



VIA E-FILING

Utility Code: 210104

April 30, 2024

Rosemary Chiavetta, Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
Harrisburg, PA 17120


**RE: Aqua Pennsylvania, Inc.
2023 Water Audit Summary
Docket No. M-2024-3045245**

Dear Secretary Chiavetta:

Enclosed for filing are Aqua Pennsylvania, Inc.'s 2023 Annual Water Audit Summaries for the following divisions: (1) Honesdale, (2) Roaring Creek, (3) Southeast Pennsylvania, (4) Shenango, (5) Susquehanna, and (6) Whitehaven. The electronic files of the water audit summaries in Excel format are being sent separately on a Compact Disc via overnight delivery to the Secretary's Bureau.

If you have any questions regarding this filing, please contact me at 610-645-1130.

Sincerely,


Alexander R. Stahl
Regulatory Counsel

cc: Clinton McKinley, Bureau of Technical Utility Services (via Email)

Enclosures



AWWA Free Water Audit Software: Worksheet

FWAS v6.0
American Water Works Association.
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Water Audit Report for: **Aqua Pennsylvania - Honesdale Division**

Audit Year: **2023** | **Jan 01 2023 - Dec 31 2023** | **2023**

To access definitions, click the [input name](#)

Click 'n' to add notes

Click 'g' to determine data validity grade

To edit water system info: [go to start page](#)

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

[Water Supplied Error Adjustments](#)

choose entry option:

WATER SUPPLIED

VOS	Volume from Own Sources:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="6"/>	<input type="text" value="756.076"/>	MG/Yr	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="4"/>	<input type="text" value="2.00%"/>	<input type="text" value="percent"/>	<input type="text" value="under-registration"/>	VOSEA
WI	Water Imported:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="n/a"/>	<input type="text" value="87.626"/>	MG/Yr	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="n/a"/>	<input type="text" value="2.00%"/>	<input type="text" value="percent"/>	<input type="text" value="under-registration"/>	WIEA
WE	Water Exported:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="n/a"/>	<input type="text" value="87.626"/>	MG/Yr	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="n/a"/>	<input type="text" value="2.00%"/>	<input type="text" value="percent"/>	<input type="text" value="under-registration"/>	WEEA

WATER SUPPLIED: MG/Yr

AUTHORIZED CONSUMPTION

BMAC	Billed Metered:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="8"/>	<input type="text" value="487.413"/>	MG/Yr						
BUAC	Billed Unmetered:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="n/a"/>	<input type="text" value="0.000"/>	MG/Yr						
UMAC	Unbilled Metered:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="4"/>	<input type="text" value="31.076"/>	MG/Yr						
UUAC	Unbilled Unmetered:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="5"/>	<input type="text" value="0.751"/>	MG/Yr						

choose entry option: MG/Yr

AUTHORIZED CONSUMPTION: MG/Yr

WATER LOSSES

MG/Yr

Apparent Losses

Default option selected for Systematic Data Handling Errors, with automatic data grading of 3

choose entry option:

SDHE	Systematic Data Handling Errors:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="3"/>	<input type="text" value="1.219"/>	MG/Yr	<input type="text" value="0.25%"/>	<input type="text" value="default"/>				
CMI	Customer Metering Inaccuracies:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="6"/>	<input type="text" value="10.581"/>	MG/Yr	<input type="text" value="2.00%"/>	<input type="text" value="percent"/>	<input type="text" value="under-registration"/>			
UC	Unauthorized Consumption:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="3"/>	<input type="text" value="1.219"/>	MG/Yr	<input type="text" value="0.25%"/>	<input type="text" value="default"/>				

Default option selected for Unauthorized Consumption, with automatic data grading of 3

Apparent Losses: MG/Yr

Real Losses

Real Losses: MG/Yr

WATER LOSSES: MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: MG/Yr

SYSTEM DATA

Lm	Length of mains:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="7"/>	<input type="text" value="258.0"/>	miles	(including fire hydrant lead lengths)						
Nc	Number of service connections:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="5"/>	<input type="text" value="8,348"/>		(active and inactive)						
	Service connection density:					<input type="text" value="32"/>	conn./mile main						
Lp	Are customer meters typically located at the curbstop/property line?					<input type="text" value="No"/>							
	Average length of (private) customer service line:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="1"/>	<input type="text" value="16.0"/>	ft	(average distance between property line and meter)						
AOP	Average Operating Pressure:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="7"/>	<input type="text" value="60.0"/>	psi							

COST DATA

CRUC	Customer Retail Unit Charge:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="5"/>	<input type="text" value="\$14.20"/>	\$/1000 gallons (US)	Total Annual Operating Cost					
VPC	Variable Production Cost:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="9"/>	<input type="text" value="\$490.00"/>	\$/Million gallons	<input type="text" value="\$522,000"/> \$/yr (optional input)					

WATER AUDIT DATA VALIDITY TIER:

Click 'g' for 4 parameter(s), then complete all visible data grading questions to enable the Data Validity Score to calculate

[go to dashboard](#)

PRIORITY AREAS FOR ATTENTION TO IMPROVE DATA VALIDITY:

Based on the information provided, audit reliability can be most improved by addressing the following components:

- 1: Volume from Own Sources (VOS)
- 2: Water Imported (WI)
- 3: Water Exported (WE)

KEY PERFORMANCE INDICATOR TARGETS:

OPTIONAL: If targets exist for the operational performance indicators, they can be input below:

Unit Total Losses:	<input type="text"/>	gal/conn/day
Unit Apparent Losses:	<input type="text"/>	gal/conn/day
Unit Real Losses ^A :	<input type="text"/>	gal/conn/day
Unit Real Losses ^B :	<input type="text"/>	gal/mile/day

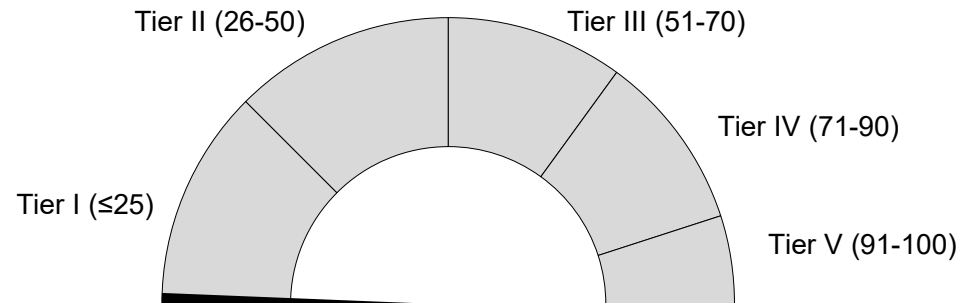
If entered above by user, targets will display on KPI gauges (see Dashboard)

***** COMPLETE ALL VISIBLE QUESTIONS ON THE INTERACTIVE DATA GRADING TAB TO DISPLAY PERFORMANCE INDICATORS *****

Data Validity

Data Validity Score: Data Validity Tier:

See [Loss Control Planning](#) for Tier Details

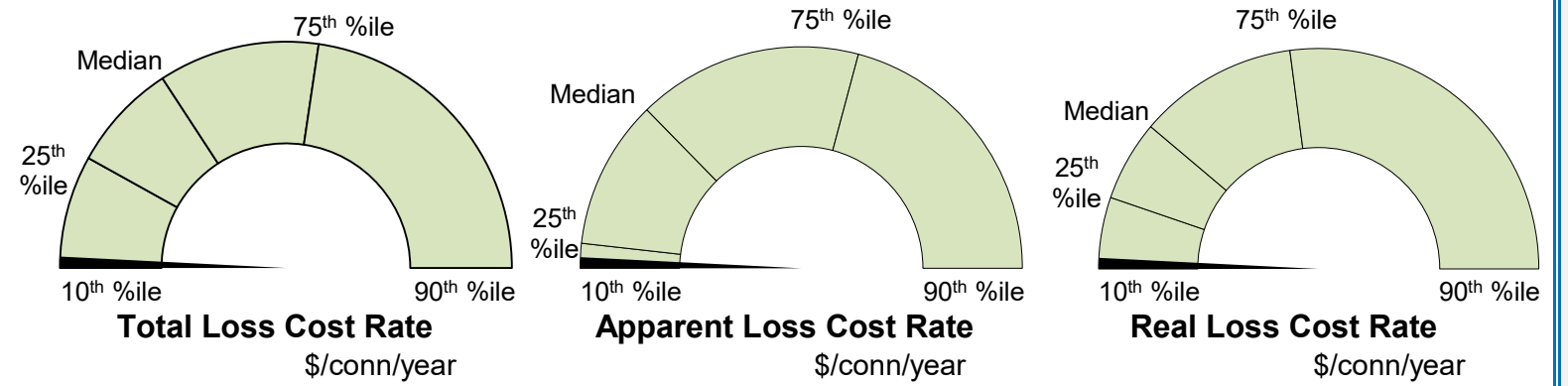


Actual KPI result

Key Performance Indicators

Target (see Worksheet)

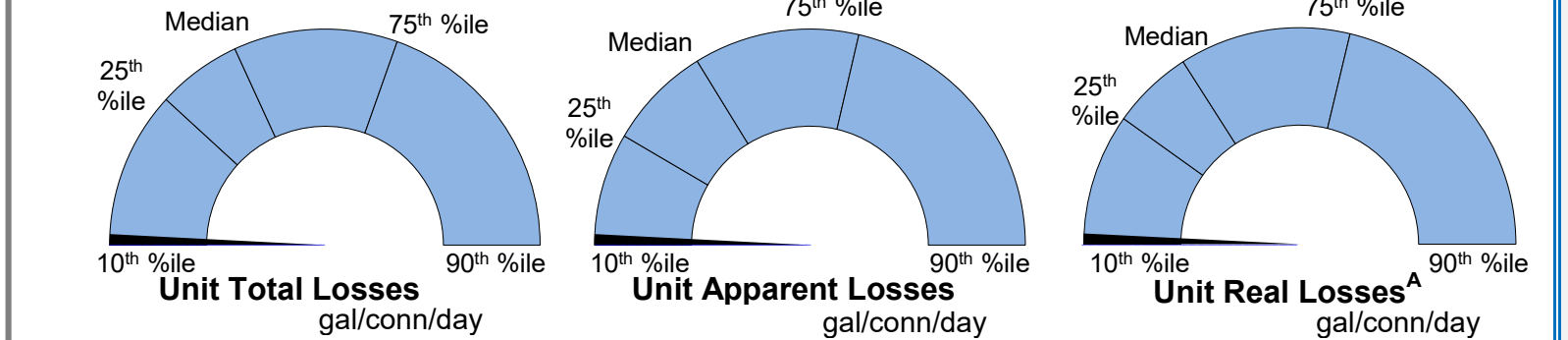
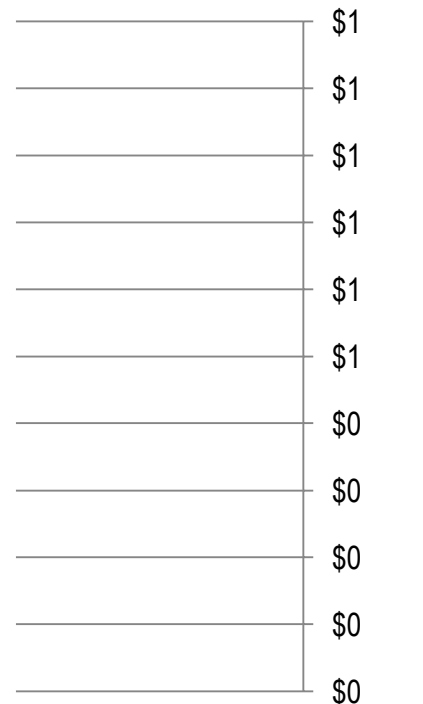
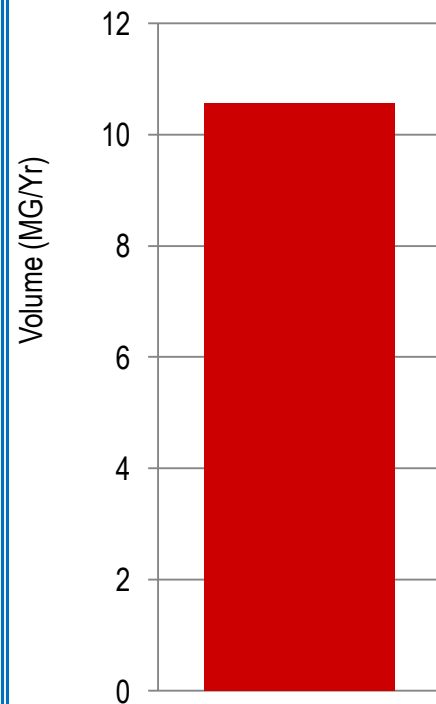
gauge %iles per validated industry ranges²



NRW Components Summary

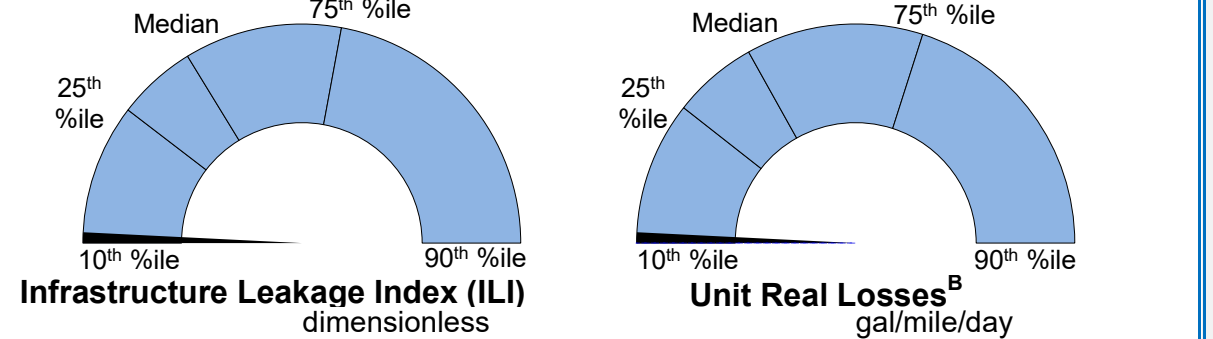
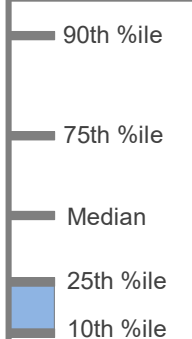
Total Volume of NRW = 10 MG/Yr

Total Cost of NRW = \$311/Yr



Average Operating Pressure

60 psi



See UARL definition for additional guidance on the ILI

(UARL) Unavoidable Annual Real Losses MG/Yr gal/conn/day

Guidance Information for Key Performance

- The eight indicators shown are the recommended suite per the AWWA Water Loss Control Committee 2020 Position on KPIs¹.
 - A suite of KPIs is necessary, as no single KPI can holistically 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.
 - Percentiles (%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.

- Real Losses
- Systematic Data Handling Errors
- Customer Metering Inaccuracies
- Unauthorized Consumption
- Unbilled Unmetered Auth Cons
- Unbilled Metered Authorized Cons

	Volume MG/Yr	Value \$/Yr	Basis of Valuation
Apparent Losses			CRUC
Real Losses			VPC
Unbilled Authorized Cons			VPC
Non-Revenue Water			Blended



AWWA Free Water Audit Software: Worksheet

FWAS v6.0
American Water Works Association.
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Water Audit Report for: **Aqua Pennsylvania - Roaring Creek Division**
Audit Year: **2023** **Jan 01 2023 - Dec 31 2023** **2023**

To access definitions, click the [input name](#)
Click 'n' to add notes
Click 'g' to determine data validity grade
To edit water system info: [go to start page](#)
All volumes to be entered as: MILLION GALLONS (US) PER YEAR

Water Supplied Error Adjustments

WATER SUPPLIED

choose entry option:

VOS	Volume from Own Sources:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="6"/>	<input type="text" value="1,974.822"/>	MG/Yr	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="4"/>	<input type="text" value="2.00%"/>	<input type="text" value="percent"/>	<input type="text" value="under-registration"/>	VOSEA
WI	Water Imported:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="n/a"/>	<input type="text" value="0.000"/>	MG/Yr							WIEA
WE	Water Exported:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="n/a"/>	<input type="text" value="0.000"/>	MG/Yr							WEEA

WATER SUPPLIED: MG/Yr

AUTHORIZED CONSUMPTION

choose entry option:

BMAC	Billed Metered:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="8"/>	<input type="text" value="1,094.292"/>	MG/Yr							
BUAC	Billed Unmetered:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="n/a"/>	<input type="text" value="0.000"/>	MG/Yr							
UMAC	Unbilled Metered:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="4"/>	<input type="text" value="89.678"/>	MG/Yr							
UUAC	Unbilled Unmetered:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="3"/>	<input type="text" value="2.736"/>	MG/Yr				<input type="text" value="0.25%"/>	<input type="text" value="default"/>		

Default option selected for Unbilled Unmetered, with automatic data grading of 3

AUTHORIZED CONSUMPTION: MG/Yr

WATER LOSSES

MG/Yr

Apparent Losses

Default option selected for Systematic Data Handling Errors, with automatic data grading of 3

choose entry option:

SDHE	Systematic Data Handling Errors:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="3"/>	<input type="text" value="2.736"/>	MG/Yr	<input type="text" value="0.25%"/>	<input type="text" value="default"/>					
CMI	Customer Metering Inaccuracies:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="6"/>	<input type="text" value="24.163"/>	MG/Yr	<input type="text" value="2.00%"/>	<input type="text" value="percent"/>				<input type="text" value="under-registration"/>	
UC	Unauthorized Consumption:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="3"/>	<input type="text" value="2.736"/>	MG/Yr	<input type="text" value="0.25%"/>	<input type="text" value="default"/>					

Default option selected for Unauthorized Consumption, with automatic data grading of 3

Apparent Losses: MG/Yr

Real Losses

Real Losses: MG/Yr

WATER LOSSES: MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: MG/Yr

SYSTEM DATA

Lm	Length of mains:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="7"/>	<input type="text" value="349.0"/>	miles	(including fire hydrant lead lengths)
Nc	Number of service connections:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="5"/>	<input type="text" value="25,662"/>		(active and inactive)
	Service connection density:				<input type="text" value="74"/>	conn./mile main	
Lp	Are customer meters typically located at the curbstop/property line?				<input type="text" value="No"/>		
	Average length of (private) customer service line:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="1"/>	<input type="text" value="65.0"/>	ft	(average distance between property line and meter)
AOP	Average Operating Pressure:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="7"/>	<input type="text" value="79.0"/>	psi	

COST DATA

CRUC	Customer Retail Unit Charge:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="5"/>	<input type="text" value="\$14.20"/>	\$/1000 gallons (US)	Total Annual Operating Cost
VPC	Variable Production Cost:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="9"/>	<input type="text" value="\$490.00"/>	\$/Million gallons	<input type="text" value="\$1,363,000"/> \$/yr (optional input)

WATER AUDIT DATA VALIDITY TIER:

***** The Water Audit Data Validity Score is in Tier III (51-70). See Dashboard tab for additional outputs. *****

[go to dashboard](#)

A weighted scale for the components of supply, consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION TO IMPROVE DATA VALIDITY:

Based on the information provided, audit reliability can be most improved by addressing the following components:

- 1: Volume from Own Sources (VOS)
- 2: Billed Metered (BMAC)
- 3: Number of Service Connections (Nc)

KEY PERFORMANCE INDICATOR TARGETS:

OPTIONAL: If targets exist for the operational performance indicators, they can be input below:

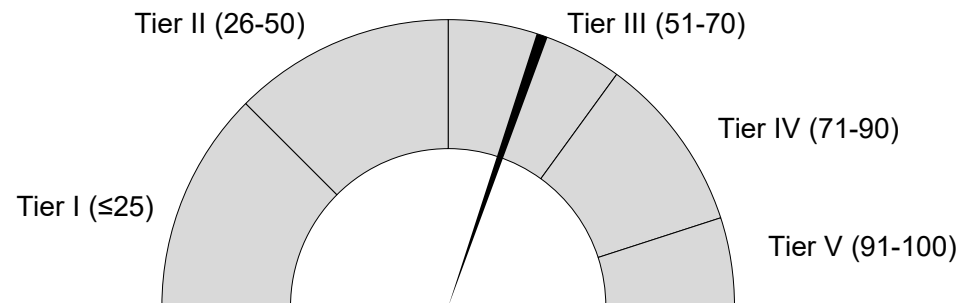
Unit Total Losses:	<input type="text"/>	gal/conn/day
Unit Apparent Losses:	<input type="text"/>	gal/conn/day
Unit Real Losses ^A :	<input type="text"/>	gal/conn/day
Unit Real Losses ^B :	<input type="text"/>	gal/mile/day

If entered above by user, targets will display on KPI gauges (see Dashboard)

Data Validity

Data Validity Score: 60 **Data Validity Tier:** Tier III (51-70)

See [Loss Control Planning](#) for Tier Details

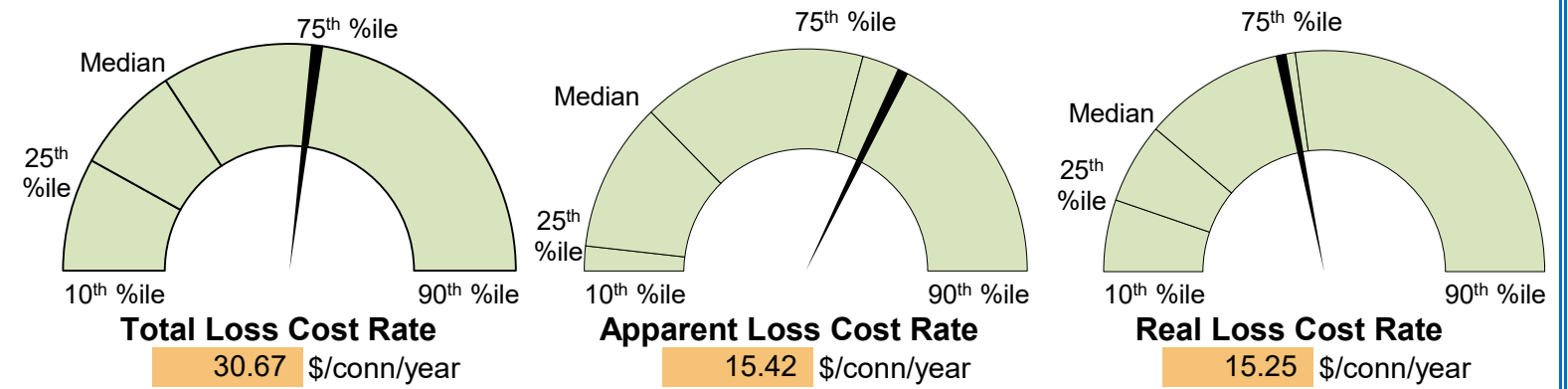


Actual KPI result

Key Performance Indicators

Target (see Worksheet)

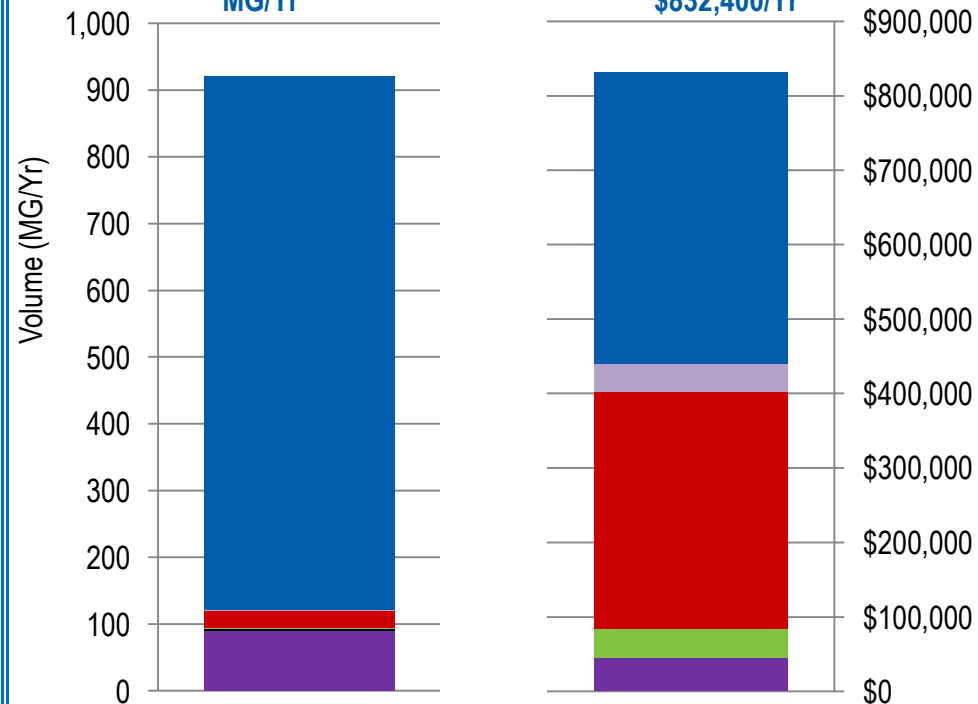
gauge %iles per validated industry ranges²



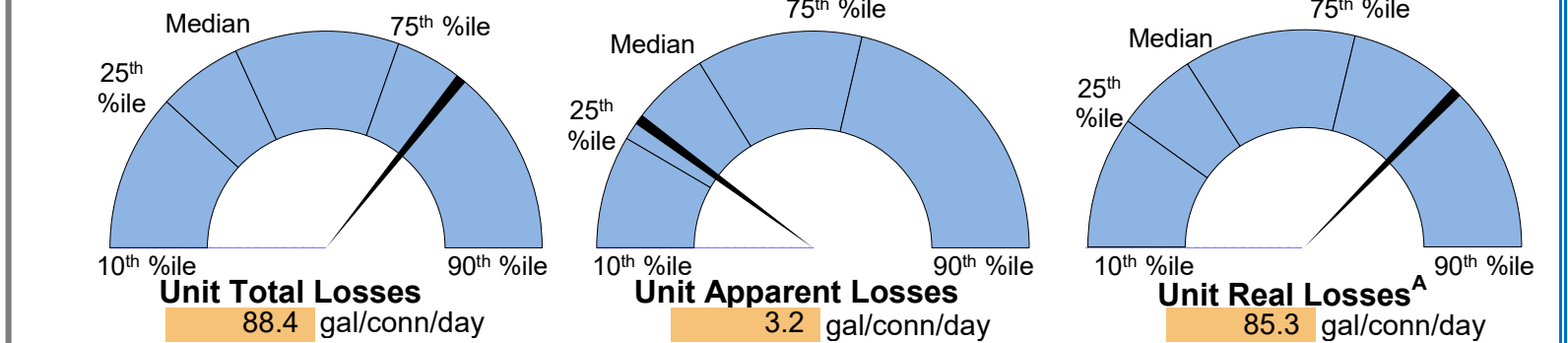
NRW Components Summary

Total Volume of NRW = 919 MG/Yr

Total Cost of NRW = \$832,400/Yr

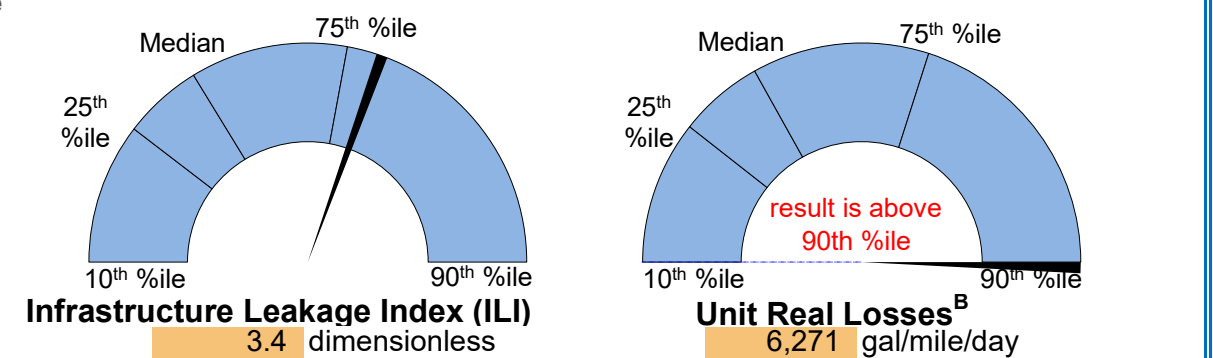
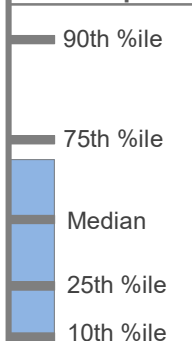


Component	Volume (MG/Yr)	Value (\$/Yr)	Basis of Valuation
Real Losses	798.8	\$391,404	VPC
Systematic Data Handling Errors	29.6	\$395,713	CRUC
Customer Metering Inaccuracies	92.4	\$45,283	VPC
Unauthorized Consumption	920.8	\$832,400	Blended
Unbilled Unmetered Auth Cons			
Unbilled Metered Authorized Cons			



Average Operating Pressure

79 psi



See UARL definition for additional guidance on the ILI

(UARL) Unavoidable Annual Real Losses 233.8 MG/Yr 25.0 gal/conn/day

Guidance Information for Key Performance

- The eight indicators shown are the recommended suite per the AWWA Water Loss Control Committee 2020 Position on KPIs¹.
 - A suite of KPIs is necessary, as no single KPI can holistically 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.
 - Percentiles (%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.



AWWA Free Water Audit Software: Worksheet

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American Water Works Association.
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Water Audit Report for: **Aqua Pennsylvania - Shenango Division**

Audit Year: **2023** | **Jan 01 2023 - Dec 31 2023** | **2023**

To access definitions, click the [input name](#)

Click 'n' to add notes

Click 'g' to determine data validity grade

To edit water system info: [go to start page](#)

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

[Water Supplied Error Adjustments](#)

WATER SUPPLIED

choose entry option:

VOS	Volume from Own Sources:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="6"/>	<input type="text" value="3,620.164"/>	MG/Yr	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="4"/>	<input type="text" value="2.00%"/>	percent	<input type="text" value="under-registration"/>	VOSEA
WI	Water Imported:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="6"/>	<input type="text" value="68.519"/>	MG/Yr	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="4"/>	<input type="text" value="2.00%"/>	percent	<input type="text" value="under-registration"/>	WIEA
WE	Water Exported:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="6"/>	<input type="text" value="0.000"/>	MG/Yr							WEEA

WATER SUPPLIED: MG/Yr

AUTHORIZED CONSUMPTION

choose entry option:

BMAC	Billed Metered:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="8"/>	<input type="text" value="2,898.554"/>	MG/Yr							
BUAC	Billed Unmetered:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="n/a"/>	<input type="text" value="0.000"/>	MG/Yr							
UMAC	Unbilled Metered:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="4"/>	<input type="text" value="103.671"/>	MG/Yr							
UUAC	Unbilled Unmetered:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="3"/>	<input type="text" value="7.246"/>	MG/Yr				<input type="text" value="0.25%"/>	default		

Default option selected for Unbilled Unmetered, with automatic data grading of 3

AUTHORIZED CONSUMPTION: MG/Yr

WATER LOSSES

MG/Yr

Apparent Losses

Default option selected for Systematic Data Handling Errors, with automatic data grading of 3

choose entry option:

SDHE	Systematic Data Handling Errors:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="3"/>	<input type="text" value="7.246"/>	MG/Yr	<input type="text" value="0.25%"/>	default					
CMI	Customer Metering Inaccuracies:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="6"/>	<input type="text" value="61.270"/>	MG/Yr	<input type="text" value="2.00%"/>	percent				<input type="text" value="under-registration"/>	
UC	Unauthorized Consumption:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="3"/>	<input type="text" value="7.246"/>	MG/Yr	<input type="text" value="0.25%"/>	default					

Default option selected for Unauthorized Consumption, with automatic data grading of 3

Apparent Losses: MG/Yr

Real Losses

Real Losses: MG/Yr

WATER LOSSES: MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: MG/Yr

SYSTEM DATA

Lm	Length of mains:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="7"/>	<input type="text" value="534.0"/>	miles	(including fire hydrant lead lengths)
Nc	Number of service connections:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="5"/>	<input type="text" value="27,421"/>		(active and inactive)
	Service connection density:				<input type="text" value="51"/>	conn./mile main	
Lp	Are customer meters typically located at the curbstop/property line?				<input type="text" value="No"/>		
	Average length of (private) customer service line:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="1"/>	<input type="text" value="17.0"/>	ft	(average distance between property line and meter)
AOP	Average Operating Pressure:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="7"/>	<input type="text" value="65.0"/>	psi	

COST DATA

CRUC	Customer Retail Unit Charge:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="5"/>	<input type="text" value="\$14.20"/>	\$/1000 gallons (US)	Total Annual Operating Cost
VPC	Variable Production Cost:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="9"/>	<input type="text" value="\$490.00"/>	\$/Million gallons	<input type="text" value="\$2,545,000"/> \$/yr (optional input)

WATER AUDIT DATA VALIDITY TIER:

***** The Water Audit Data Validity Score is in Tier III (51-70). See Dashboard tab for additional outputs. *****

[go to dashboard](#)

A weighted scale for the components of supply, consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION TO IMPROVE DATA VALIDITY:

Based on the information provided, audit reliability can be most improved by addressing the following components:

- 1: Volume from Own Sources (VOS)
- 2: Billed Metered (BMAC)
- 3: Number of Service Connections (Nc)

KEY PERFORMANCE INDICATOR TARGETS:

OPTIONAL: If targets exist for the operational performance indicators, they can be input below:

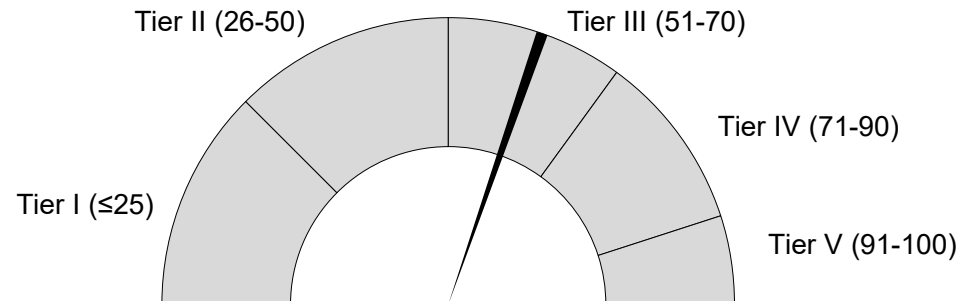
Unit Total Losses:	<input type="text"/>	gal/conn/day
Unit Apparent Losses:	<input type="text"/>	gal/conn/day
Unit Real Losses ^A :	<input type="text"/>	gal/conn/day
Unit Real Losses ^B :	<input type="text"/>	gal/mile/day

If entered above by user, targets will display on KPI gauges (see Dashboard)

Data Validity

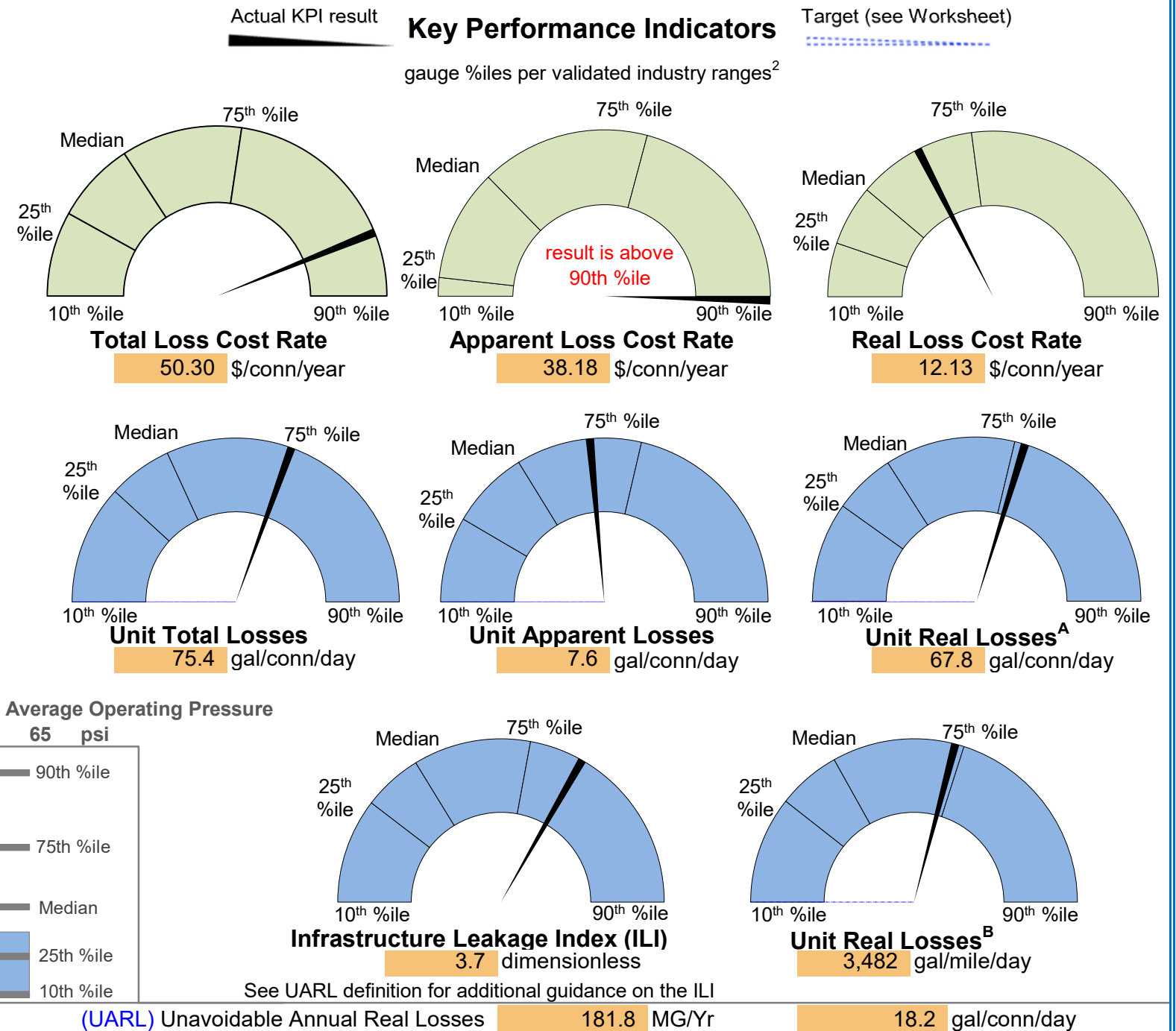
Data Validity Score: 60 **Data Validity Tier:** Tier III (51-70)

See [Loss Control Planning](#) for Tier Details



Key Performance Indicators

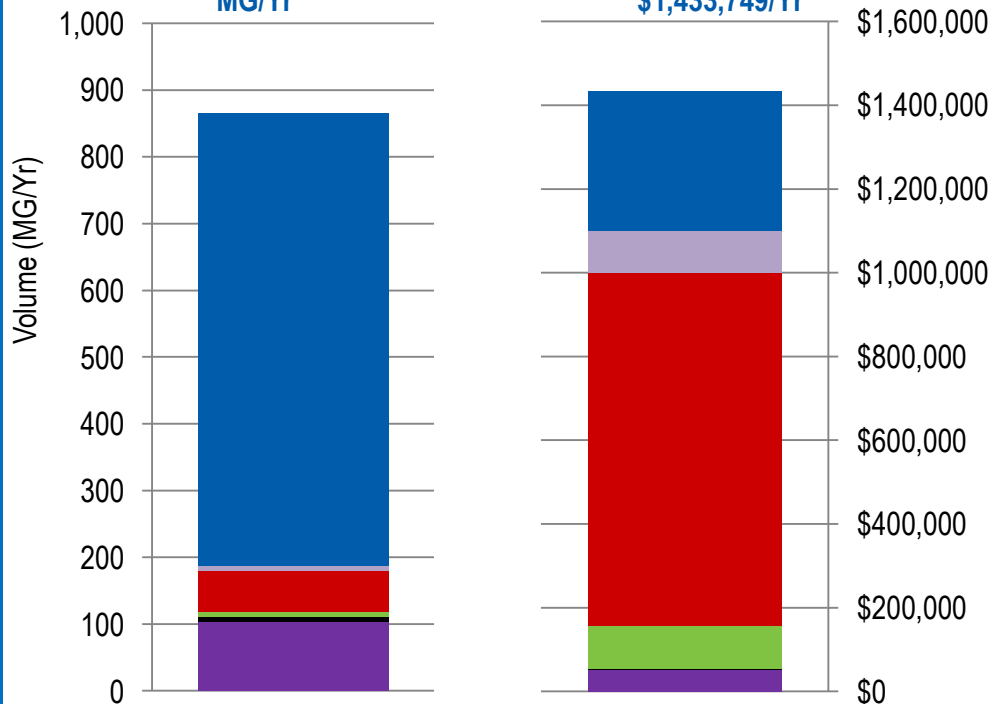
gauge %iles per validated industry ranges²



NRW Components Summary

Total Volume of NRW = 863 MG/Yr

Total Cost of NRW = \$1,433,749/Yr



Real Losses	Unauthorized Consumption
Systematic Data Handling Errors	Unbilled Unmetered Auth Cons
Customer Metering Inaccuracies	Unbilled Metered Authorized Cons

	Volume MG/Yr	Value \$/Yr	Basis of Valuation
Apparent Losses	75.8	\$1,046,823	CRUC
Real Losses	678.7	\$332,577	VPC
Unbilled Authorized Cons	110.9	\$54,350	VPC
Non-Revenue Water	865.4	\$1,433,749	Blended

Guidance Information for Key Performance

- The eight indicators shown are the recommended suite per the AWWA Water Loss Control Committee 2020 Position on KPIs¹.
 - A suite of KPIs is necessary, as no single KPI can holistically 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.
 - Percentiles (%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.



AWWA Free Water Audit Software: Worksheet

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American Water Works Association.
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Water Audit Report for: **Aqua Pennsylvania - SEPA Division**

Audit Year: **2023** **Jan 01 2023 - Dec 31 2023** **2023**

Click 'n' to add notes

Click 'g' to determine data validity grade

To edit water system info: [go to start page](#)

To access definitions, click the [input name](#)

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

[Water Supplied Error Adjustments](#)

WATER SUPPLIED

choose entry option:

VOS WI WE	Volume from Own Sources: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="6"/> <input type="text" value="34,512.042"/> MG/Yr Water Imported: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="6"/> <input type="text" value="748.890"/> MG/Yr Water Exported: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="6"/> <input type="text" value=""/> MG/Yr	<input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="4"/> <input type="text" value="2.00%"/> percent <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="4"/> <input type="text" value="2.00%"/> percent	<input type="text" value="under-registration"/> VOSEA <input type="text" value="under-registration"/> WIEA <input type="text" value=""/> WEEA
-----------------	--	--	---

WATER SUPPLIED: MG/Yr

AUTHORIZED CONSUMPTION

choose entry option:

BMAC BUAC UMAC UUAC	Billed Metered: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="8"/> <input type="text" value="28,820.612"/> MG/Yr Billed Unmetered: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="n/a"/> <input type="text" value="0.000"/> MG/Yr Unbilled Metered: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="n/a"/> <input type="text" value="0.000"/> MG/Yr Unbilled Unmetered: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="3"/> <input type="text" value="72.052"/> MG/Yr	<input type="text" value="0.25%"/> default <input type="text" value="0.25%"/> default	<input type="text" value="under-registration"/>
------------------------------	--	--	---

Default option selected for Unbilled Unmetered, with automatic data grading of 3

AUTHORIZED CONSUMPTION: MG/Yr

WATER LOSSES

MG/Yr

Apparent Losses

Default option selected for Systematic Data Handling Errors, with automatic data grading of 3

choose entry option:

SDHE CMI UC	Systematic Data Handling Errors: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="3"/> <input type="text" value="72.052"/> MG/Yr Customer Metering Inaccuracies: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="6"/> <input type="text" value="588.176"/> MG/Yr Unauthorized Consumption: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="3"/> <input type="text" value="72.052"/> MG/Yr	<input type="text" value="0.25%"/> default <input type="text" value="2.00%"/> percent <input type="text" value="0.25%"/> default	<input type="text" value="under-registration"/>
-------------------	--	--	---

Default option selected for Unauthorized Consumption, with automatic data grading of 3

Apparent Losses: MG/Yr

Real Losses

Real Losses: MG/Yr

WATER LOSSES: MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: MG/Yr

SYSTEM DATA

Lm Nc	Length of mains: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="7"/> <input type="text" value="5,866.0"/> miles Number of service connections: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="5"/> <input type="text" value="385,000"/>	(including fire hydrant lead lengths) (active and inactive)
	Service connection density: <input type="text" value=""/> <input type="text" value=""/> <input type="text" value=""/> <input type="text" value="66"/> conn./mile main	
Lp	Are customer meters typically located at the curbstop/property line? <input type="text" value="No"/> Average length of (private) customer service line: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="1"/> <input type="text" value="35.0"/> ft	(average distance between property line and meter)
AOP	Average Operating Pressure: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="7"/> <input type="text" value="60.0"/> psi	

COST DATA

CRUC VPC	Customer Retail Unit Charge: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="5"/> <input type="text" value="\$14.20"/> \$/1000 gallons (US) Variable Production Cost: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="9"/> <input type="text" value="\$490.00"/> \$/Million gallons	Total Annual Operating Cost <input type="text" value="\$23,813,310"/> \$/yr (optional input)
-------------	--	--

WATER AUDIT DATA VALIDITY TIER:

***** The Water Audit Data Validity Score is in Tier III (51-70). See Dashboard tab for additional outputs. *****

[go to dashboard](#)

A weighted scale for the components of supply, consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION TO IMPROVE DATA VALIDITY:

Based on the information provided, audit reliability can be most improved by addressing the following components:

- | |
|--|
| 1: Volume from Own Sources (VOS) |
| 2: Billed Metered (BMAC) |
| 3: Number of Service Connections (Nc) |

KEY PERFORMANCE INDICATOR TARGETS:

OPTIONAL: If targets exist for the operational performance indicators, they can be input below:

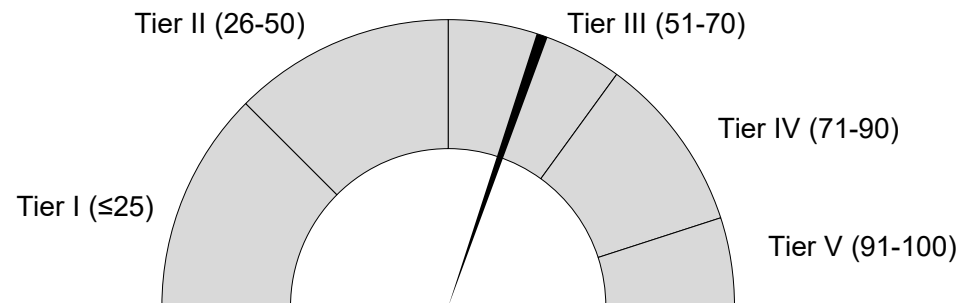
Unit Total Losses:	<input type="text" value=""/>	gal/conn/day
Unit Apparent Losses:	<input type="text" value=""/>	gal/conn/day
Unit Real Losses ^A :	<input type="text" value=""/>	gal/conn/day
Unit Real Losses ^B :	<input type="text" value=""/>	gal/mile/day

If entered above by user, targets will display on KPI gauges (see Dashboard)

Data Validity

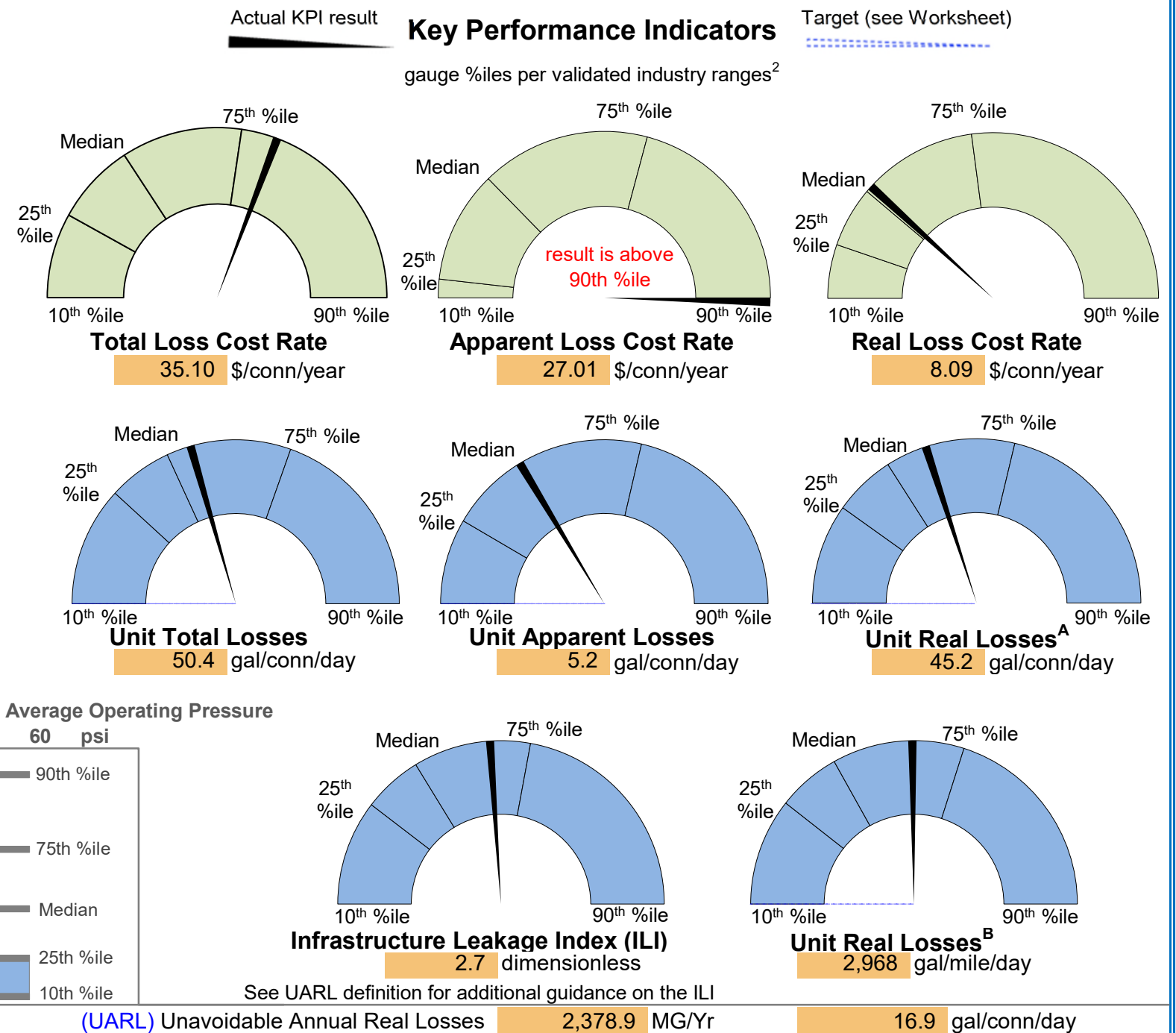
Data Validity Score: 60 **Data Validity Tier:** Tier III (51-70)

See [Loss Control Planning](#) for Tier Details



Key Performance Indicators

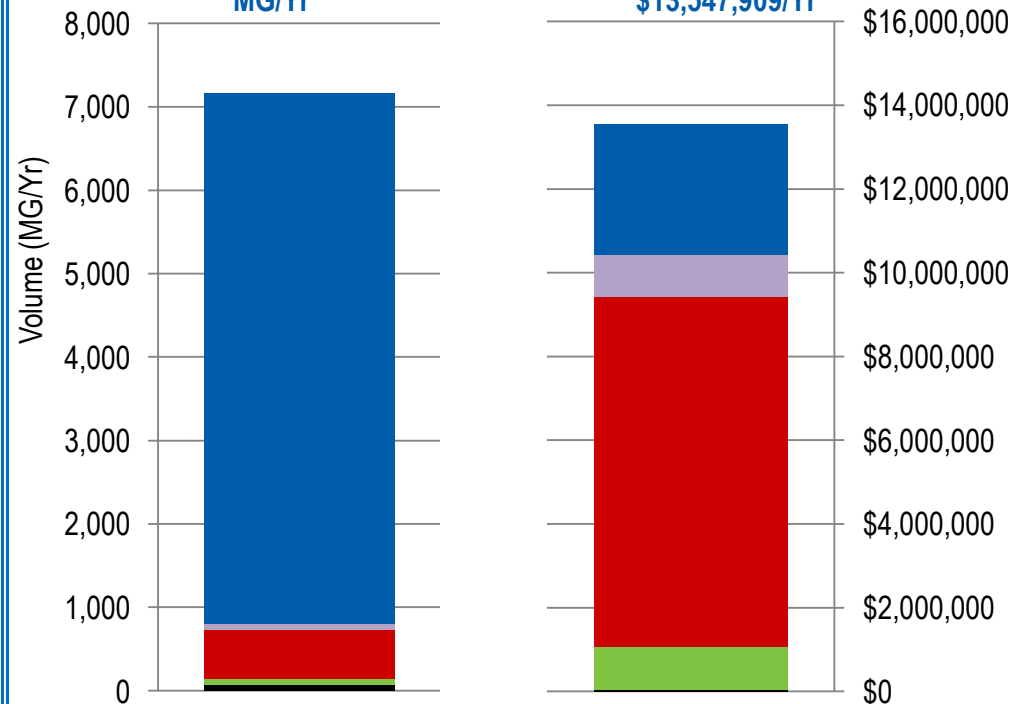
gauge %iles per validated industry ranges²



NRW Components Summary

Total Volume of NRW = 7,160 MG/Yr

Total Cost of NRW = \$13,547,909/Yr



Real Losses	Unauthorized Consumption
Systematic Data Handling Errors	Unbilled Unmetered Auth Cons
Customer Metering Inaccuracies	Unbilled Metered Authorized Cons

	Volume MG/Yr	Value \$/Yr	Basis of Valuation
Apparent Losses	732.3	\$10,398,359	CRUC
Real Losses	6,355.6	\$3,114,244	VPC
Unbilled Authorized Cons	72.1	\$35,305	VPC
Non-Revenue Water	7,159.9	\$13,547,909	Blended

Guidance Information for Key Performance

- The eight indicators shown are the recommended suite per the AWWA Water Loss Control Committee 2020 Position on KPIs¹.
 - A suite of KPIs is necessary, as no single KPI can holistically 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.
 - Percentiles (%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.



AWWA Free Water Audit Software: Worksheet

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American Water Works Association.
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Water Audit Report for: **Aqua Pennsylvania - Susquehanna Division**
 Audit Year: **2023** **Jan 01 2023 - Dec 31 2023** **2023**

To access definitions, click the [input name](#) Click 'n' to add notes Click 'g' to determine data validity grade To edit water system info: [go to start page](#)
 All volumes to be entered as: MILLION GALLONS (US) PER YEAR

Water Supplied Error Adjustments

choose entry option:

VOS WI WE	Volume from Own Sources: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="6"/>	396.655 MG/Yr		<input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="4"/>	2.00%	percent		<input type="text" value="under-registration"/>	VOSEA WIEA WEEA
	Water Imported: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="n/a"/>	0.000 MG/Yr							
	Water Exported: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="n/a"/>	0.000 MG/Yr							
WATER SUPPLIED:		404.750	MG/Yr						

AUTHORIZED CONSUMPTION

BMAC BUAC UMAC UUAC	Billed Metered: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="8"/>	308.001 MG/Yr							
	Billed Unmetered: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="n/a"/>	0.000 MG/Yr							
	Unbilled Metered: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="4"/>	7.953 MG/Yr							
	Unbilled Unmetered: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="3"/>	0.770 MG/Yr							
AUTHORIZED CONSUMPTION:		316.724	MG/Yr						

Default option selected for Unbilled Unmetered, with automatic data grading of 3

choose entry option:

WATER LOSSES

88.026 MG/Yr

Apparent Losses

Default option selected for Systematic Data Handling Errors, with automatic data grading of 3

SDHE CMI UC	Systematic Data Handling Errors: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="3"/>	0.770 MG/Yr		<input type="text" value="0.25%"/> <input type="text" value="default"/>					
	Customer Metering Inaccuracies: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="6"/>	6.448 MG/Yr						<input type="text" value="under-registration"/>	
	Unauthorized Consumption: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="3"/>	0.770 MG/Yr							
Apparent Losses:		7.988	MG/Yr						

Default option selected for Unauthorized Consumption, with automatic data grading of 3

Real Losses

Real Losses: **80.038** MG/Yr

WATER LOSSES: **88.026** MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: **96.749** MG/Yr

SYSTEM DATA

Lm Nc	Length of mains: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="7"/>	83.0		miles				
	Number of service connections: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="5"/>	4,896						(including fire hydrant lead lengths) (active and inactive)
	Service connection density:	59						
	Are customer meters typically located at the curbstop/property line?		No					
Lp	Average length of (private) customer service line: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="1"/>	20.0						ft (average distance between property line and meter)
AOP	Average Operating Pressure: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="7"/>	85.0						psi

COST DATA

CRUC VPC	Customer Retail Unit Charge: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="5"/>	\$14.20		\$/1000 gallons (US)				
	Variable Production Cost: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="9"/>	\$490.00						
						Total Annual Operating Cost		
						\$274,000		\$/yr (optional input)

WATER AUDIT DATA VALIDITY TIER:

***** The Water Audit Data Validity Score is in Tier III (51-70). See Dashboard tab for additional outputs. *****

[go to dashboard](#)

A weighted scale for the components of supply, consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION TO IMPROVE DATA VALIDITY:

Based on the information provided, audit reliability can be most improved by addressing the following components:

- | |
|---------------------------------------|
| 1: Volume from Own Sources (VOS) |
| 2: Billed Metered (BMAC) |
| 3: Number of Service Connections (Nc) |

KEY PERFORMANCE INDICATOR TARGETS:

OPTIONAL: If targets exist for the operational performance indicators, they can be input below:

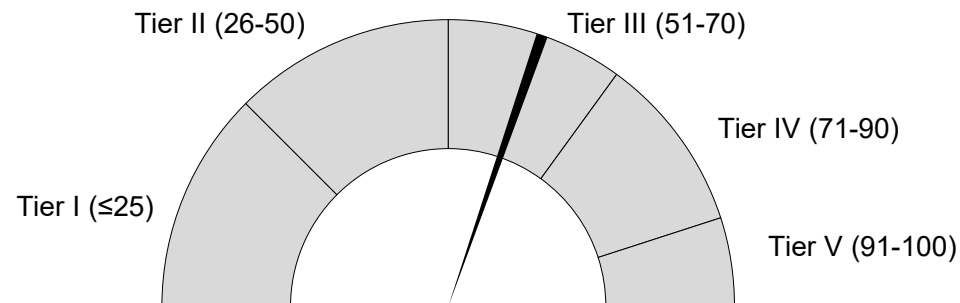
Unit Total Losses:	<input type="text"/>	gal/conn/day
Unit Apparent Losses:	<input type="text"/>	gal/conn/day
Unit Real Losses ^A :	<input type="text"/>	gal/conn/day
Unit Real Losses ^B :	<input type="text"/>	gal/mile/day

If entered above by user, targets will display on KPI gauges (see Dashboard)

Data Validity

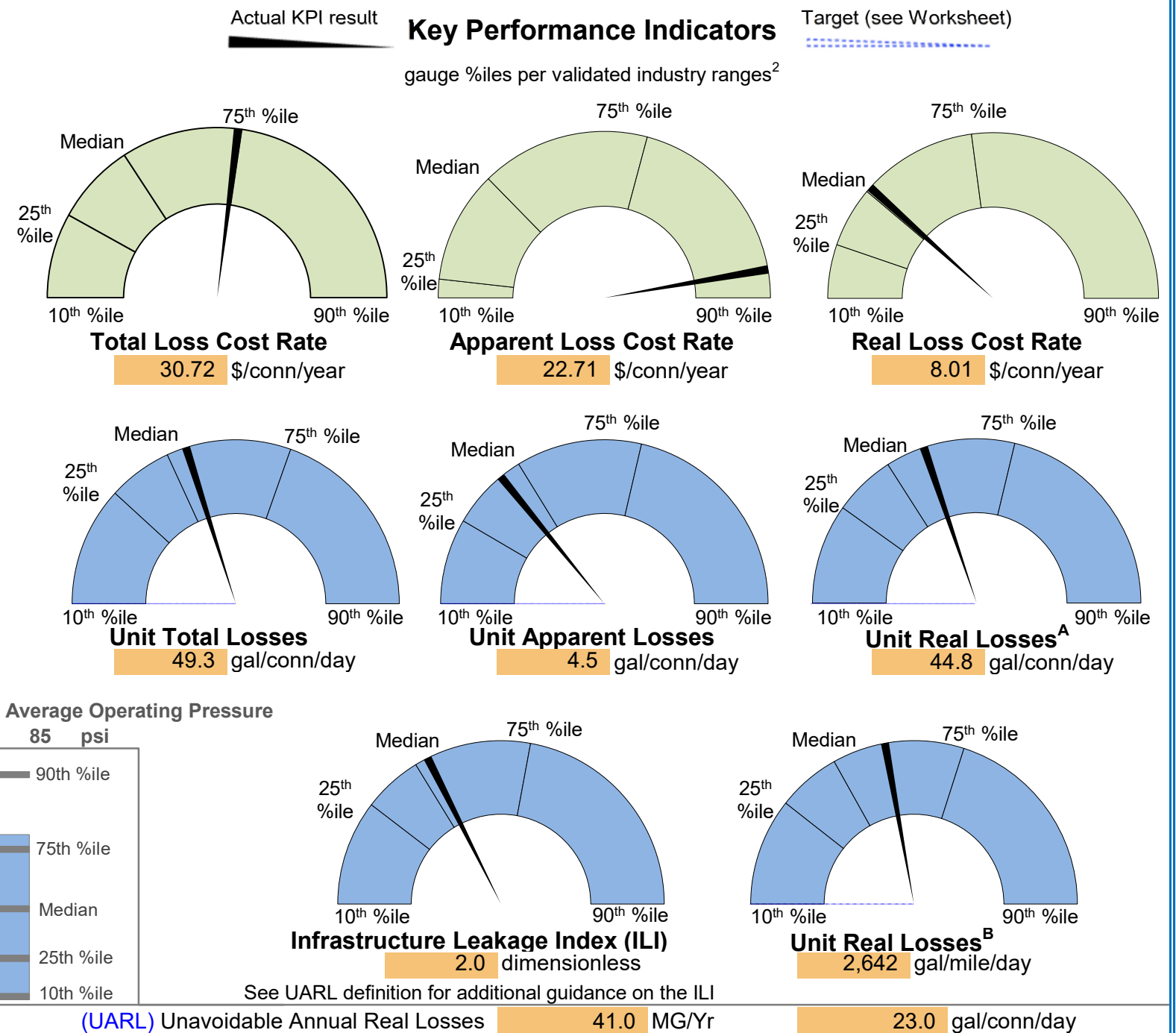
Data Validity Score: 60 **Data Validity Tier:** Tier III (51-70)

See [Loss Control Planning](#) for Tier Details



Key Performance Indicators

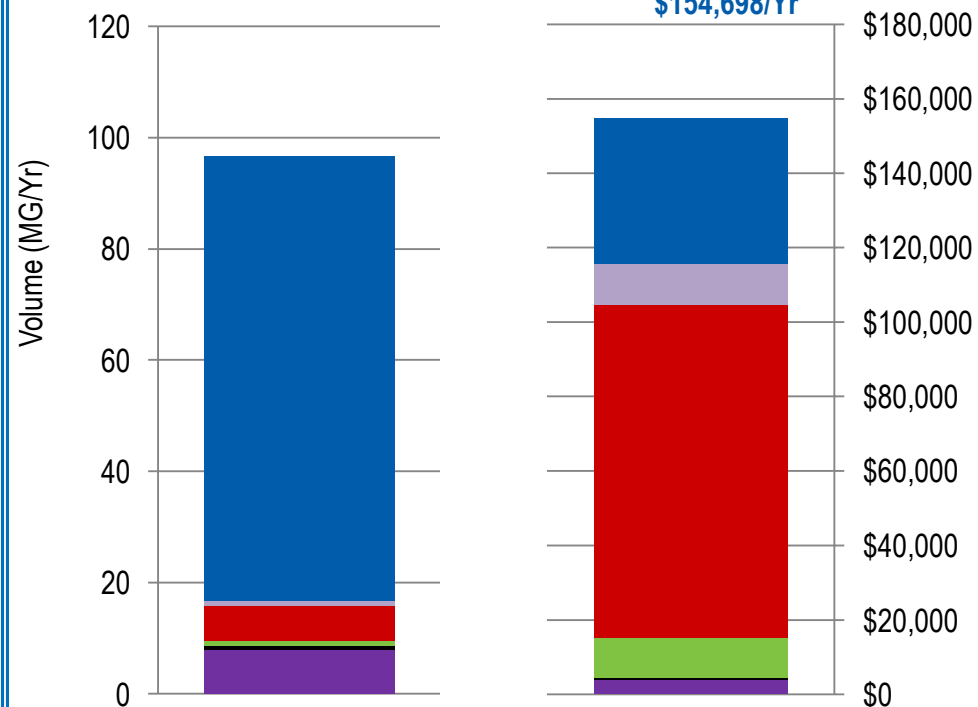
gauge %iles per validated industry ranges²



NRW Components Summary

Total Volume of NRW = 97 MG/Yr

Total Cost of NRW = \$154,698/Yr



Real Losses	Unauthorized Consumption
Systematic Data Handling Errors	Unbilled Unmetered Auth Cons
Customer Metering Inaccuracies	Unbilled Metered Authorized Cons

	Volume MG/Yr	Value \$/Yr	Basis of Valuation
Apparent Losses	8.0	\$111,205	CRUC
Real Losses	80.0	\$39,219	VPC
Unbilled Authorized Cons	8.7	\$4,274	VPC
Non-Revenue Water	96.7	\$154,698	Blended

Guidance Information for Key Performance

- The eight indicators shown are the recommended suite per the AWWA Water Loss Control Committee 2020 Position on KPIs¹.
 - A suite of KPIs is necessary, as no single KPI can holistically 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.
 - Percentiles (%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.



AWWA Free Water Audit Software: Worksheet

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Water Audit Report for: **Aqua Pennsylvania - Whitehaven Division**

Audit Year: **2023** | **Jan 01 2023 - Dec 31 2023** | **2023**

To access definitions, click the [input name](#)

Click 'n' to add notes
Click 'g' to determine data validity grade

To edit water system info: [go to start page](#)

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

Water Supplied Error Adjustments

choose entry option:

VOS WI WE	Volume from Own Sources:	n g 6	443.151	MG/Yr	n g 4	2.00%	percent		
	Water Imported:	n g 6	18.786	MG/Yr	n g 4	2.00%	percent		
	Water Exported:	n g 6	0.000	MG/Yr					
WATER SUPPLIED:			471.364	MG/Yr					

under-registration VOSEA
under-registration WIEA
WEEA

AUTHORIZED CONSUMPTION

choose entry option:

BMAC BUAC UMAC UUAC	Billed Metered:	n g 8	341.487	MG/Yr					
	Billed Unmetered:	n g 10	0.566	MG/Yr					
	Unbilled Metered:	n g 4	0.926	MG/Yr					
	Unbilled Unmetered:	n g 6	8.631	MG/Yr					
AUTHORIZED CONSUMPTION:			351.610	MG/Yr					

custom 8.631 MG/Yr

WATER LOSSES

119.754 MG/Yr

Apparent Losses

Default option selected for Systematic Data Handling Errors, with automatic data grading of 3

choose entry option:

SDHE CMI UC	Systematic Data Handling Errors:	n g 3	0.855	MG/Yr	0.25%	default			
	Customer Metering Inaccuracies:	n g 6	6.988	MG/Yr	2.00%	percent		under-registration	
	Unauthorized Consumption:	n g 3	0.855	MG/Yr	0.25%	default			
Apparent Losses:			8.698	MG/Yr					

Real Losses

Real Losses: **111.056** MG/Yr

WATER LOSSES: **119.754** MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: **129.311** MG/Yr

SYSTEM DATA

Lm Nc	Length of mains:	n g 7	187.0	miles	(including fire hydrant lead lengths)				
	Number of service connections:	n g 5	8,085		(active and inactive)				
	Service connection density:		43	conn./mile main					
Are customer meters typically located at the curbstop/property line?			No						
Lp	Average length of (private) customer service line:	n g 1	34.0	ft	(average distance between property line and meter)				
AOP	Average Operating Pressure:	n g 7	69.0	psi					

COST DATA

CRUC VPC	Customer Retail Unit Charge:	n g 5	\$14.20	\$/1000 gallons (US)				
	Variable Production Cost:	n g 9	\$490.00	\$/Million gallons		Total Annual Operating Cost		
						\$319,000	\$/yr (optional input)	

WATER AUDIT DATA VALIDITY TIER:

***** The Water Audit Data Validity Score is in Tier III (51-70). See Dashboard tab for additional outputs. *****

[go to dashboard](#)

A weighted scale for the components of supply, consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION TO IMPROVE DATA VALIDITY:

Based on the information provided, audit reliability can be most improved by addressing the following components:

- | |
|---------------------------------------|
| 1: Volume from Own Sources (VOS) |
| 2: Billed Metered (BMAC) |
| 3: Number of Service Connections (Nc) |

KEY PERFORMANCE INDICATOR TARGETS:

OPTIONAL: If targets exist for the operational performance indicators, they can be input below:

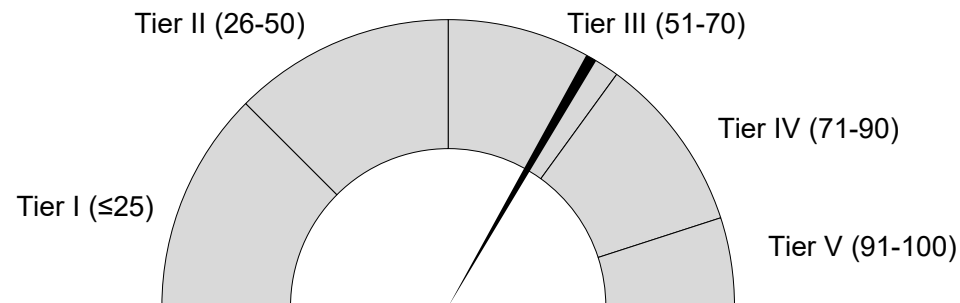
Unit Total Losses:	[input]	gal/conn/day
Unit Apparent Losses:	[input]	gal/conn/day
Unit Real Losses ^A :	[input]	gal/conn/day
Unit Real Losses ^B :	[input]	gal/mile/day

If entered above by user, targets will display on KPI gauges (see Dashboard)

Data Validity

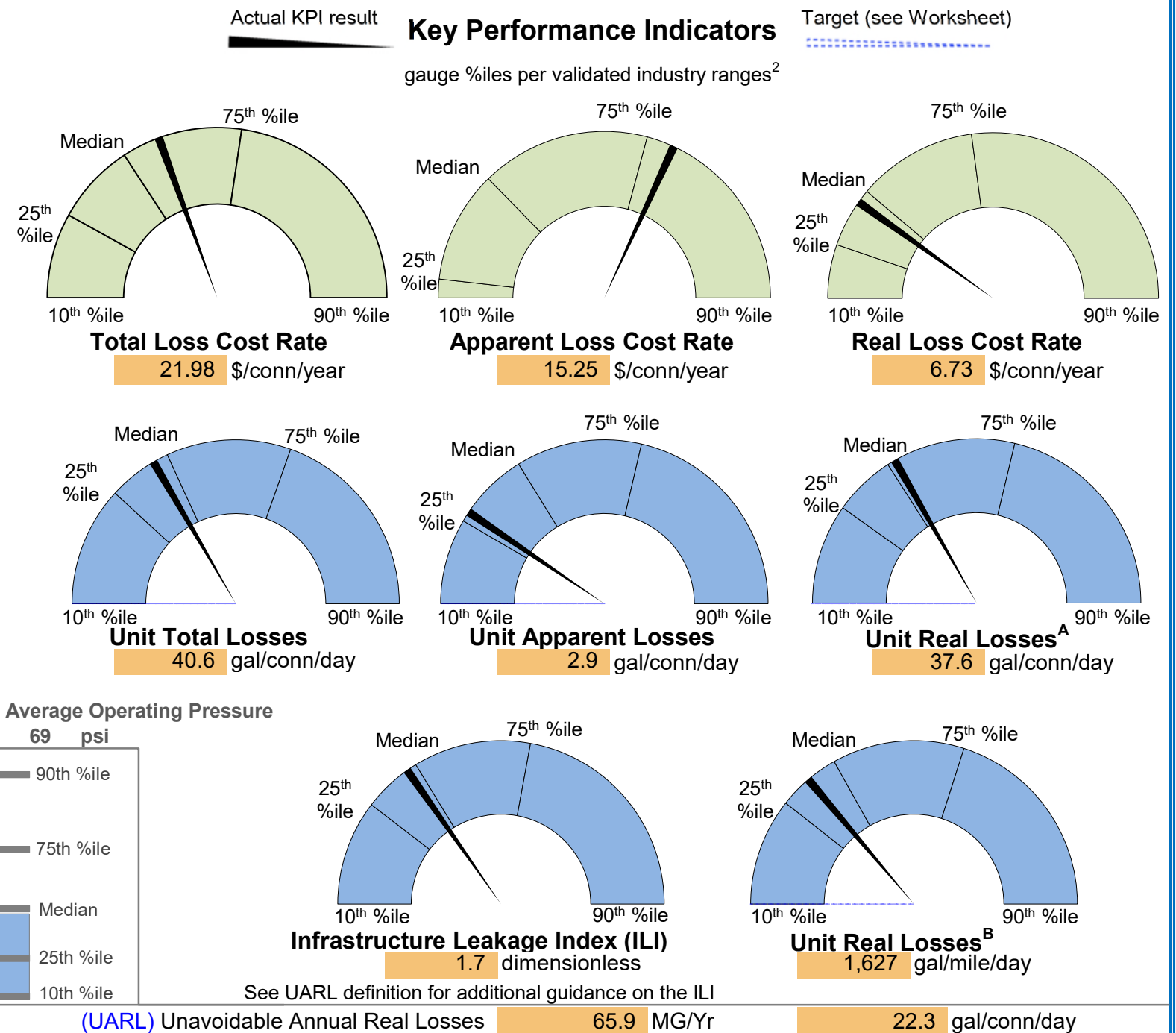
Data Validity Score: 66 **Data Validity Tier:** Tier III (51-70)

See [Loss Control Planning](#) for Tier Details



Key Performance Indicators

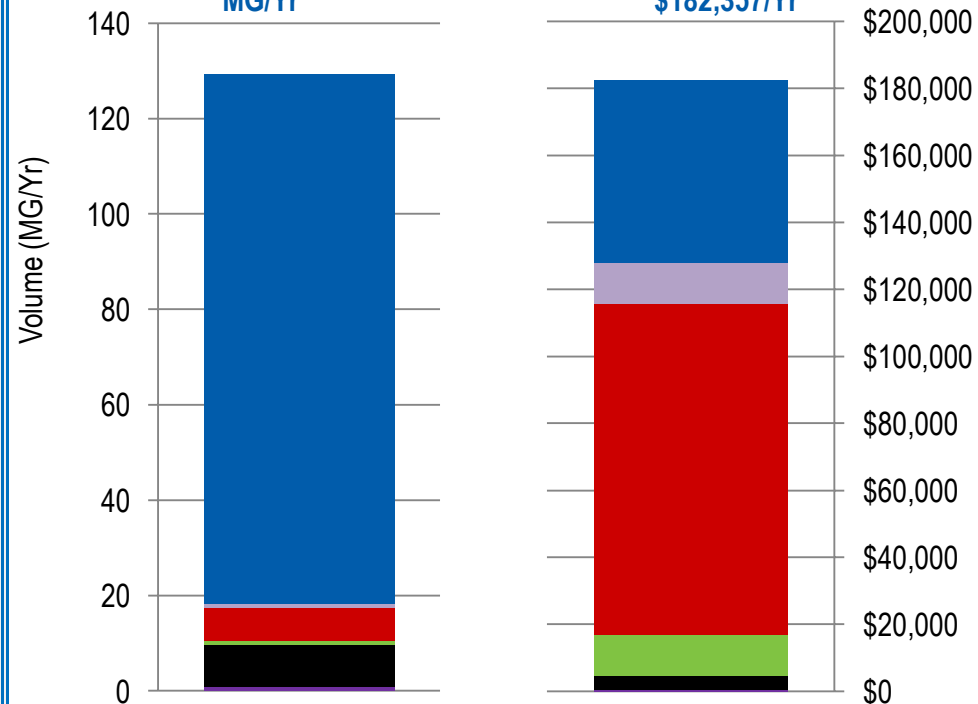
gauge %iles per validated industry ranges²



NRW Components Summary

Total Volume of NRW = 129 MG/Yr

Total Cost of NRW = \$182,357/Yr



Real Losses	Unauthorized Consumption
Systematic Data Handling Errors	Unbilled Unmetered Auth Cons
Customer Metering Inaccuracies	Unbilled Metered Authorized Cons

	Volume MG/Yr	Value \$/Yr	Basis of Valuation
Apparent Losses	8.7	\$123,257	CRUC
Real Losses	111.1	\$54,417	VPC
Unbilled Authorized Cons	9.6	\$4,683	VPC
Non-Revenue Water	129.3	\$182,357	Blended

Guidance Information for Key Performance

- The eight indicators shown are the recommended suite per the AWWA Water Loss Control Committee 2020 Position on KPIs¹.
 - A suite of KPIs is necessary, as no single KPI can holistically 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.
 - Percentiles (%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.