v2 – v3
FWAS v4
(2,000)
FWAS v5
(13,000)
FWAS v6
MG volumes only
Data grading:
either 'measured'
or 'estimated'
Megaliters added
Two financial performance indicators added (cost of real and apparent losses)
Acre-ft added
Example audits included
Two default values
Data checks / instant feedback added
Data grading matrix (1-10)
Service connection diagram
French language version available
Separate data input/output tabs
Dashboard
Volume weighted data grading
Comments page
Meter error adjustment for all water supplied components
AWWA Compiler developed for large audit sets

14



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- Large stakeholder team
- Utilities, consultants, regulators
- Multiple feedback loops
- Over 1,000 comments received to date related to v6 development

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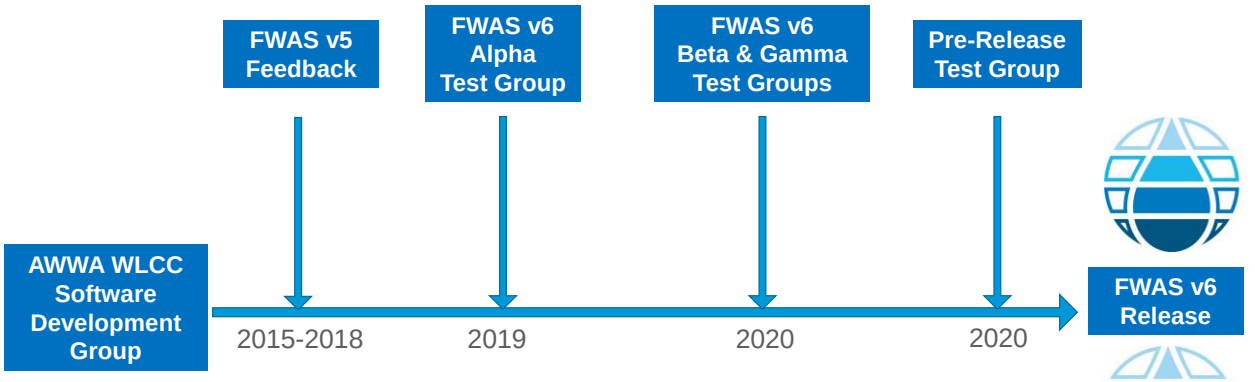

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- Volunteer effort
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- Utilities, consultants, regulators
- Multiple feedback loops
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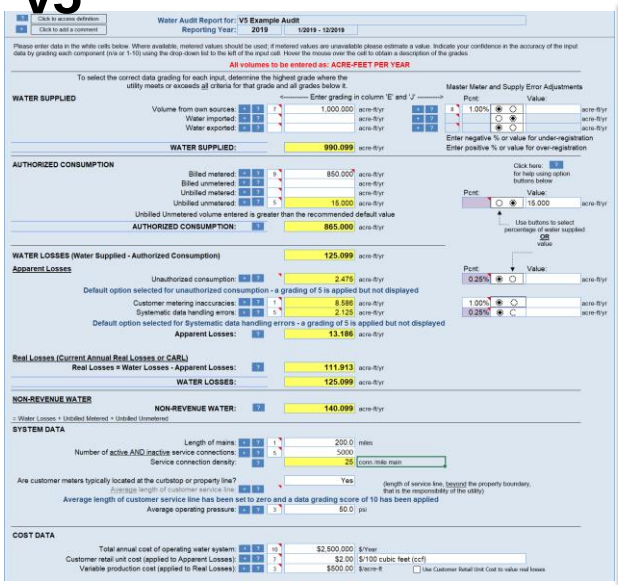
v6.0 – What's New?

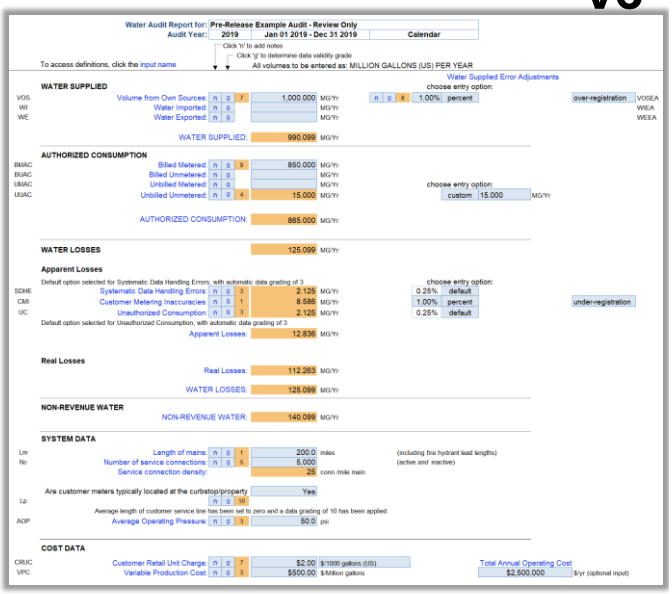
17

Worksheet

v5



v6



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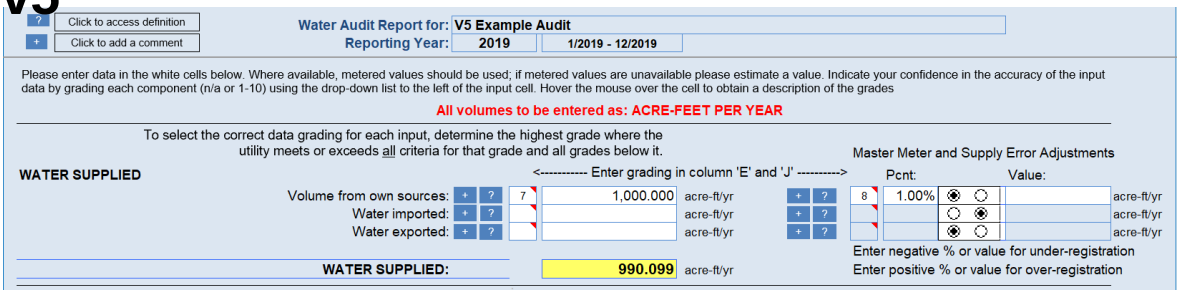
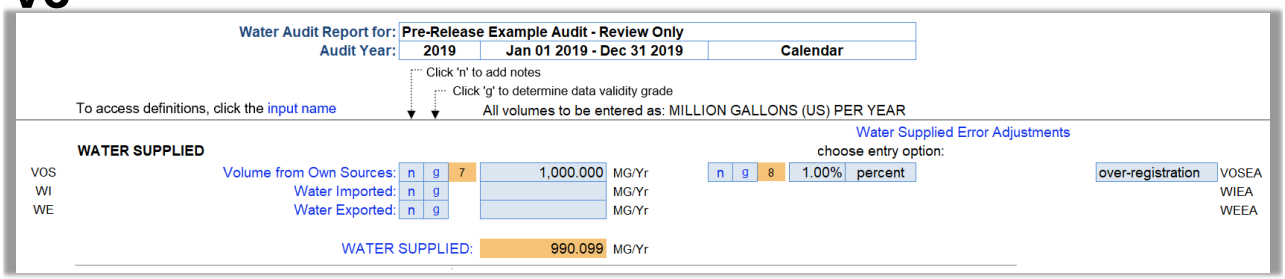
Worksheet

v5



v6



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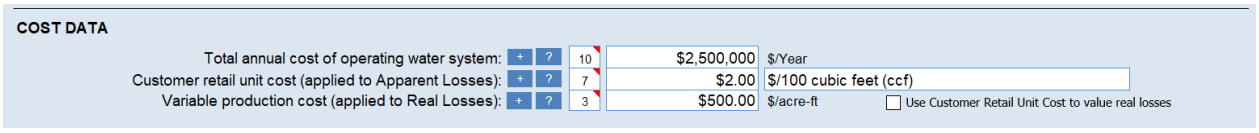
Worksheet

v5



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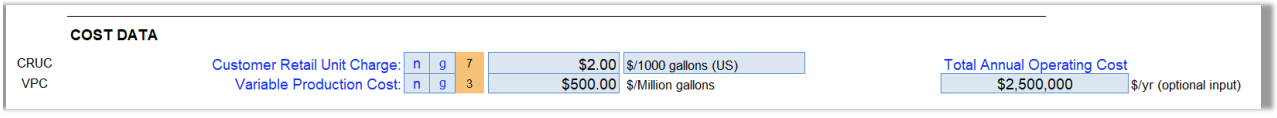

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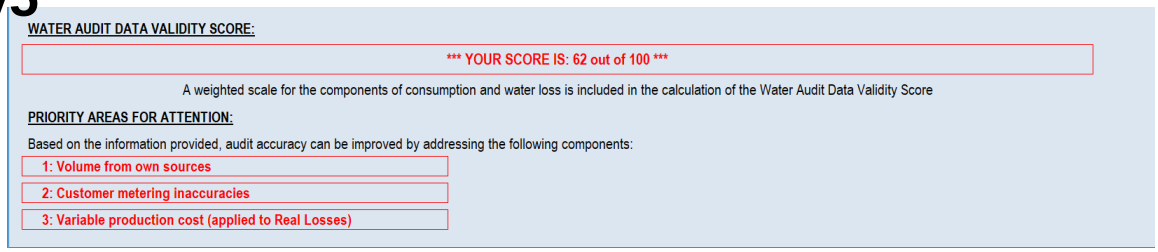
Worksheet

v5



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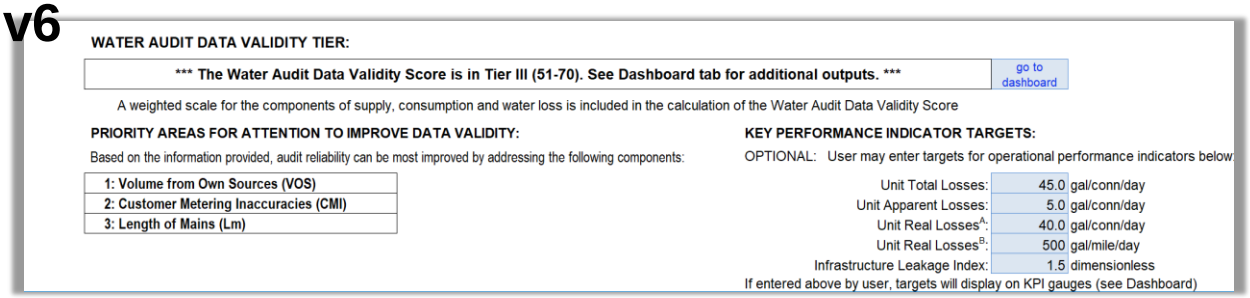
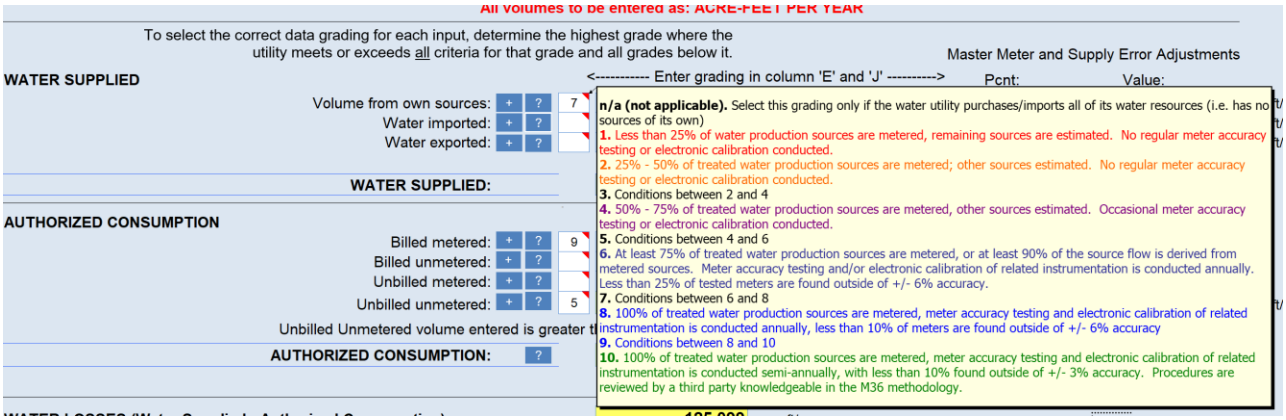


22

Data Validity Grading

v5



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Data Validity Grading

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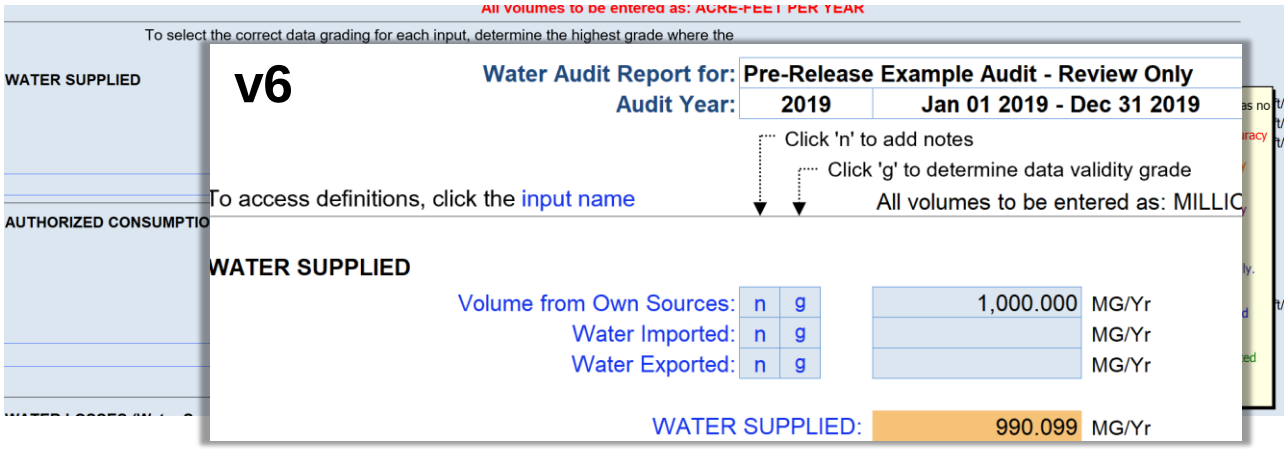

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Data Validity Grading

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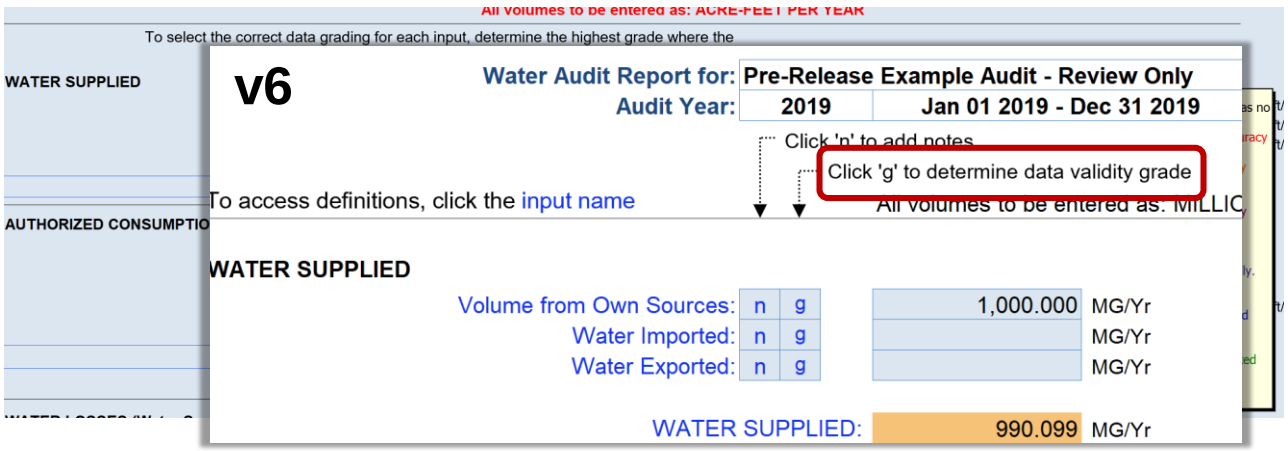

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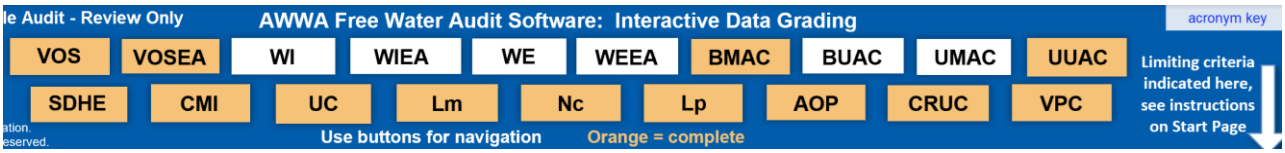
Data Validity Grading

v6



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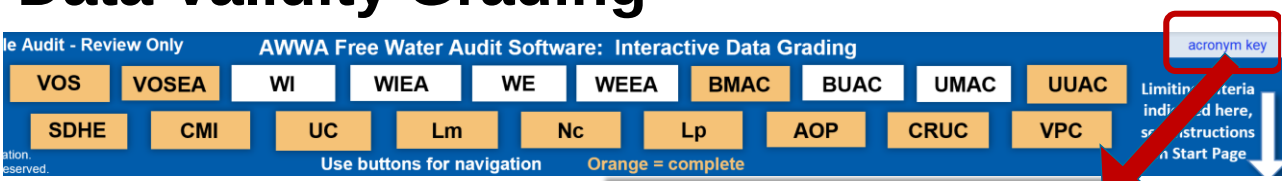
Data Validity Grading

v6



Key of Input Acronyms *In order of appearance in the Worksheet*

VOS	Volume from Own Sources
VOSEA	VOS Error Adjustment
WI	Water Imported
WIEA	WI Error Adjustment
WE	Water Exported
WEEA	WE Error Adjustment
BMAC	Billed Metered Authorized Consumption
BUAC	Billed Unmetered Authorized Consumption
UMAC	Unbilled Metered Authorized Consumption
UUAC	Unbilled Unmetered Authorized Consumption
SDHE	Systematic Data Handling Errors
CMI	Customer Metering Inaccuracies
UC	Unauthorized Consumption
Lm	Length of mains
Nc	Number of service connections
Lp	Average length of (private) customer service line
AOP	Average Operating Pressure
CRUC	Customer Retail Unit Charge
VPC	Variable Production Cost

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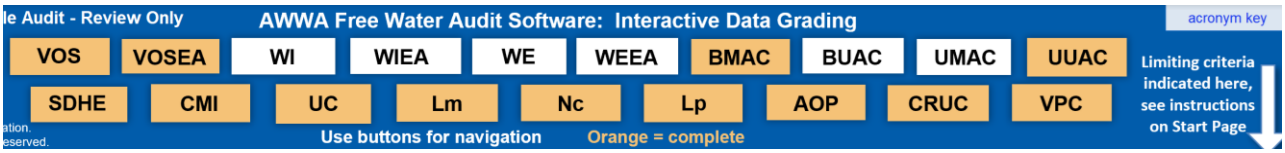
Data Validity Grading v6



Guidance for the Interactive Data Grading

Use buttons in IDG header to navigate among inputs — VOS

Buttons turn orange when grading complete for an input — VOS

Answer all visible questions for each input in the order they're presented, choosing best-fit answer

Grade will populate when all visible questions are complete for an input — 7

The limiting criteria will be labeled along the right. If only 1 limiting criterion is shown, improving on that criterion will achieve a higher data grade. If multiple limiting criteria are shown, improving on each limiting criteria is necessary to achieve a higher data grade. A complete inventory of data grading criteria is available in the Data Grading Matrix v6.0 (see web resources) — Limiting

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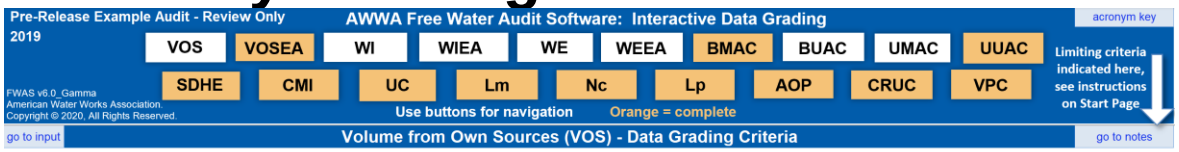
Data Validity Grading v6



vos	Criteria Question	Select Best-Fit Answers to All Visible Questions
vos.0	Did the water utility supply any water from its own sources during the audit year?	Yes
vos.1	What percent of own supply volume is metered?	>99%
	For questions 2-10 below: Choose the answer that applies for those meters that measure >90% of the finished water volume. **In-situ flow accuracy testing** refers to a test process that confirms the flow measuring accuracy of the primary device (the flowmeter), in its installed location. **Electronic calibration** refers to a process that checks for error in the metering secondary device(s) and/or the tertiary device(s). **Secondary device** can include meter transmitter, DP cell, chart recorder or similar instrumentation. **Tertiary device** can include SCADA, historian or other computerized archival system.	
vos.2	What is the frequency of electronic calibration?	Annually
vos.3	What level of data transfer errors are checked as part of the electronic calibration process?	Data transfer errors are checked at secondary device(s) AND tertiary device(s)
vos.4	Is the most recent electronic calibration documentation available for review?	Yes
vos.5	What is the frequency of in-situ flow accuracy testing?	Less than annual but within last 5 years
vos.6	Is the most recent in-situ flow accuracy testing documentation available for review?	Yes
vos.7	What are the total volume-weighted average results of in-situ flow accuracy testing (during or closest to audit year)?	
vos.8	Have testing and calibration procedures been closely scrutinized for compliance with procedures described in the AWWA M36 and/or M33 Manual(s)?	At ±6% or greater Between ±3% to ±6% At or within ±3%
vos.9	Which best describes the frequency of finished water meter readings?	
vos.10	Which best describes the frequency of data review for anomalies/errors? These can include numbers that are outside of typical patterns, and zero or 'null' values that may reflect a gap in data recording.	

FINAL DATA GRADE FOR THIS AUDIT INPUT:

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Data Validity Grading

v6

Pre-Release Example Audit - Review Only
2019

AWWA Free Water Audit Software: Interactive Data Grading

acronym key

VOS | VOSEA | WI | WIEA | WE | WEEA | BMAC | BUAC | UMAC | UUAC

SDHE | CMI | UC | Lm | Nc | Lp | AOP | CRUC | VPC

Limiting criteria indicated here, see instructions on Start Page

FWAS v6.0_Gamma
American Water Works Association.

Use buttons for navigation Orange = complete

go to input

Volume from Own Sources (VOS) - Data Grading Criteria

go to notes

vos	Criteria Question	Select Best-Fit Answers to All Visible Questions	
vos.0	Did the water utility supply any water from its own sources during the audit year?	Yes	
vos.1	What percent of own supply volume is metered?	>99%	
	For questions 2-10 below: Choose the answer that applies for those meters that measure >90% of the finished water volume. **In-situ flow accuracy testing** refers to a test process that confirms the flow measuring accuracy of the primary device (the flowmeter), in its installed location. **Electronic calibration** refers to a process that checks for error in the metering secondary device(s) and/or the tertiary device(s). **Secondary device** can include meter transmitter, DP cell, chart recorder or similar instrumentation. **Tertiary device** can include SCADA, historian or other computerized archival system.		
vos.2	What is the frequency of electronic calibration?	Annually	
vos.3	What level of data transfer errors are checked as part of the electronic calibration process?	Data transfer errors are checked at secondary device(s) AND tertiary device(s)	
vos.4	Is the most recent electronic calibration documentation available for review?	Yes	
vos.5	What is the frequency of in-situ flow accuracy testing?	Less than annual but within last 5 years	Limiting
vos.6	Is the most recent in-situ flow accuracy testing documentation available for review?	Yes	
vos.7	What are the total volume-weighted average results of in-situ flow accuracy testing (during or closest to audit year)?	At or within ±3%	
vos.8	Have testing and calibration procedures been closely scrutinized for compliance with procedures described in the AWWA M36 and/or M33 Manual(s)?	Yes	
vos.9	Which best describes the frequency of finished water meter readings?	Continuous	
vos.10	Which best describes the frequency of data review for anomalies/errors? These can include numbers that are outside of typical patterns, and zero or 'null' values that may reflect a gap in data recording.	Daily	
	FINAL DATA GRADE FOR THIS AUDIT INPUT:	**7**	

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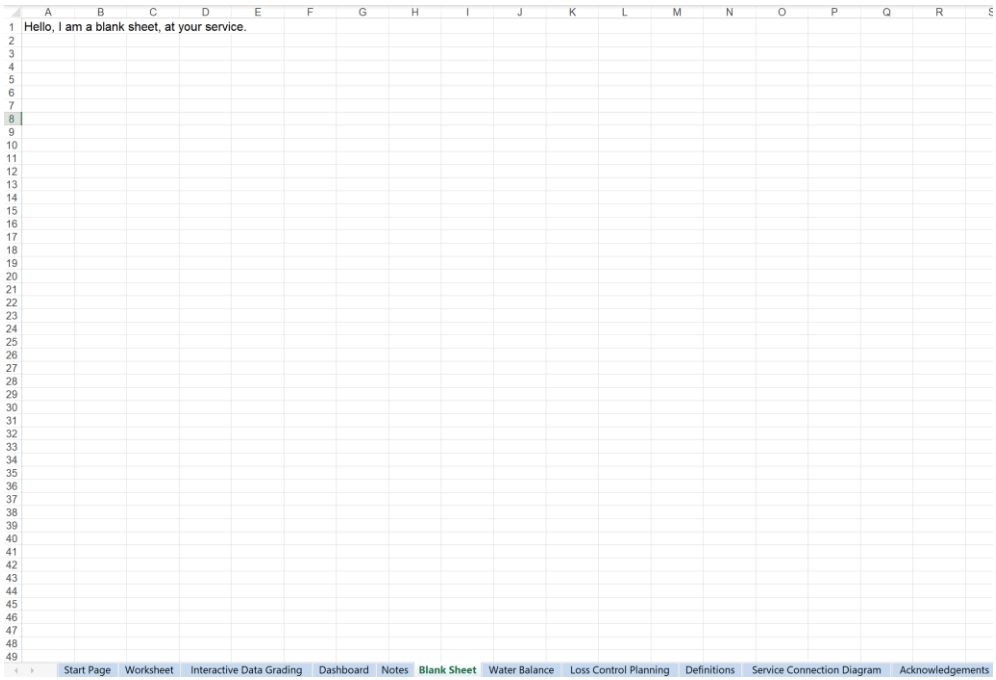
v6 Blank Sheet



Alexa,
find my blank sheet

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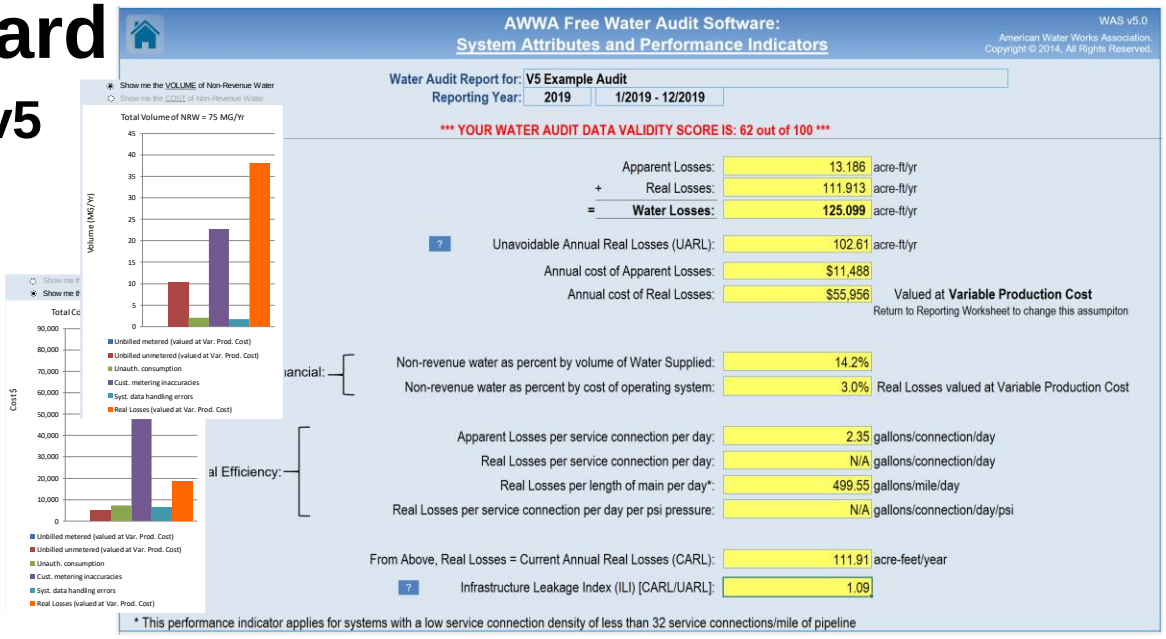
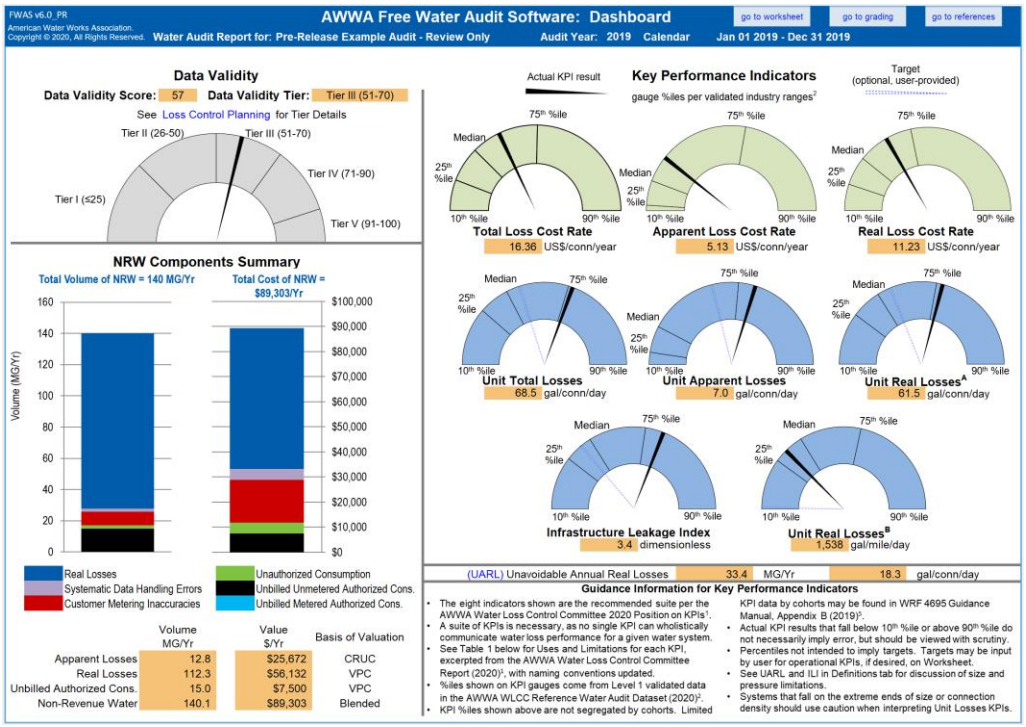
Dash-board v5

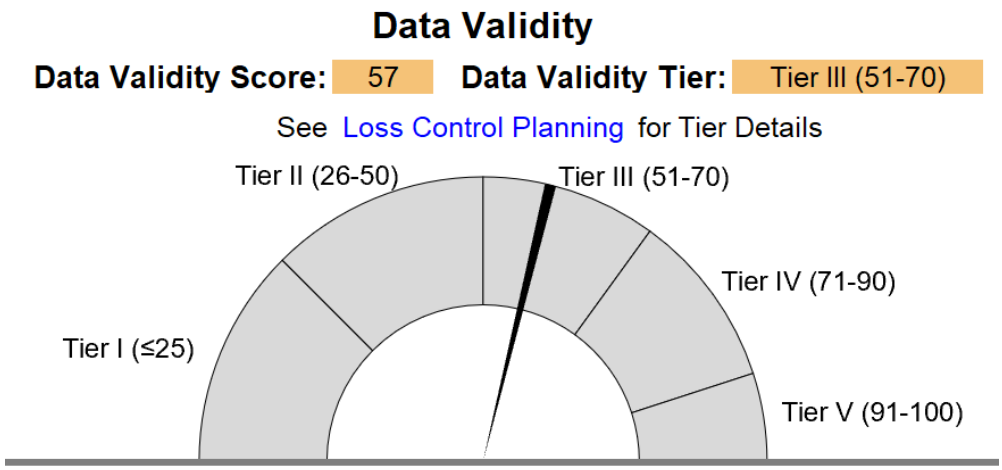


Dash-board v6



Dash-board

v6



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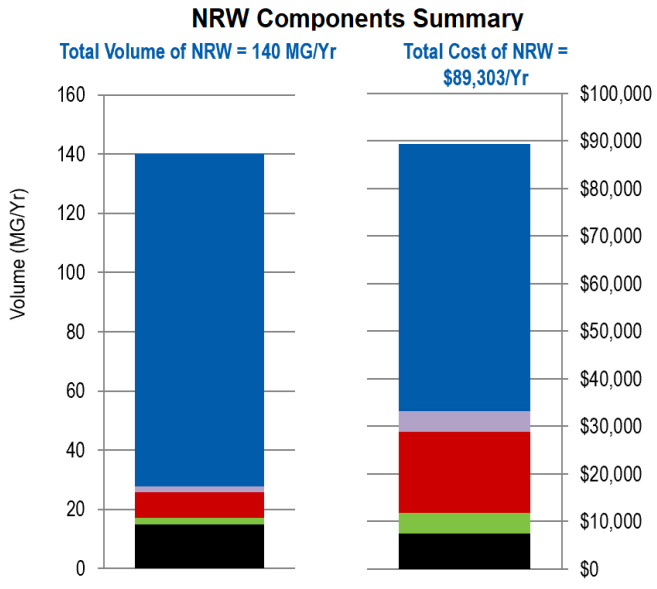
Dash-board

v6



	Volume MG/Yr	Value $/Yr	Basis of Valuation
Apparent Losses	12.8	$25,672	CRUC
Real Losses	112.3	$56,132	VPC
Unbilled Authorized Cons.	15.0	$7,500	VPC
Non-Revenue Water	140.1	$89,303	Blended

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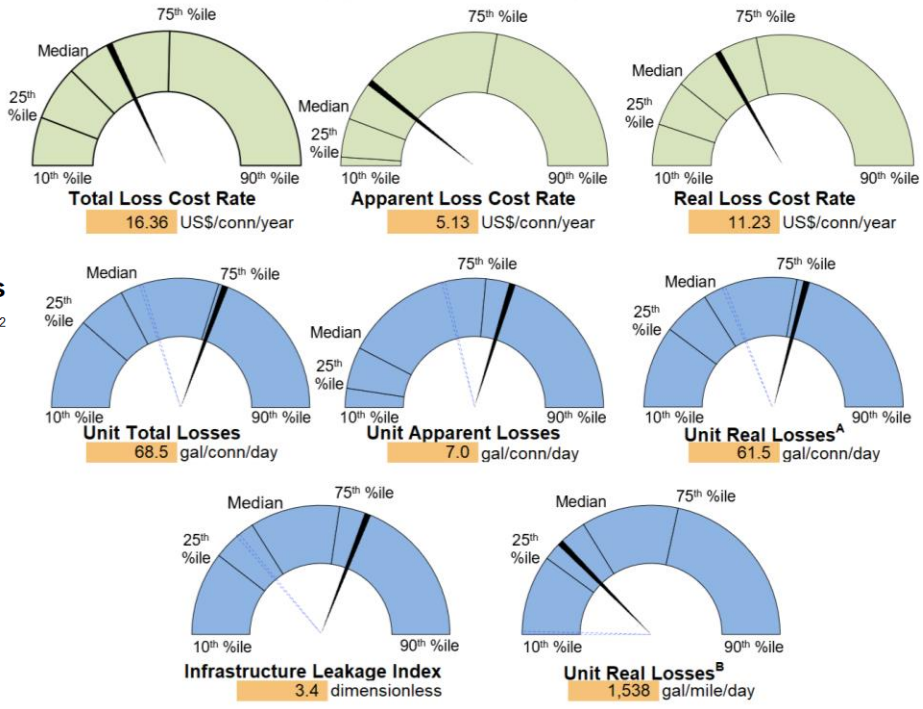
Dash-board v6

Key Performance Indicators

gauge %iles per validated industry ranges[2]

Actual KPI result

Target
(optional, user-provided)



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Dash-board v6

Guidance Information for Key Performance Indicators

- The eight indicators shown are the recommended suite per the AWWA Water Loss Control Committee 2020 Position on KPIs[1].
- A suite of KPIs is necessary, as no single KPI can wholistically communicate water loss performance for a given water system.
- See Table 1 below for Uses and Limitations for each KPI, excerpted from the AWWA Water Loss Control Committee Report (2020)[1], with naming conventions updated.
- %iles shown on KPI gauges come from Level 1 validated data in the AWWA WLCC Reference Water Audit Dataset (2020)[2].
- KPI %iles shown above are not segregated by cohorts. Limited KPI data by cohorts may be found in WRF 4695 Guidance Manual, Appendix B (2019)[5].
- Actual KPI results that fall below 10th %ile or above 90th %ile do not necessarily imply error, but should be viewed with scrutiny.
- Percentiles not intended to imply targets. Targets may be input by user for operational KPIs, if desired, on Worksheet.
- See UARL and ILI in Definitions tab for discussion of size and pressure limitations.
- Systems that fall on the extreme ends of size or connection density should use caution when interpreting Unit Losses KPIs.

Source: AWWA Water Loss Control Committee Report (2020)[1], with naming conventions updated

Table 1
2020 AWWA Water Audit Method – Water Audit Outputs and Key Performance Indicators: Uses and Limitations

Type	Indicator	Description	Suitable Purposes					Uses and Limitations	Principal Users
			Assessment	Bench-marking	Target-Setting	Planning	Tracking		
Volume	Unit Apparent Losses (vol / conn / day)	Strong and understandable indicator for multiple users	✓	✓	✓	✓	✓	Used for performance tracking and target-setting	Utilities Regulators
	Unit Real Losses[A] (vol / conn / day)	Strong and understandable indicator for multiple users	✓	✓	✓	✓	✓	Used for performance tracking and target-setting	Utilities, Regulators, Policy Makers
	Unit Real Losses[B] (vol / pipeline length / day)	Strong and understandable indicator for use by utilities with low connection density	✓	✓	✓	✓	✓	Data collection and assessment of systems with "low" connection density	Utilities, Regulators, Policy Makers
	Unit Total Losses (vol / conn / day) **New KPI**	Strong and understandable indicator; suitable for high-level performance measurement	✓				✓	High level indicator for trending analysis. Not appropriate for target-setting or benchmarking	Utilities, Customers
	Infrastructure Leakage Index (ILI)	Robust, specialized ratio KPI; can be influenced by pressure and connection density.	✓	✓			✓	Benchmarking after pressure management is implemented	Utilities
Value	Apparent Loss Cost Rate (value / conn / year) **New KPI**	Indicators with sufficient technical rigor. Provide the unit financial value of each type of loss, which is very useful for planning and assessment of cost efficiency of water loss reduction and control interventions and	✓			✓	✓	Data collection and assessment on AWWA indicators or contextual parameters to use in conjunction with Loss Cost Rates	Utilities, Regulators, Customers
	Real Loss Cost Rate								

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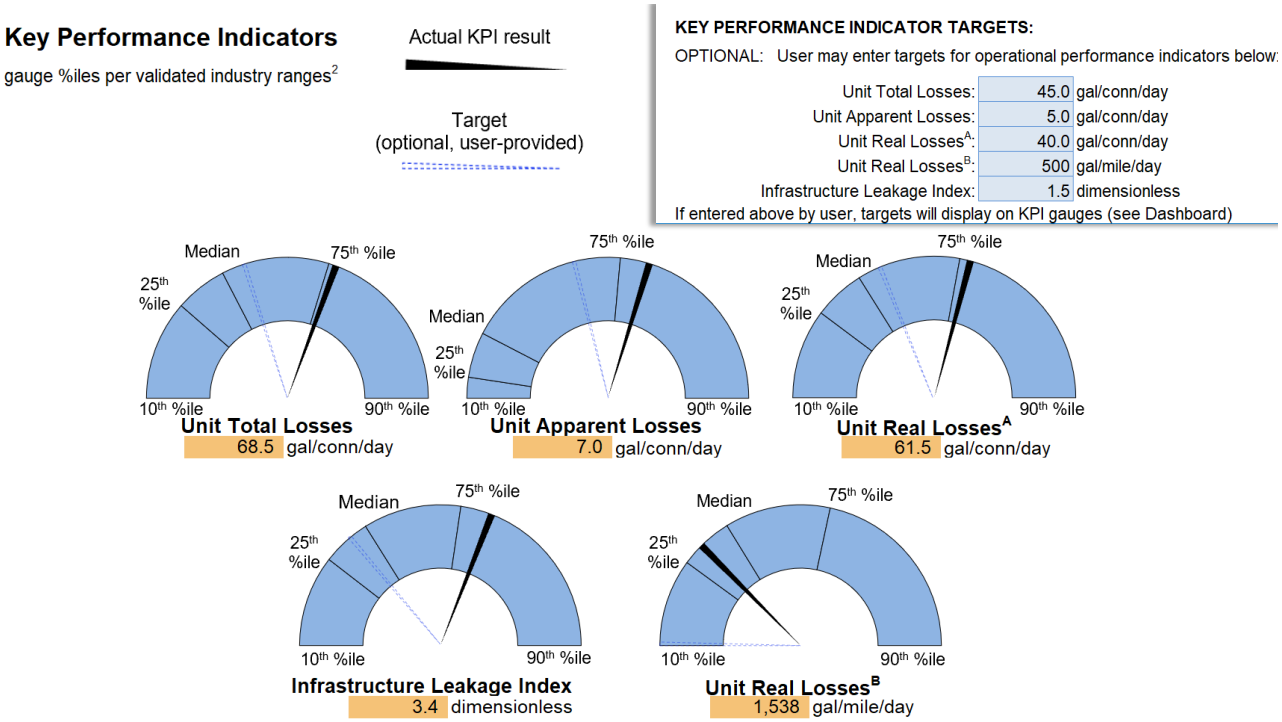

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SUMMARY OF MAJOR V6 IMPROVEMENTS

- Interactive Data Grading to improve consistency, objectivity, transparency in data grade assignment for each input
- Blank sheet for user calculations / extras
- Fighterjet Dashboard
- KPIs updated per AWWA 2020 Position
- KPIs shown on gauge against industry ranges

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ACKNOWLEDGEMENTS

Software Development Group

- Will Jernigan (Chair)
- David Sayers
- Kate Gasner
- Andrew Chastain-Howley
- George Kunkel

Alpha Test Group

- Drew Blackwell
- Heather Himmelberger
- Yannis Kachani
- Chris Leauber
- Sofia Marcus
- Brian Skeens
- Dan Strub
- Ken Brothers

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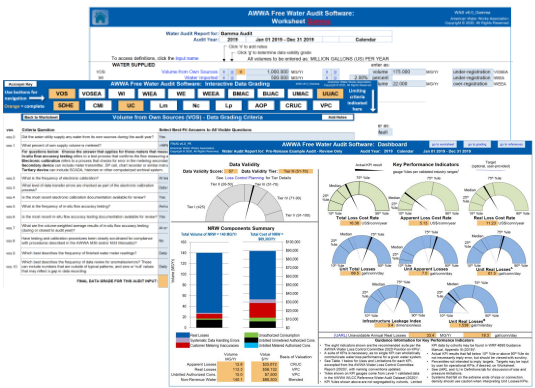
OFFICIAL RELEASE DATE



AWWA FWAS v6.0

World Water Loss Day
4th December

American Water Works Association
Dedicated to the World's Most Important Resource®

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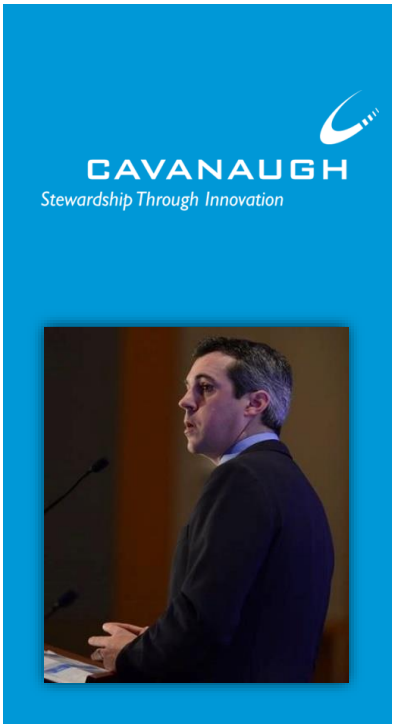

TAKING THE V6 FOR A SPIN

THE NEW AWWA FREE WATER AUDIT SOFTWARE IS HERE

Will Jernigan, P.E.
Chair / AWWA Water Loss Software Committee
Chair / North American Water Loss Conference
CFO, Director of Water Efficiency / Cavanaugh

Will.Jernigan@cavanaughsolutions.com

25 YEARS 1995-2020 DELIVERING STEWARDSHIP THROUGH INNOVATION CAVANAUGH

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ASK THE EXPERTS

Will Jernigan, PE
Cavanaugh

Sofia Marcus, PE
LADWP

Enter your **question** into the **question pane** on the right-hand side of the screen.

Please specify to whom you are addressing the question.

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TAKING THE NEW V6 FOR A SPIN AT LADWP

Sofia Marcus, PE

Program Manager – LADWP Water Loss Task Force

Los Angeles Department of Water and Power

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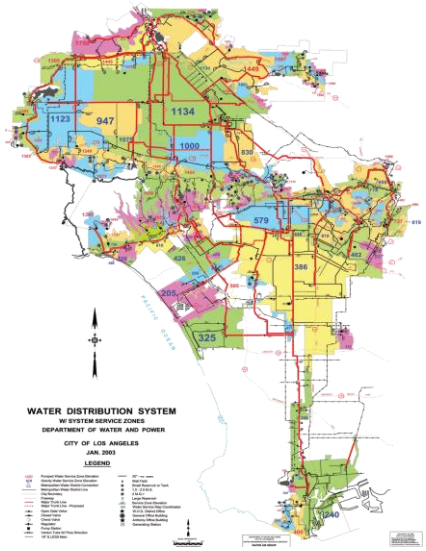
LOS ANGELES DWP PROFILE



- 473 square miles
- 4 million people served
- 7,400 miles of mains
- 740,000 services
- 113 pressure zones
- 331 pressure regulating stations
- 61,000 hydrants
- 457 million gallons of water delivered per day

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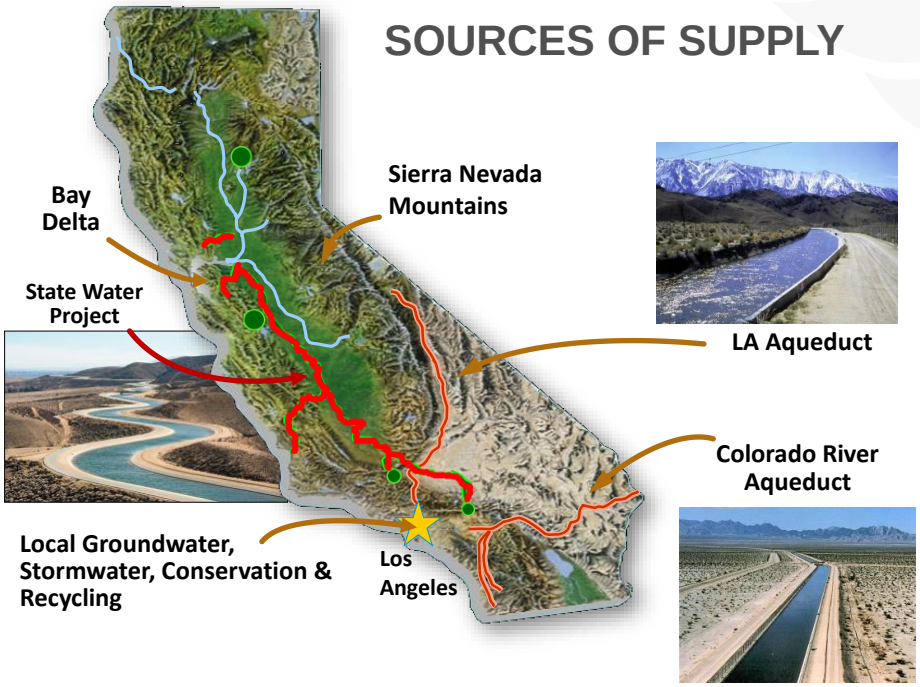
SOURCES OF SUPPLY



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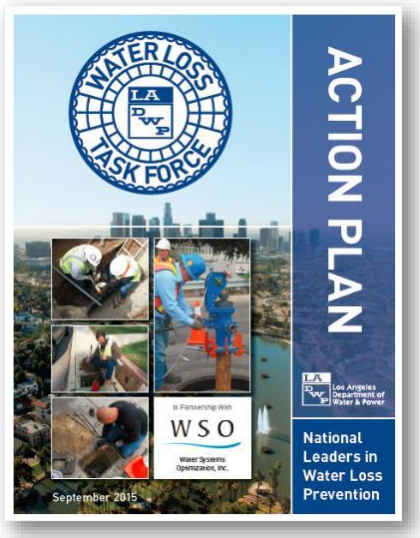
WATER LOSS TASK FORCE ACTION PLAN



- Summarizes LADWP's cost-effective water loss control actions:
  - Data Quality Improvement
  - Water Loss Reduction
- Completed in 2015
- Implementation Phase in progress

Download at:
www.ladwp.com/waterconservation

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LADWP BENEFITS FROM THE AUDIT




Programs,
Prevention, and More!

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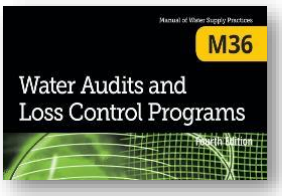
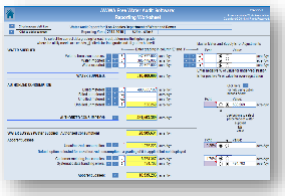
REGULATIONS AND STANDARDS

California SB 555 (2015)

- *Requires annual validated water loss audits starting 2017 utilizing AWWA V5 software*
- *Sets water loss performance standards for each urban retail water supplier*

AWWA Standards





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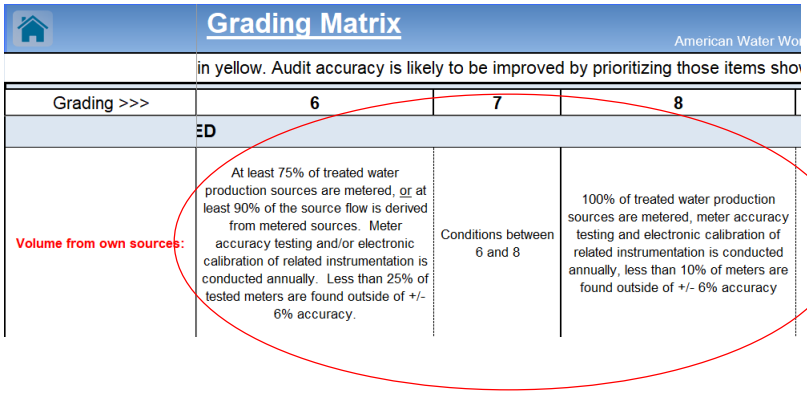
DIFFICULTY WITH VERSION 5.0



Grading Matrix

American Water Wo

in yellow. Audit accuracy is likely to be improved by prioritizing those items sho

Grading >>>	6	7	8
	ED		
Volume from own sources:	At least 75% of treated water production sources are metered, or at least 90% of the source flow is derived from metered sources. Meter accuracy testing and/or electronic calibration of related instrumentation is conducted annually. Less than 25% of tested meters are found outside of +/- 6% accuracy.	Conditions between 6 and 8	100% of treated water production sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted annually, less than 10% of meters are found outside of +/- 6% accuracy

Open to interpretation!

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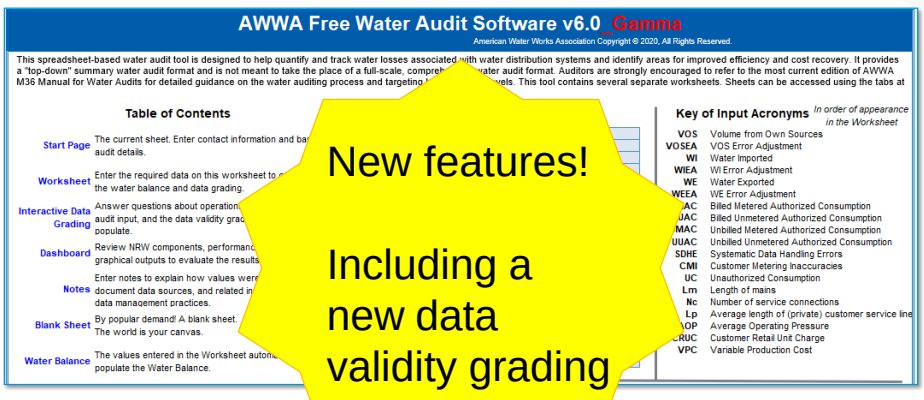
INTRODUCING…V 6.0!



AWWA Free Water Audit Software v6.0 Gamma

American Water Works Association Copyright © 2020, 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 targeting real loss reduction levels. This tool contains several separate worksheets. Sheets can be accessed using the tabs at

Table of Contents

Start Page	The current sheet. Enter contact information and ba audit details.
Worksheet	Enter the required data on this worksheet to the water balance and data grading.
Interactive Data Grading	Answer questions about operation audit input, and the data validity grad populate.
Dashboard	Review NRW components, performanc graphical outputs to evaluate the results
Notes	Enter notes to explain how values were document data sources, and related in data management practices.
Blank Sheet	By popular demand! A blank sheet. The world is your canvas.
Water Balance	The values entered in the Worksheet autom populate the Water Balance.

Key of Input Acronyms *In order of appearance in the Worksheet*

VOS	Volume from Own Sources
VOSEA	VOS Error Adjustment
WI	Water Imported
WIEA	WI Error Adjustment
WE	Water Exported
WEEA	WE Error Adjustment
AC	Billed Metered Authorized Consumption
AC	Billed Unmetered Authorized Consumption
MAC	Unbilled Metered Authorized Consumption
UAC	Unbilled Unmetered Authorized Consumption
DHE	Systematic Data Handling Errors
CMI	Customer Metering Inaccuracies
UC	Unauthorized Consumption
Lm	Length of mains
Nc	Number of service connections
Lp	Average length of (private) customer service line
OP	Average Operating Pressure
RUC	Customer Retail Unit Charge
VPC	Variable Production Cost

New features!

Including a new data validity grading system!

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NEW DATA VALIDITY GRADE QUESTIONS

Guidance for the Interactive Data Grading

Use buttons in IDG header to navigate among inputs	VOS
Buttons turn orange when grading complete for an input	VOS
Answer all visible questions for each input in the order they're presented, choosing best-fit	
Grade will populate when all visible questions are complete for an input	7

The limiting criteria will be labeled along the right. If only 1 limiting criterion is shown, improving on that criterion will achieve a higher data grade. If multiple limiting criteria are shown, improving on each limiting criteria is necessary to achieve a higher data grade. A complete inventory of data grading criteria is available in the Data Grading Matrix v6.0 (see web resources)

Limiting

New

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NEW DATA VALIDITY GRADE QUESTIONS

Gamma Audit 2019

AWWA Free Water Audit Software: Interactive Data Grading

acronym key

VOS | VOSEA | WI | WIEA | WE | WEEA | BMAC | BUAC | UMAC | UUAC

SDHE | CMI | UC | Lm | Nc | Lp | AOP | CRUC | VPC

Limiting criteria indicated here, see instructions on Start Page

FWAS v6.0_Gamma
American Water Works Association.
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Use buttons for navigation Orange = complete

go to input | Volume from Own Sources (VOS) - Data Grading Criteria | go to notes

vos	Criteria Question	Select Best-Fit Answers to All Visible Questions	
vos.0	Did the water utility supply any water from its own sources during the audit year?	Yes	
vos.1	What percent of own supply volume is metered?	>99%	
	For questions 2-10 below: Choose the answer that applies for those meters that measure >90% of the finished water volume. **In-situ flow accuracy testing** refers to a test process that confirms the flow measuring accuracy of the primary device (the flowmeter), in its installed location. **Electronic calibration** refers to a process that checks for error in the metering secondary device(s) and/or the tertiary device(s). **Secondary device** can include meter transmitter, DP cell, chart recorder or similar instrumentation. **Tertiary device** can include SCADA, historian or other computerized archival system.		
vos.2	What is the frequency of electronic calibration?	Annually	
vos.3	What level of data transfer errors are checked as part of the electronic calibration process?	Data transfer errors are checked at secondary device(s) AND tertiary device(s)	
vos.4	Is the most recent electronic calibration documentation available for review?	Yes	
vos.5	What is the frequency of in-situ flow accuracy testing?	None, or Not within last 5 years	Limiting
vos.6			

99 questions seems intimidating… but it is simpler than it seems!

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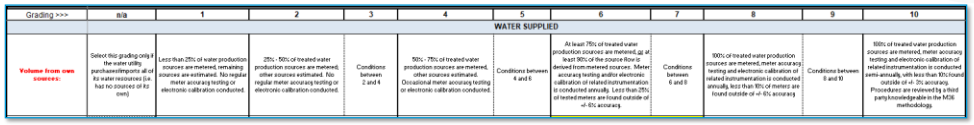
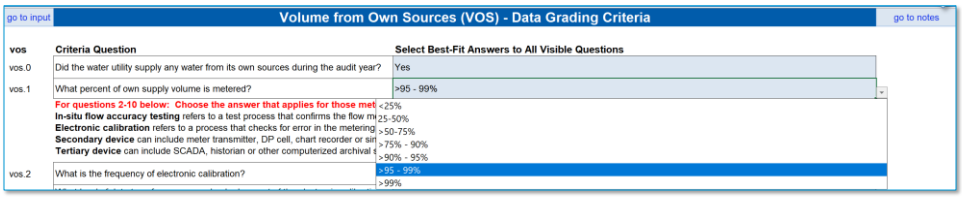
NEW DATA VALIDITY GRADE QUESTIONS

V 5



Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
WATER SUPPLIED											
Volume from own sources:	Select this grading only if the water utility purchases/imports all of its water resources (i.e. had no sources of its own)	Less than 25% of water production sources are metered, remaining sources are estimated. No regular meter accuracy testing or electronic calibration conducted.	25% - 50% of treated water production sources are metered, other sources estimated. No regular meter accuracy testing or electronic calibration conducted.	Conditions between 2 and 4	50% - 75% of treated water production sources are metered, other sources estimated. Occasional meter accuracy testing or electronic calibration conducted.	Conditions between 4 and 6	At least 75% of treated water production sources are metered, or at least 90% of the source flow is derived from metered sources. Meter accuracy testing and/or electronic calibration of related instrumentation is conducted annually. Less than 25% of tested meters are found outside of +/- 6% accuracy.	Conditions between 6 and 8	100% of treated water production sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted annually, less than 10% of meters are found outside of +/- 6% accuracy	Conditions between 8 and 10	100% of treated water production sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted semi-annually, with less than 10% found outside of +/- 2% accuracy. Procedures are reviewed by a third party knowledgeable in the M36 methodology.

V 6



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NEW CRITERIA FOR IMPROVED VALIDITY

BMAC.3:	Is the BMAC volume pro-rated to represent consumption occurring exactly during the audit period?
CMI.1:	Do you test meters reactively (when triggered by customer complaint or billing/consumption flag)?
CMI.2 & CMI.4:	Which best describes the frequency of the proactive testing program (effort beyond when triggered by customer complaint or billing/consumption flag)?

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CHANGES IN LADWP'S DATA VALIDITY GRADES

Audit Input	V 5.0 Grade	V 6.0 Grade	Change
VOS	6	5	-2
VOSEA	9	10	+1
WIEA	4	10	+6
WE	7	8	+1
BMAC	9	8	-1
UUAC	10	8	-2
UC	5	3	-2
CMI	9	7	-2
SDHE	7	6	-1
Nc	9	10	+1
CRUC	9	10	+1
VPC	7	10	+3
Overall Data Validity Score	**77**	**74**	**-3**
	Tier IV	**Tier IV**	

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DIFFICULTY WITH VERSION 5.0

Grading Matrix

in yellow. Audit accuracy is likely to be improved by prioritizing those items shou

Grading >>>	6	7	8
	ED		
Volume from own sources:	At least 75% of treated water production sources are metered, or at least 90% of the source flow is derived from metered sources. Meter accuracy testing and/or electronic calibration of related instrumentation is conducted annually. Less than 25% of tested meters are found outside of +/- 6% accuracy.	Conditions between 6 and 8	100% of treated water production sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted annually, less than 10% of meters are found outside of +/- 6% accuracy
Improvements to attain higher data grading for "Volume from own Sources" component:	to qualify for 8: Conduct annual meter accuracy testing and calibration of related instrumentation on all meter installations on a regular basis. Complete project to install new, or replace defective existing, meters so that entire production meter population is metered. Repair or replace meters outside of +/- 6% accuracy.		to qualify for 10: Maintain annual meter accuracy testi related instrumentation for all meter ins replace meters outside of +/- 3% accu meter technology; pilot one or more innovative meters in attempt to further im

Which improvements should be done?

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LIMITING FACTORS

Back to Worksheet | Volume from Own Sources (VOS) - Data Grading Criteria | Add Notes

vos	Criteria Question	Select Best-Fit Answers to All Visible Questions	
vos.0	Did the water utility supply any water from its own sources during the audit year?	Yes	
vos.1	What percent of own supply volume is metered?	>99%	
	For questions 2-10 below: Choose the answer that applies for those meters that measure >90% of the finished water volume. **In-situ flow accuracy testing** refers to a test process that confirms the flow measuring accuracy of the primary device (the flowmeter), in its installed location. **Electronic calibration** refers to a process that checks for error in the metering secondary device(s) and/or the tertiary device(s). **Secondary device** can include meter transmitter, DP cell, chart recorder or similar instrumentation. **Tertiary device** can include SCADA, historian or other computerized archival system.		
vos.2	What is the frequency of electronic calibration?	Annually	
vos.3	What level of data transfer errors are checked as part of the electronic calibration process?	Data transfer errors are checked at secondary device(s) AND tertiary device(s)	
vos.4	Is the most recent electronic calibration documentation available for review?	Yes	
vos.5	What is the frequency of in-situ flow accuracy testing?	None, or Not within last 5 years	Limiting
vos.6			
vos.7			
vos.8	Have testing and calibration procedures been closely scrutinized for compliance with procedures described in the AWWA M36 and/or M33 Manual(s)?	Yes	
vos.9	Which best describes the frequency of finished water meter readings?	Continuous	
vos.10	Which best describes the frequency of data review for anomalies/errors? These can include numbers that are outside of typical patterns, and zero or 'null' values that may reflect a gap in data recording.	Daily	
	FINAL DATA GRADE FOR THIS AUDIT INPUT:	7	

Limiting criteria shows where improvements should be made!

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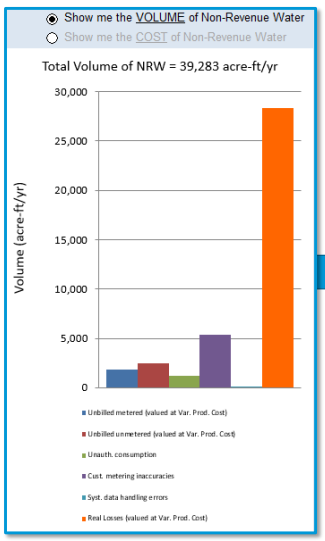
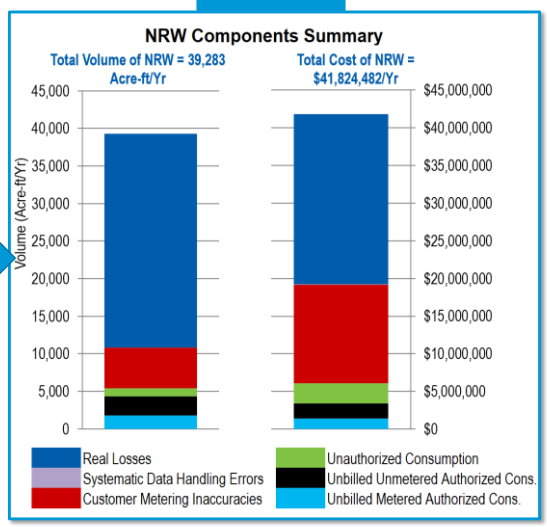
NEW CHARTS!

V 5



V 6



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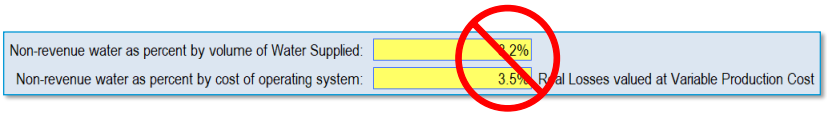
NO MORE PERCENT NON-REVENUE WATER



Utility A	Utility B
20% Water Loss	10% Water Loss

Even though percents are different, water loss volume is the same!

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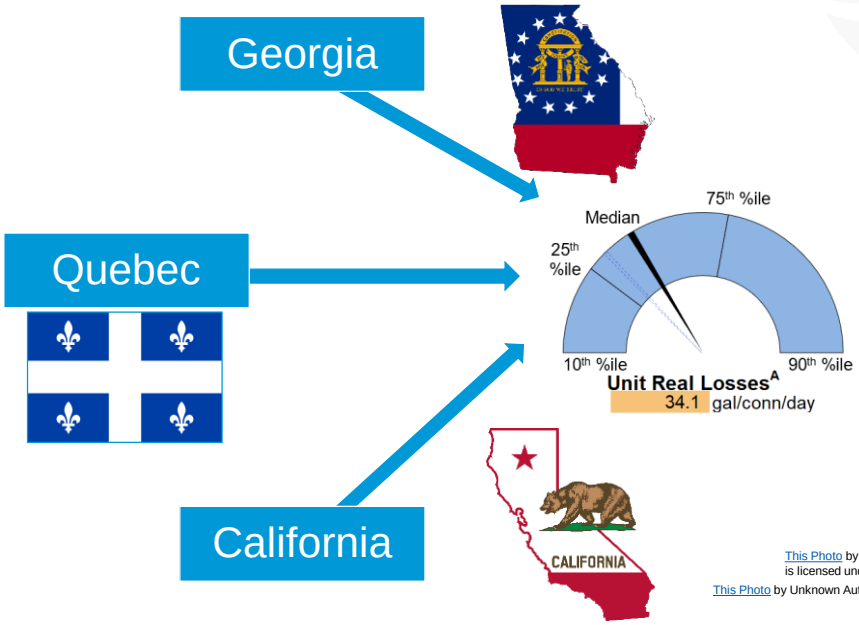
VALIDATED DATASETS PROVIDE BENCHMARKING



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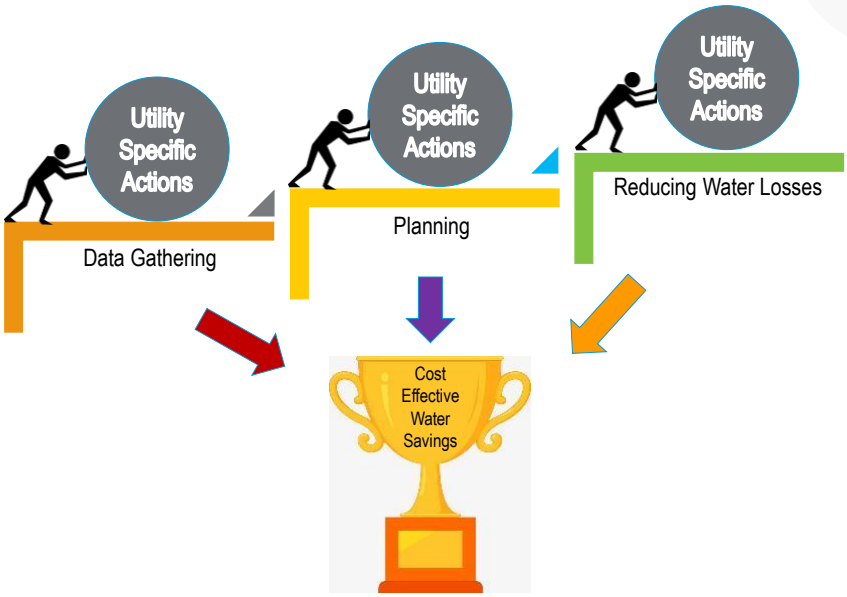
HOW V6 BENEFITS WATER UTILITIES



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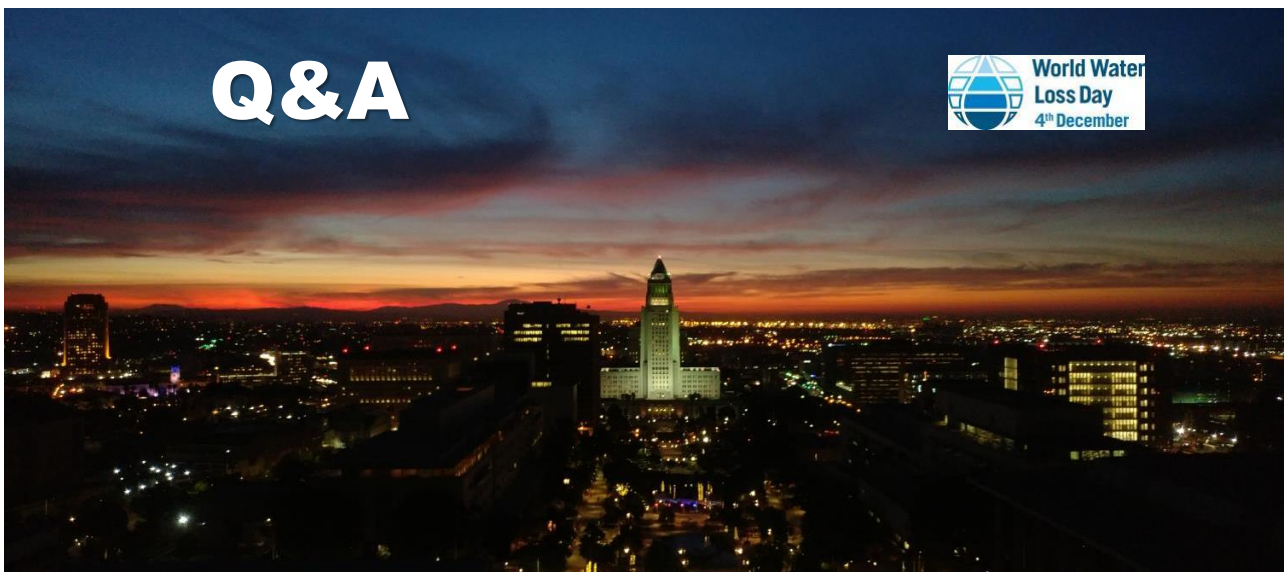

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American Water Works Association

LA DWP Los Angeles Department of Water & Power

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ASK THE EXPERTS

Will Jernigan, PE
Cavanaugh

Sofia Marcus, PE
LADWP

Enter your **question** into the **question pane** on the right-hand side of the screen.

Please specify to whom you are addressing the question.

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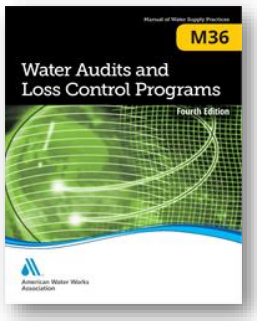
ADDITIONAL RESOURCES

- AWWA Water Loss Control Resource Community
- M36 Water Audits and Loss Control Programs
  - AWWA catalog no: 30036-4E



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UPCOMING WEBINARS

Oct 21 - Watershed Protection and Military Installations

Oct 22 - FREE Webinar from Napoli Shkolnik: A Cost Recovery Program: PFAS Water Contamination

Oct 28 - A Closer Look at New and Not so New CEC's: PFAS, Microplastics and Solvents

Register for a 2020 Webinar Bundle

View the full 2020 schedule at awwa.org/webinars

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- As part of your registration, you are entitled to an additional 30-day archive access of today's program.
- Until next time, keep the water safe and secure.

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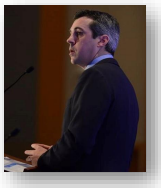
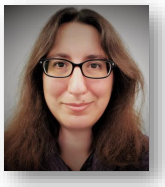


Will Jernigan is the Director of Water Efficiency with Cavanaugh, and has worked with over 1,200 water systems across North America where he is recognized as a leader in the water loss industry. Will leads the AWWA Water Loss Software, Subcommittee, and was appointed to the Management Committee of IWA's Water Loss Specialist group. He was also appointed as the US expert to an international task force developing the ISO Water Loss Standards. Will was Co-Principle Investigator for Water Research Foundation in 2016 and updated in 2020 which formally codified Level 1 validation methodology.



Sofia Marcus is the Manager of Water Resources Regulation, Legislation, and Grants at the Los Angeles Department of Water and Power. Sofia is also serving as program manager for LADWP's Water Loss Task Force. Prior to her employment at LADWP, Sofia worked for the Los Angeles Sanitation Watershed Protection Division and was responsible for ensuring stormwater regulatory compliance for the city. Sofia has bachelor's and master's degrees from the University of Southern California in Environmental Engineering and is currently serving as the Vice Chair of AWWA's Water Loss Control Committee.

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