



**VIA E-FILING**

Utility Code: 210104

April 27, 2022

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

**RE: Aqua Pennsylvania, Inc.  
2021 Water Audit Summary  
Docket No. M-2022-3030282**

Dear Secretary Chiavetta:

Enclosed for filing are Aqua Pennsylvania, Inc.'s 2021 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

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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: **2021** | **Jan 01 2021 - Dec 31 2021** | **2021**

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="771.110"/>	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"/>	
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							VOSEA
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							WIEA
													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="487.328"/>	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="18.545"/>	MG/Yr							
UUAC	Unbilled Unmetered:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="5"/>	<input type="text" value="1.737"/>	MG/Yr				<input type="text" value="custom"/>	<input type="text" value="1.737"/>	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="1.218"/>	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="10.324"/>	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="1.218"/>	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="264.0"/>	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="11,830"/>							(active and inactive)
	Service connection density:				<input type="text" value="45"/>	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	Customer Retail Unit Charge:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="5"/>	<input type="text" value="\$11.46"/>	\$/1000 gallons (US)						
VPC	Variable Production Cost:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="9"/>	<input type="text" value="\$330.00"/>	\$/Million gallons				<input type="text" value="\$385,555"/>	\$/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:

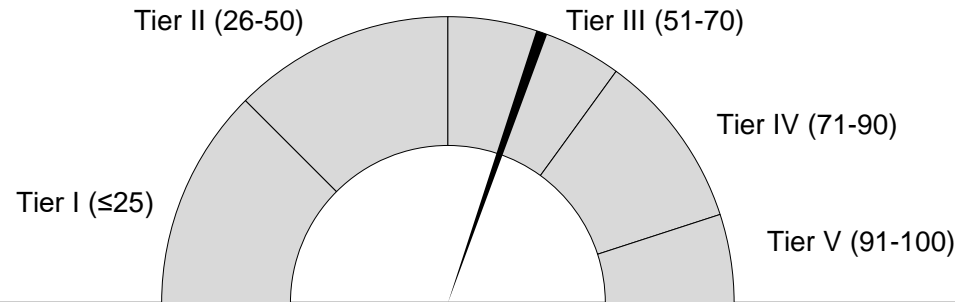
Unit Total Losses:	<input type="text"/>	gal/conn/day
Unit Apparent Losses:	<input type="text"/>	gal/conn/day
Unit Real Losses <sup>A</sup> :	<input type="text"/>	gal/conn/day
Unit Real Losses <sup>B</sup> :	<input type="text"/>	gal/mile/day

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

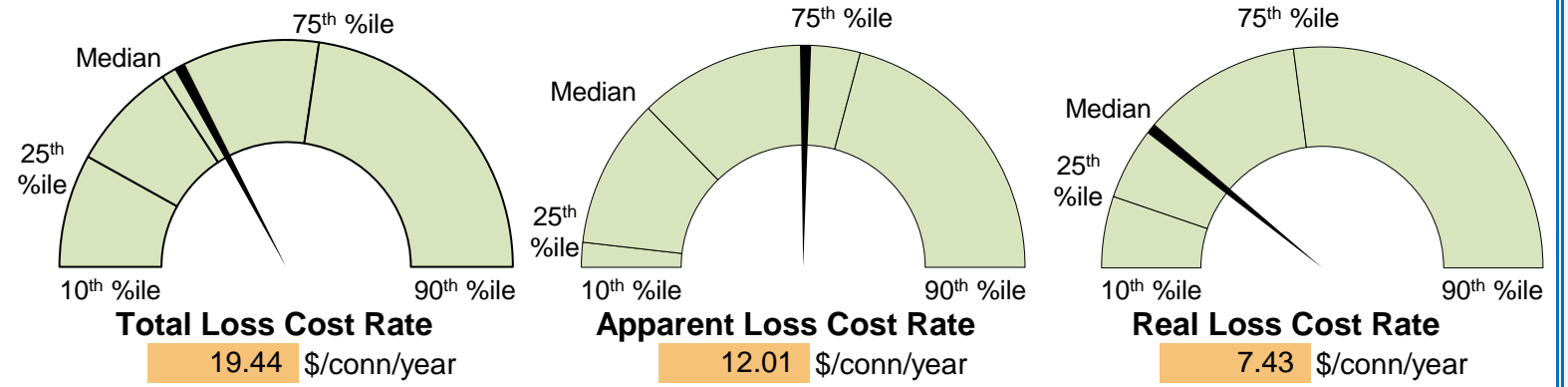


Actual KPI result

## Key Performance Indicators

Target (see Worksheet)

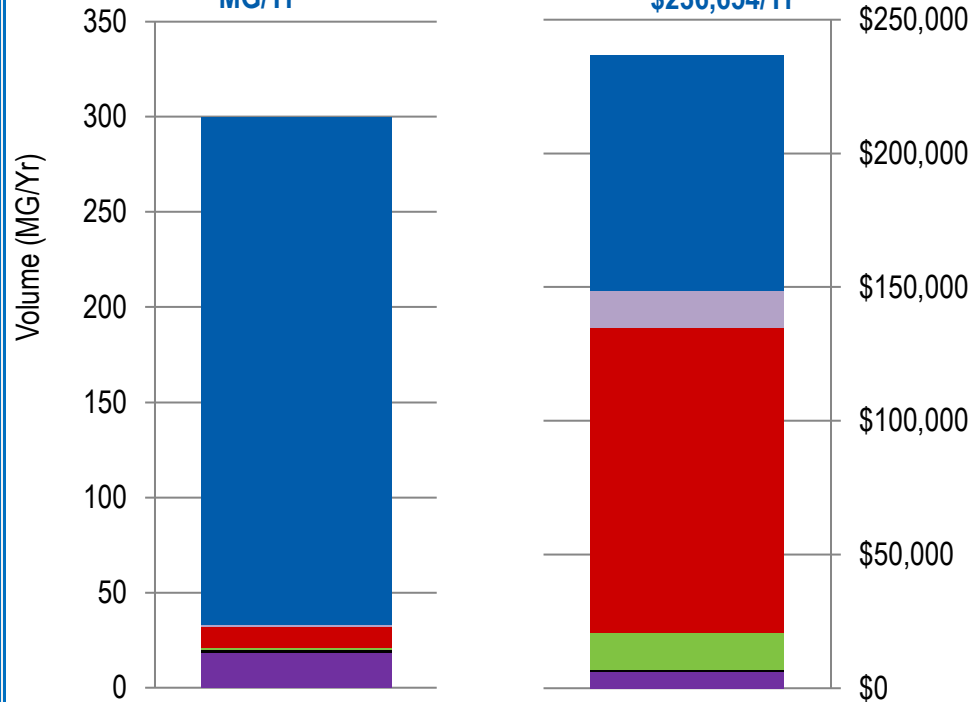
gauge %iles per validated industry ranges<sup>2</sup>



## NRW Components Summary

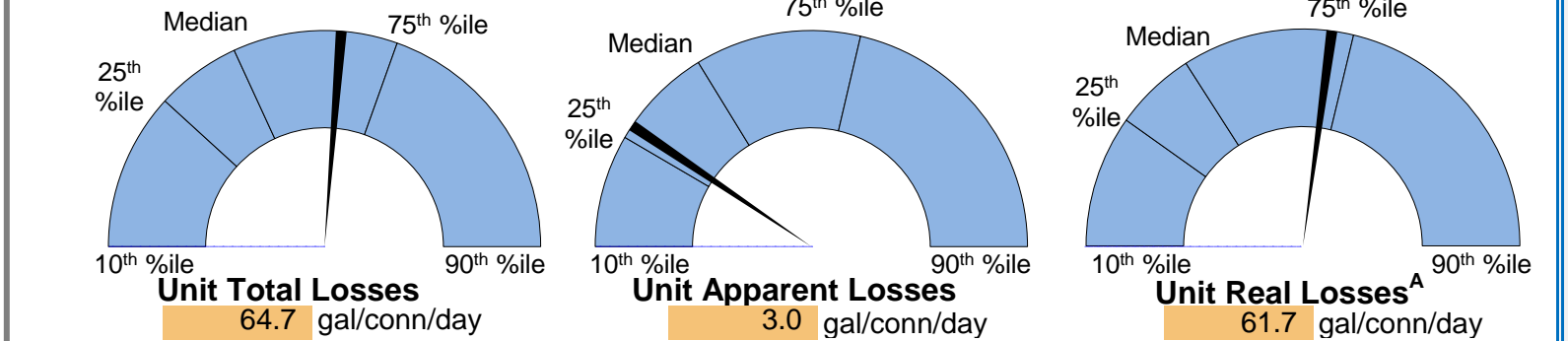
**Total Volume of NRW = 299 MG/Yr**

**Total Cost of NRW = \$236,654/Yr**

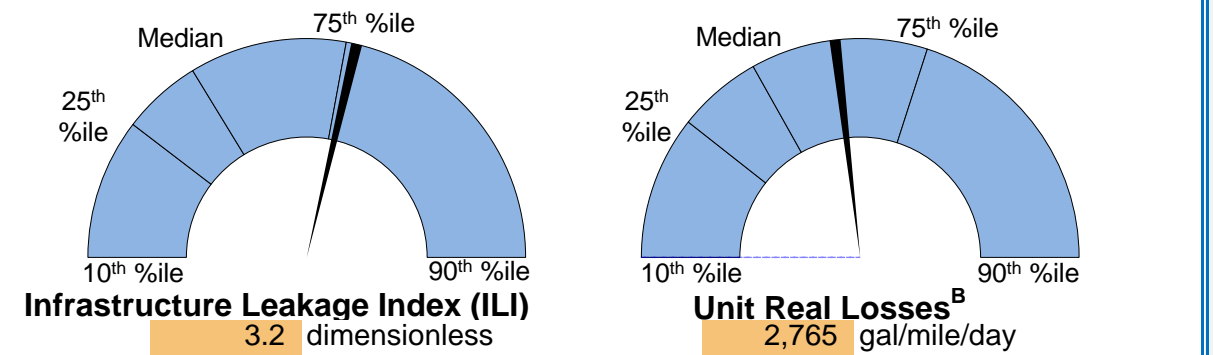
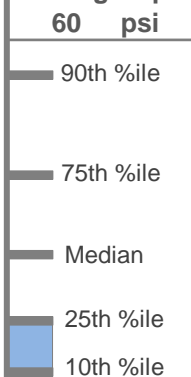


Real Losses	Unauthorized Consumption
Systematic Data Handling Errors	Unbilled Unmetered Auth Cons
Customer Metering Inaccuracies	Unbilled Metered Authorized Cons

	Volume MG/Yr	Value \$/Yr	Basis of Valuation
Apparent Losses	12.8	\$142,024	CRUC
Real Losses	266.5	\$87,937	VPC
Unbilled Authorized Cons	20.3	\$6,693	VPC
Non-Revenue Water	299.5	\$236,654	Blended



## Average Operating Pressure



See UARL definition for additional guidance on the ILI

**(UARL) Unavoidable Annual Real Losses** **83.0** MG/Yr **19.2** 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 KPIs<sup>1</sup>.
- 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)<sup>1</sup>, 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)<sup>2</sup>.
- 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)<sup>5</sup>.
- Actual KPI results that fall below 10<sup>th</sup> %ile or above 90<sup>th</sup> %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 - Roaring Creek Division**

Audit Year: **2021** | **Jan 01 2021 - Dec 31 2021** | **2021**

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"/>	1,703.974 MG/Yr		<input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="4"/>	2.00% percent	
	Water Imported: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="n/a"/>	0.000 MG/Yr				under-registration
	Water Exported: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="n/a"/>	0.000 MG/Yr				VOSEA WIEA WEEA
<b>WATER SUPPLIED:</b>		<b>1,738.749</b> 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"/>	899.959 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"/>	52.199 MG/Yr			choose entry option:	
	Unbilled Unmetered: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="3"/>	2.250 MG/Yr			0.25% default	
Default option selected for Unbilled Unmetered, with automatic data grading of 3						
<b>AUTHORIZED CONSUMPTION:</b>		<b>954.408</b> MG/Yr				

### WATER LOSSES

**784.341** 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"/>	2.250 MG/Yr				
	Customer Metering Inaccuracies: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="6"/>	19.432 MG/Yr			choose entry option:	
	Unauthorized Consumption: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="3"/>	2.250 MG/Yr			0.25% default	under-registration
Default option selected for Unauthorized Consumption, with automatic data grading of 3						
<b>Apparent Losses:</b>		<b>23.932</b> MG/Yr				

#### Real Losses

**Real Losses: 760.409** MG/Yr

**WATER LOSSES: 784.341** MG/Yr

### NON-REVENUE WATER

**NON-REVENUE WATER: 838.790** MG/Yr

### SYSTEM DATA

Lm Nc	Length of mains: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="7"/>	300.0 miles			(including fire hydrant lead lengths)
	Number of service connections: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="5"/>	18,513			(active and inactive)
	Service connection density:	62	conn./mile main		
Are customer meters typically located at the curbstop/property line? <input type="text" value="No"/>					
Lp	Average length of (private) customer service line: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="1"/>	25.0 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"/>	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"/>	\$11.46	\$/1000 gallons (US)		
	Variable Production Cost: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="9"/>	\$330.00	\$/Million gallons		<b>Total Annual Operating Cost</b>
					<b>\$852,000</b> \$/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:

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

#### KEY PERFORMANCE INDICATOR TARGETS:

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

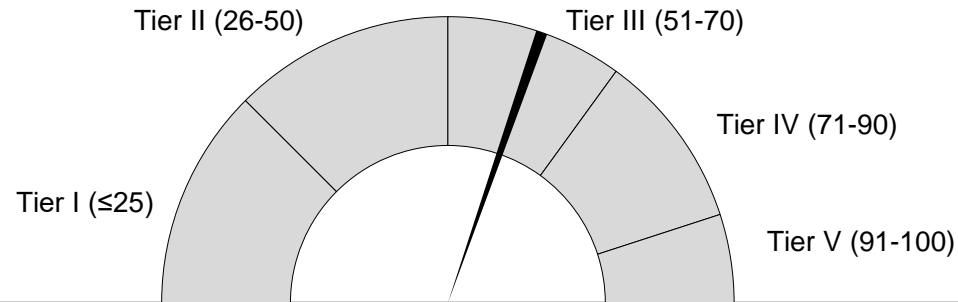
Unit Total Losses:		gal/conn/day
Unit Apparent Losses:		gal/conn/day
Unit Real Losses <sup>A</sup> :		gal/conn/day
Unit Real Losses <sup>B</sup> :		gal/mile/day

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

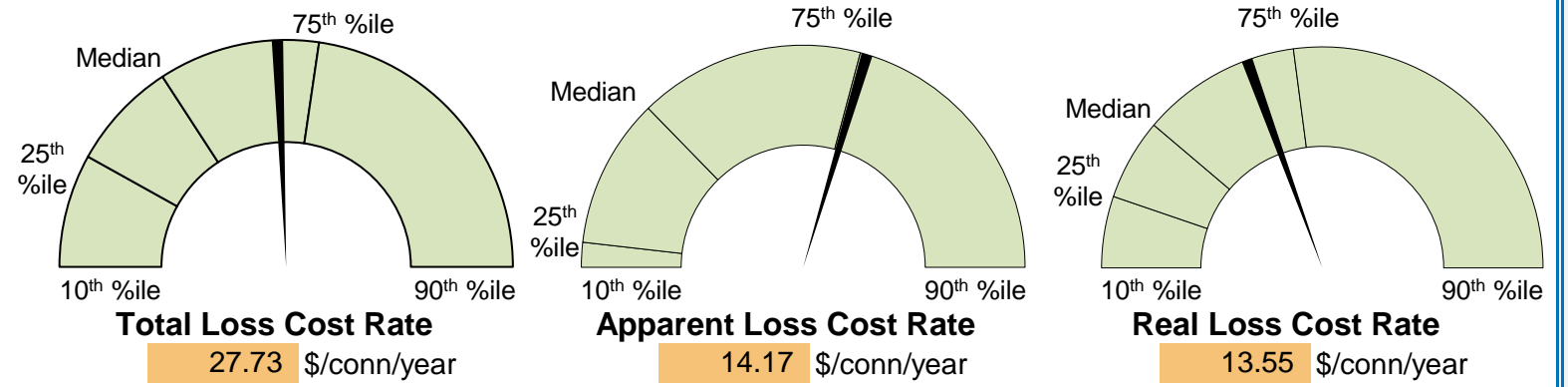


Actual KPI result

## Key Performance Indicators

Target (see Worksheet)

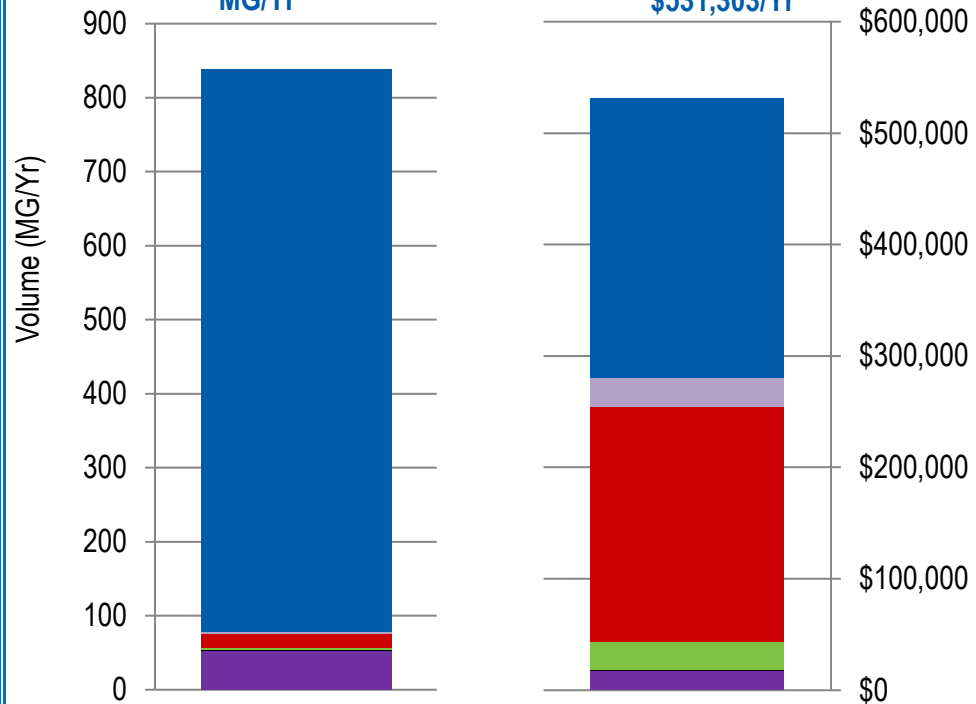
gauge %iles per validated industry ranges<sup>2</sup>



## NRW Components Summary

Total Volume of NRW = 838 MG/Yr

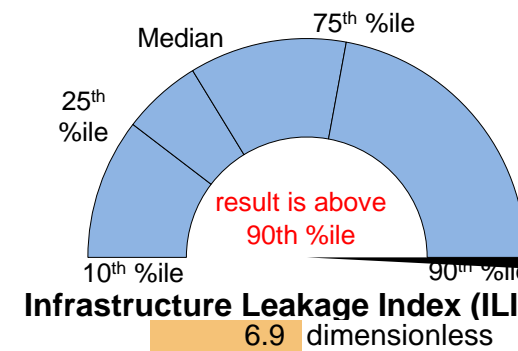
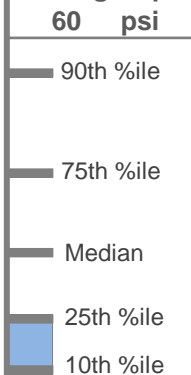
Total Cost of NRW = \$531,303/Yr



Component	Volume (MG/Yr)	Value (\$/Yr)	Basis of Valuation
Real Losses	760.4	\$250,935	VPC
Systematic Data Handling Errors	23.9	\$262,399	CRUC
Customer Metering Inaccuracies	54.4	\$17,968	VPC
Unauthorized Consumption	54.4	\$17,968	VPC
Unbilled Unmetered Auth Cons	54.4	\$17,968	VPC
Unbilled Metered Authorized Cons	838.8	\$531,303	Blended

Component	Volume (MG/Yr)	Value (\$/Yr)	Basis of Valuation
Apparent Losses	23.9	\$262,399	CRUC
Real Losses	760.4	\$250,935	VPC
Unbilled Authorized Cons	54.4	\$17,968	VPC
Non-Revenue Water	838.8	\$531,303	Blended

## Average Operating Pressure



See UARL definition for additional guidance on the ILI

(UARL) Unavoidable Annual Real Losses **110.8** MG/Yr **16.4** 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 KPIs<sup>1</sup>.
- 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)<sup>1</sup>, 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)<sup>2</sup>.
- 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)<sup>5</sup>.
- Actual KPI results that fall below 10<sup>th</sup> %ile or above 90<sup>th</sup> %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

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

Audit Year: **2021** | **Jan 01 2021 - Dec 31 2021** | **2021**

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:

<b>WATER SUPPLIED</b>	Volume from Own Sources: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="6"/> <input style="width: 100px;" type="text" value="3,426.845"/> MG/Yr	<input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="4"/> <input style="width: 50px;" type="text" value="2.00%"/> <input type="text" value="percent"/>	<input type="text" value="under-registration"/>	<b>VOSEA</b>
WI	Water Imported: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="n/a"/> <input style="width: 100px;" type="text" value="0.000"/> MG/Yr			<b>WIEA</b>
WE	Water Exported: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="n/a"/> <input style="width: 100px;" type="text" value="0.000"/> MG/Yr			<b>WEEA</b>
<b>WATER SUPPLIED: 3,496.781 MG/Yr</b>				

### AUTHORIZED CONSUMPTION

choose entry option:

<b>BMAC</b>	Billed Metered: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="8"/> <input style="width: 100px;" type="text" value="2,586.834"/> MG/Yr			
<b>BUAC</b>	Billed Unmetered: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="n/a"/> <input style="width: 100px;" type="text" value="0.000"/> MG/Yr			
<b>UMAC</b>	Unbilled Metered: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="4"/> <input style="width: 100px;" type="text" value="73.181"/> MG/Yr			
<b>UUAC</b>	Unbilled Unmetered: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="3"/> <input style="width: 100px;" type="text" value="6.467"/> 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				
<b>AUTHORIZED CONSUMPTION: 2,666.482 MG/Yr</b>				

### WATER LOSSES

**830.299 MG/Yr**

#### Apparent Losses

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

choose entry option:

<b>SDHE</b>	Systematic Data Handling Errors: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="3"/> <input style="width: 100px;" type="text" value="6.467"/> MG/Yr	<input type="text" value="0.25%"/> <input type="text" value="default"/>		
<b>CMI</b>	Customer Metering Inaccuracies: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="6"/> <input style="width: 100px;" type="text" value="54.286"/> MG/Yr	<input type="text" value="2.00%"/> <input type="text" value="percent"/>	<input type="text" value="under-registration"/>	
<b>UC</b>	Unauthorized Consumption: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="3"/> <input style="width: 100px;" type="text" value="6.467"/> 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				
<b>Apparent Losses: 67.220 MG/Yr</b>				

#### Real Losses

**Real Losses: 763.078 MG/Yr**

**WATER LOSSES: 830.299 MG/Yr**

### NON-REVENUE WATER

**NON-REVENUE WATER: 909.947 MG/Yr**

### SYSTEM DATA

<b>Lm</b>	Length of mains: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="7"/> <input style="width: 100px;" type="text" value="534.0"/> miles		(including fire hydrant lead lengths)
<b>Nc</b>	Number of service connections: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="5"/> <input style="width: 100px;" type="text" value="30,800"/>		(active and inactive)
	Service connection density: <input style="width: 100px;" type="text" value="58"/> conn./mile main		
	Are customer meters typically located at the curbstop/property line? <input type="text" value="No"/>		
<b>Lp</b>	Average length of (private) customer service line: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="1"/> <input style="width: 100px;" type="text" value="25.0"/> ft		(average distance between property line and meter)
<b>AOP</b>	Average Operating Pressure: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="7"/> <input style="width: 100px;" type="text" value="60.0"/> psi		

### COST DATA

<b>CRUC</b>	Customer Retail Unit Charge: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="5"/> <input style="width: 100px;" type="text" value="\$11.46"/> \$/1000 gallons (US)		<b>Total Annual Operating Cost</b>
<b>VPC</b>	Variable Production Cost: <input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="9"/> <input style="width: 100px;" type="text" value="\$330.00"/> \$/Million gallons		<input style="width: 100px;" type="text" value="\$1,710,000"/> \$/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:

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

#### KEY PERFORMANCE INDICATOR TARGETS:

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

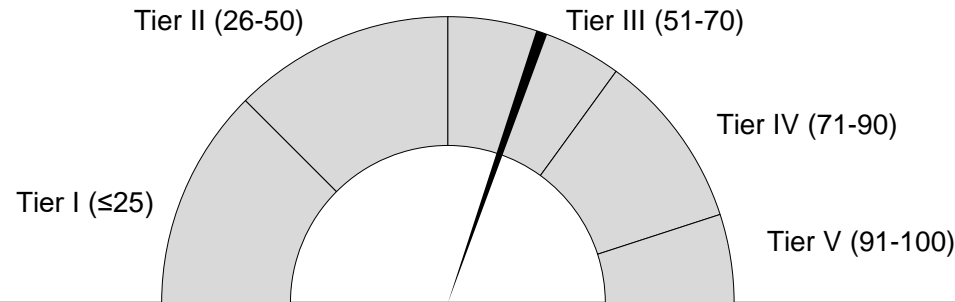
Unit Total Losses:	<input style="width: 100px;" type="text"/>	gal/conn/day
Unit Apparent Losses:	<input style="width: 100px;" type="text"/>	gal/conn/day
Unit Real Losses <sup>A</sup> :	<input style="width: 100px;" type="text"/>	gal/conn/day
Unit Real Losses <sup>B</sup> :	<input style="width: 100px;" 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

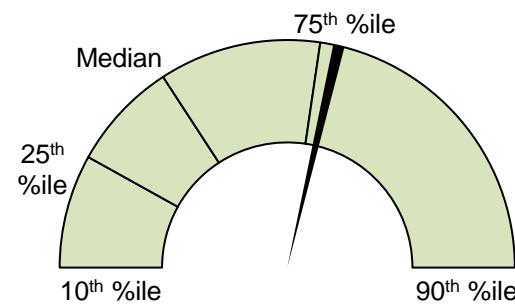


Actual KPI result

## Key Performance Indicators

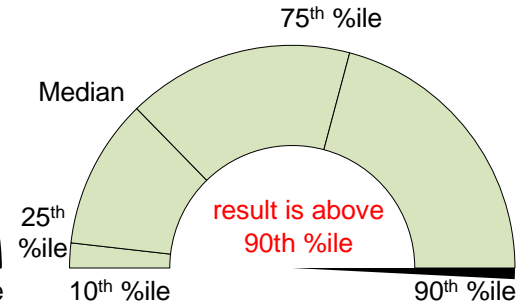
Target (see Worksheet)

gauge %iles per validated industry ranges<sup>2</sup>



**Total Loss Cost Rate**

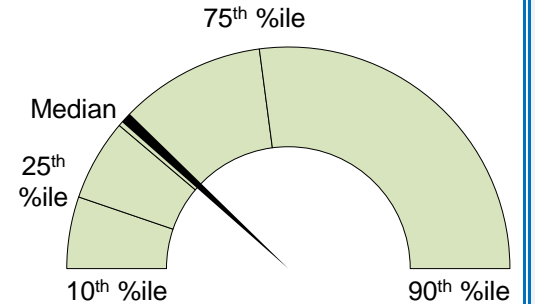
**32.65** \$/conn/year



**Apparent Loss Cost Rate**

**24.47** \$/conn/year

result is above 90th %ile



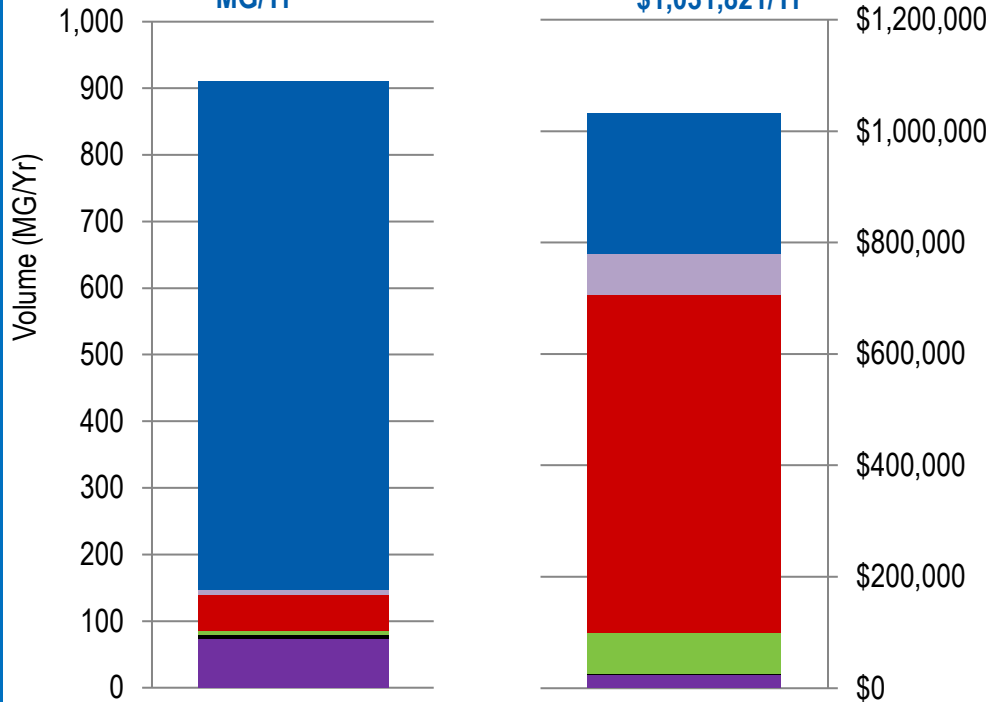
**Real Loss Cost Rate**

**8.18** \$/conn/year

## NRW Components Summary

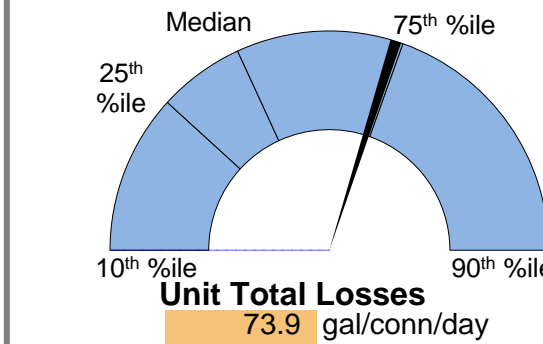
Total Volume of NRW = **908** MG/Yr

Total Cost of NRW = **\$1,031,821**/Yr



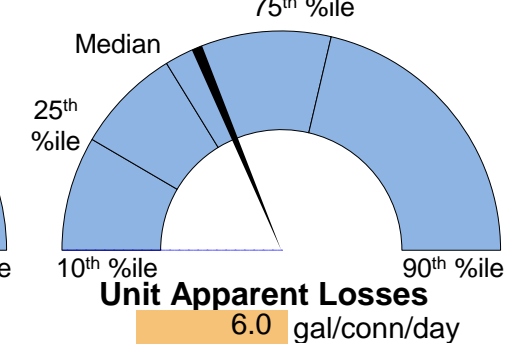
Real Losses	Unauthorized Consumption
Systematic Data Handling Errors	Unbilled Unmetered Auth Cons
Customer Metering Inaccuracies	Unbilled Metered Authorized Cons

	Volume MG/Yr	Value \$/Yr	Basis of Valuation
Apparent Losses	67.2	\$753,721	CRUC
Real Losses	763.1	\$251,816	VPC
Unbilled Authorized Cons	79.6	\$26,284	VPC
Non-Revenue Water	909.9	\$1,031,821	Blended



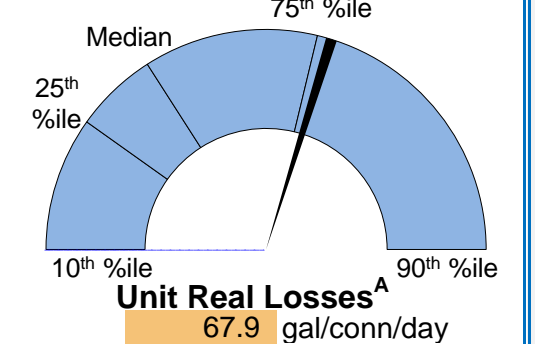
**Unit Total Losses**

**73.9** gal/conn/day



**Unit Apparent Losses**

**6.0** gal/conn/day

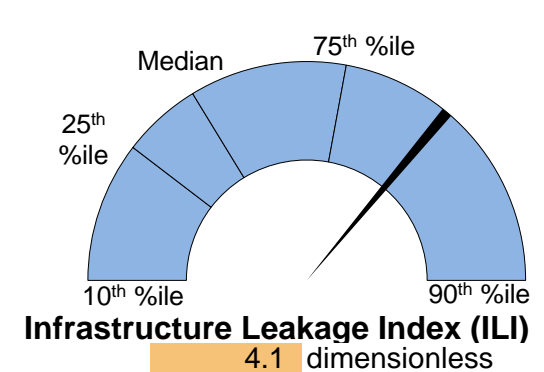
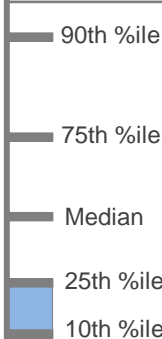


**Unit Real Losses<sup>A</sup>**

**67.9** gal/conn/day

## Average Operating Pressure

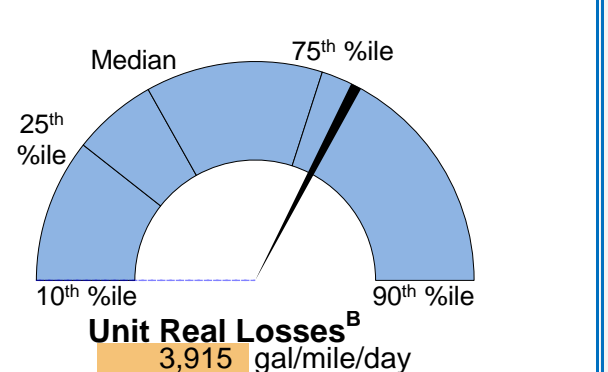
**60** psi



**Infrastructure Leakage Index (ILI)**

**4.1** dimensionless

See UARL definition for additional guidance on the ILI



**Unit Real Losses<sup>B</sup>**

**3,915** gal/mile/day

**(UARL) Unavoidable Annual Real Losses** **188.4** MG/Yr **16.8** 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 KPIs<sup>1</sup>.
- 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)<sup>1</sup>, 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)<sup>2</sup>.
- 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)<sup>5</sup>.
- Actual KPI results that fall below 10<sup>th</sup> %ile or above 90<sup>th</sup> %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 - SEPA Division**

Audit Year: **2021** | **Jan 01 2021 - Dec 31 2021** | **2021**

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:

<b>WATER SUPPLIED</b>	<table border="0"> <tr> <td>Volume from Own Sources:</td> <td><input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="6"/></td> <td><input type="text" value="34,228.891"/> MG/Yr</td> <td><input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="4"/></td> <td><input type="text" value="2.00%"/> percent</td> <td><input type="text" value="under-registration"/></td> <td>VOSEA</td> </tr> <tr> <td>Water Imported:</td> <td><input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="6"/></td> <td><input type="text" value="3,792.681"/> MG/Yr</td> <td><input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="4"/></td> <td><input type="text" value="2.00%"/> percent</td> <td><input type="text" value="under-registration"/></td> <td>WIEA</td> </tr> <tr> <td>Water Exported:</td> <td><input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="6"/></td> <td><input type="text" value="2,670.192"/> MG/Yr</td> <td><input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="4"/></td> <td><input type="text" value="2.00%"/> percent</td> <td><input type="text" value="under-registration"/></td> <td>WEEA</td> </tr> </table>	Volume from Own Sources:	<input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="6"/>	<input type="text" value="34,228.891"/> 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	Water Imported:	<input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="6"/>	<input type="text" value="3,792.681"/> 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	Water Exported:	<input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="6"/>	<input type="text" value="2,670.192"/> 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"/>	WEEA		
Volume from Own Sources:	<input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="6"/>	<input type="text" value="34,228.891"/> 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																		
Water Imported:	<input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="6"/>	<input type="text" value="3,792.681"/> 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																		
Water Exported:	<input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="6"/>	<input type="text" value="2,670.192"/> 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"/>	WEEA																		
<b>WATER SUPPLIED:</b>		<input type="text" value="36,072.837"/> 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="28,711.004"/> 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="n/a"/>	<input type="text" value="0.000"/> MG/Yr			
UUAC	Unbilled Unmetered:	<input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="3"/>	<input type="text" value="71.778"/> MG/Yr			

choose entry option:

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

SDHE	Systematic Data Handling Errors:	<input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="3"/>	<input type="text" value="71.778"/> 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="585.939"/> 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="71.778"/> 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="4,600.0"/> 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="375,000"/>	(active and inactive)	
	Service connection density:		<input type="text" value="82"/> 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	Customer Retail Unit Charge:	<input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="5"/>	<input type="text" value="\$11.46"/> \$/1000 gallons (US)	<b>Total Annual Operating Cost</b>	
VPC	Variable Production Cost:	<input type="text" value="n"/> <input type="text" value="g"/> <input type="text" value="9"/>	<input type="text" value="\$330.00"/> \$/Million gallons		

### 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:

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

#### KEY PERFORMANCE INDICATOR TARGETS:

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

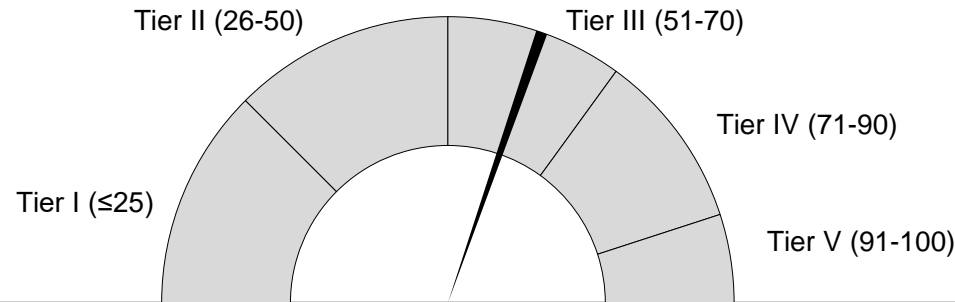
Unit Total Losses:	<input type="text"/>	gal/conn/day
Unit Apparent Losses:	<input type="text"/>	gal/conn/day
Unit Real Losses <sup>A</sup> :	<input type="text"/>	gal/conn/day
Unit Real Losses <sup>B</sup> :	<input type="text"/>	gal/mile/day

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

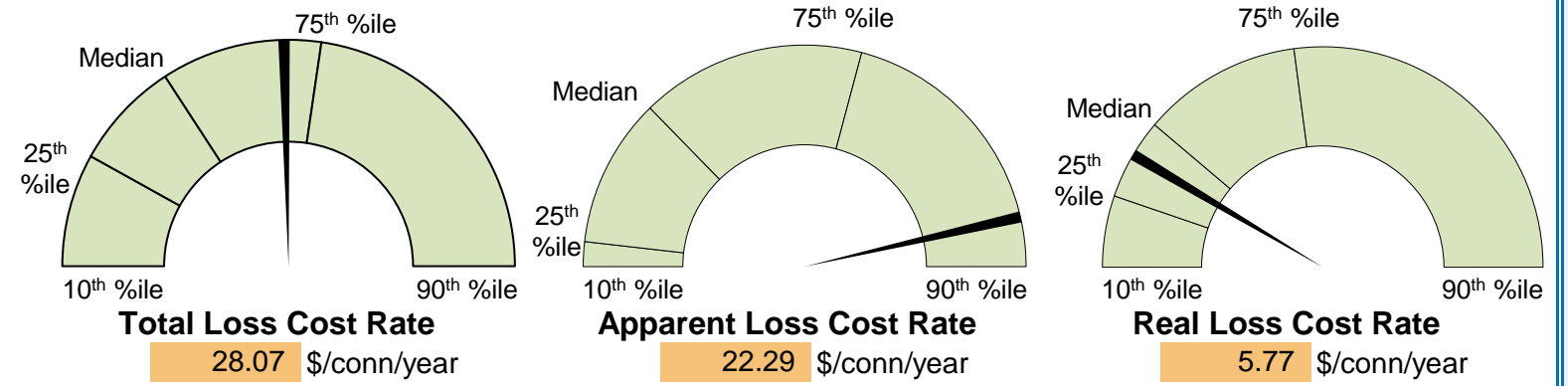


Actual KPI result

## Key Performance Indicators

Target (see Worksheet)

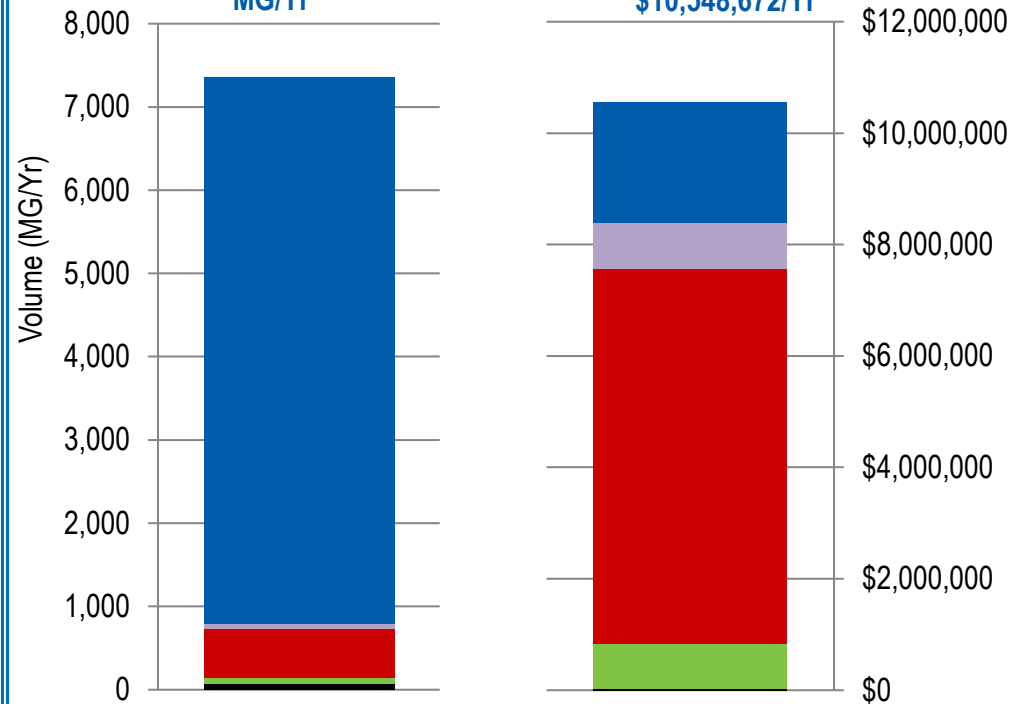
gauge %iles per validated industry ranges<sup>2</sup>



## NRW Components Summary

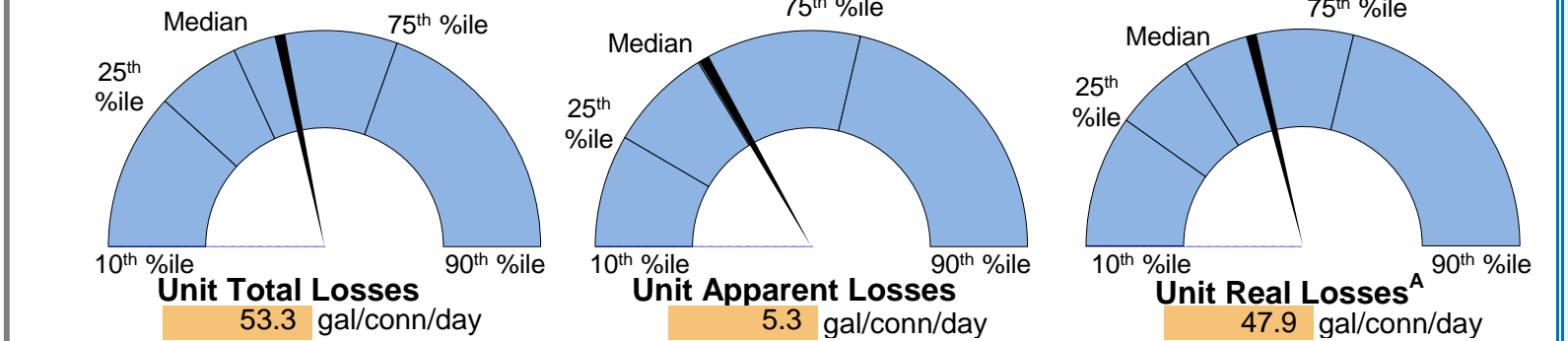
**Total Volume of NRW = 7,362 MG/Yr**

**Total Cost of NRW = \$10,548,672/Yr**

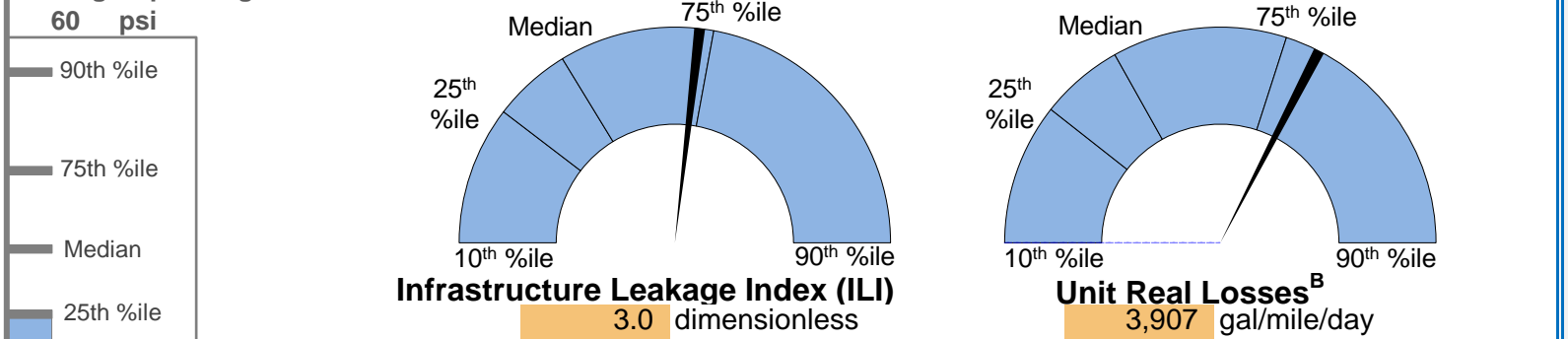


Real Losses	Unauthorized Consumption
Systematic Data Handling Errors	Unbilled Unmetered Auth Cons
Customer Metering Inaccuracies	Unbilled Metered Authorized Cons

	Volume MG/Yr	Value \$/Yr	Basis of Valuation
Apparent Losses	729.5	\$8,360,000	CRUC
Real Losses	6,560.6	\$2,164,985	VPC
Unbilled Authorized Cons	71.8	\$23,687	VPC
Non-Revenue Water	7,361.8	\$10,548,672	Blended



## Average Operating Pressure



See UARL definition for additional guidance on the ILI

**(UARL) Unavoidable Annual Real Losses** 2,185.2 MG/Yr 16.0 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 KPIs<sup>1</sup>.
- 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)<sup>1</sup>, 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)<sup>2</sup>.
- 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)<sup>5</sup>.
- Actual KPI results that fall below 10<sup>th</sup> %ile or above 90<sup>th</sup> %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: **2021** **Jan 01 2021 - Dec 31 2021** **2021**

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="411.901"/>	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"/>	
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							VOSEA
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							WIEA
													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="307.147"/>	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="5.875"/>	MG/Yr							
UUAC	Unbilled Unmetered:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="3"/>	<input type="text" value="0.768"/>	MG/Yr							

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="0.768"/>	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="6.388"/>	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="0.768"/>	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="85.0"/>	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="4,900"/>							(active and inactive)
	Service connection density:				<input type="text" value="58"/>	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="25.0"/>	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="85.0"/>	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="\$11.46"/>	\$/1000 gallons (US)						
VPC	Variable Production Cost:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="9"/>	<input type="text" value="\$330.00"/>	\$/Million gallons						<input type="text" value="\$206,000"/>
												\$/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:

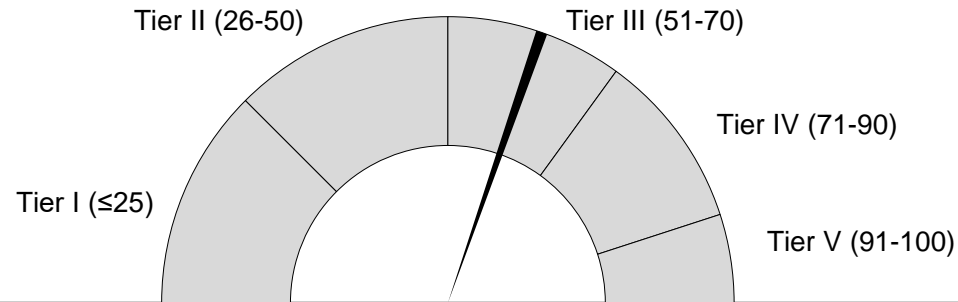
Unit Total Losses:	<input type="text"/>	gal/conn/day
Unit Apparent Losses:	<input type="text"/>	gal/conn/day
Unit Real Losses <sup>A</sup> :	<input type="text"/>	gal/conn/day
Unit Real Losses <sup>B</sup> :	<input type="text"/>	gal/mile/day

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

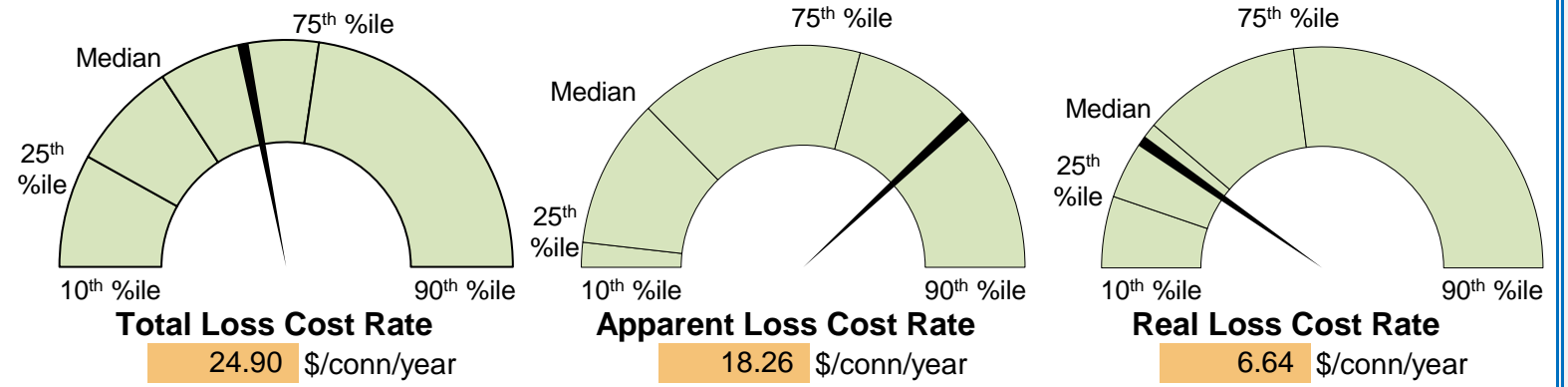


Actual KPI result

## Key Performance Indicators

Target (see Worksheet)

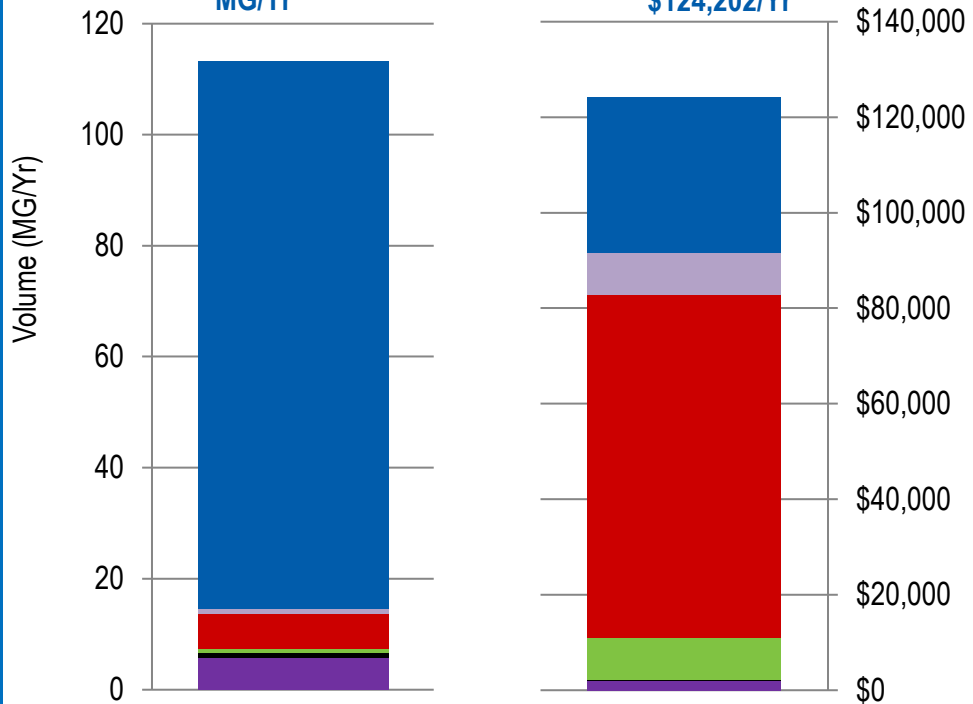
gauge %iles per validated industry ranges<sup>2</sup>



## NRW Components Summary

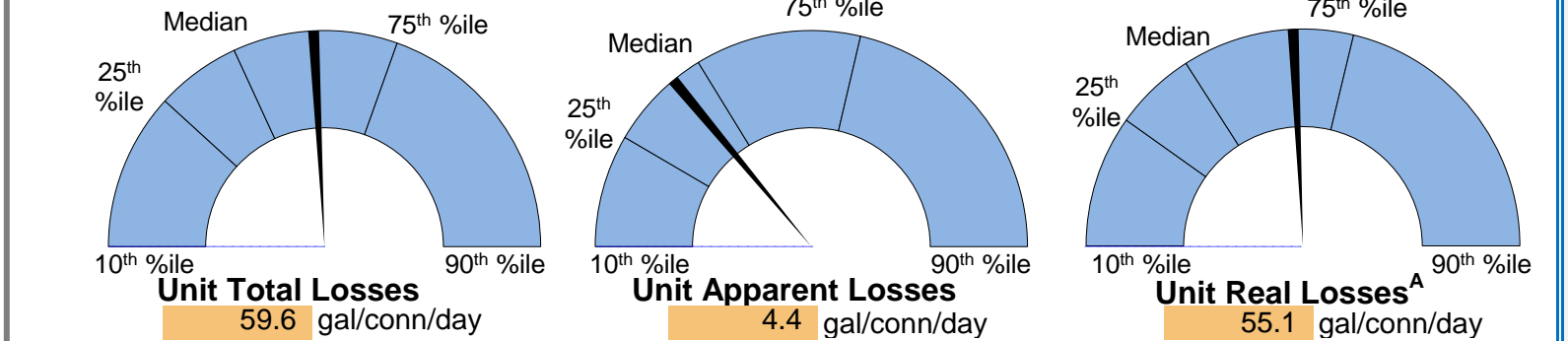
**Total Volume of NRW = 113 MG/Yr**

**Total Cost of NRW = \$124,202/Yr**

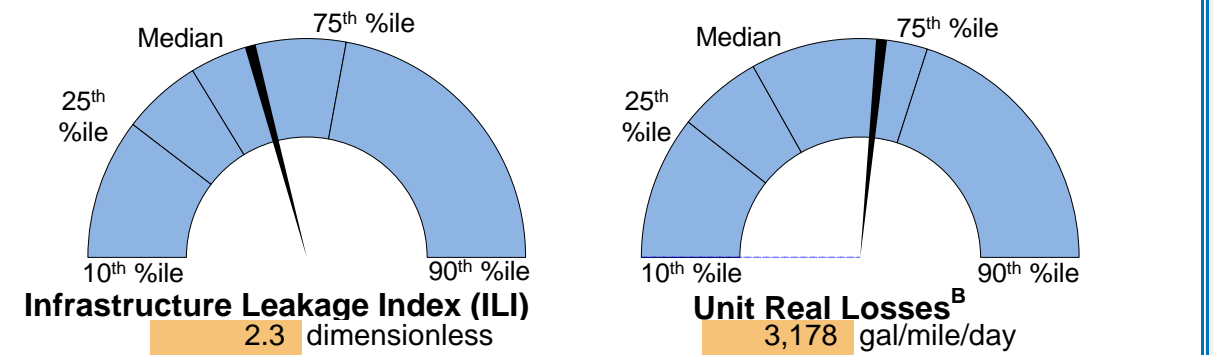
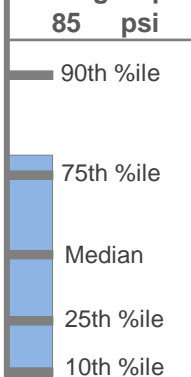


Real Losses	Systematic Data Handling Errors	Unauthorized Consumption
Customer Metering Inaccuracies	Unbilled Unmetered Auth Cons	Unbilled Metered Authorized Cons

	Volume MG/Yr	Value \$/Yr	Basis of Valuation
Apparent Losses	7.9	\$89,474	CRUC
Real Losses	98.6	\$32,536	VPC
Unbilled Authorized Cons	6.6	\$2,192	VPC
Non-Revenue Water	113.2	\$124,202	Blended



## Average Operating Pressure



See UARL definition for additional guidance on the ILI

**(UARL) Unavoidable Annual Real Losses** 42.5 MG/Yr 23.7 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 KPIs<sup>1</sup>.
- 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)<sup>1</sup>, 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)<sup>2</sup>.
- 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)<sup>5</sup>.
- Actual KPI results that fall below 10<sup>th</sup> %ile or above 90<sup>th</sup> %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

FWAS v6.0  
American Water Works Association.  
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Water Audit Report for: **Aqua Pennsylvania - Whitehaven Division**  
 Audit Year: **2021** **Jan 01 2021 - Dec 31 2021** **2021**

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="473.307"/>	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="6"/>	<input type="text" value="15.531"/>	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"/>	WIEA
WE	Water Exported:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="6"/>	<input type="text" value="1.039"/>	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"/>	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="335.095"/>	MG/Yr						
BUAC	Billed Unmetered:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="10"/>	<input type="text" value="2.658"/>	MG/Yr						
UMAC	Unbilled Metered:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="n/a"/>	<input type="text" value=""/>	MG/Yr						
UUAC	Unbilled Unmetered:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="6"/>	<input type="text" value="8.631"/>	MG/Yr	<input type="text" value="custom"/>	<input type="text" value="8.631"/>				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="0.844"/>	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="6.839"/>	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="0.844"/>	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="243.0"/>	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="8,960"/>		(active and inactive)						
	Service connection density:					<input type="text" value="37"/>	conn./mile main						
Are customer meters typically located at the curbstop/property line?													<input type="text" value="No"/>
Lp	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	Customer Retail Unit Charge:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="5"/>	<input type="text" value="\$11.46"/>	\$/1000 gallons (US)	<b>Total Annual Operating Cost</b>					
VPC	Variable Production Cost:	<input type="text" value="n"/>	<input type="text" value="g"/>	<input type="text" value="9"/>	<input type="text" value="\$330.00"/>	\$/Million gallons	<input type="text" value="\$240,000"/> \$/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:

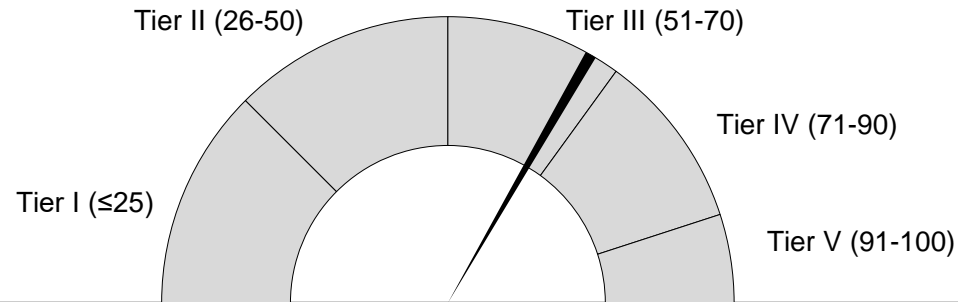
Unit Total Losses:	<input type="text" value=""/>	gal/conn/day
Unit Apparent Losses:	<input type="text" value=""/>	gal/conn/day
Unit Real Losses <sup>A</sup> :	<input type="text" value=""/>	gal/conn/day
Unit Real Losses <sup>B</sup> :	<input type="text" value=""/>	gal/mile/day

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

## Data Validity

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

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

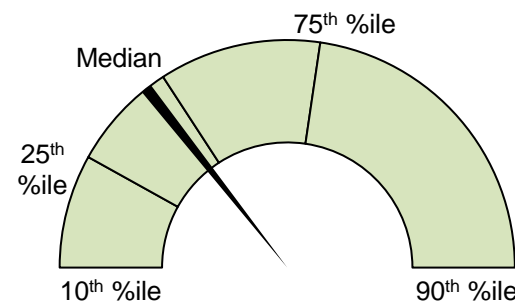


Actual KPI result

## Key Performance Indicators

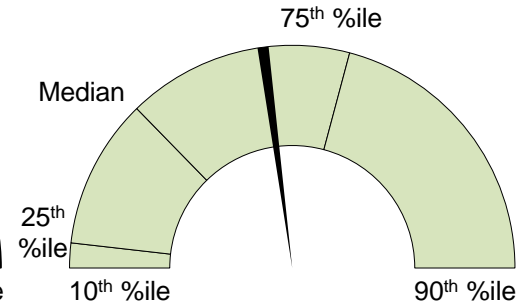
Target (see Worksheet)

gauge %iles per validated industry ranges<sup>2</sup>



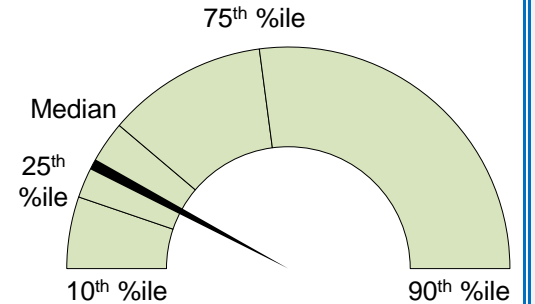
**Total Loss Cost Rate**

**16.17** \$/conn/year



**Apparent Loss Cost Rate**

**10.91** \$/conn/year



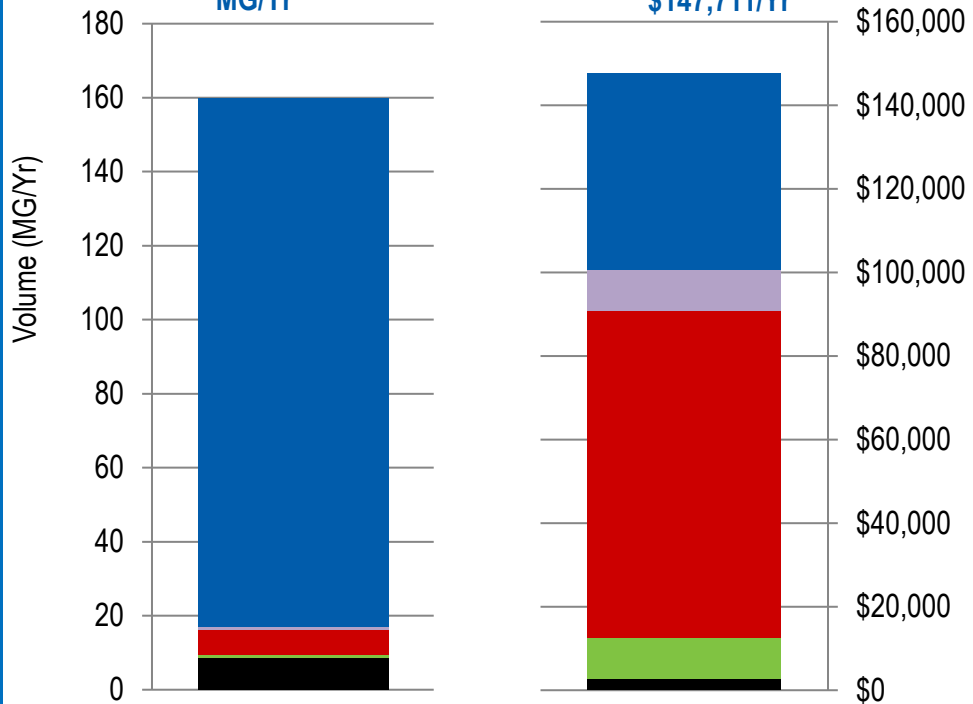
**Real Loss Cost Rate**

**5.26** \$/conn/year

## NRW Components Summary

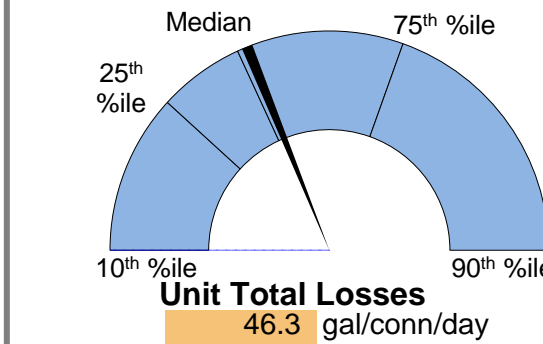
**Total Volume of NRW = 160**  
**MG/Yr**

**Total Cost of NRW =**  
**\$147,711/Yr**



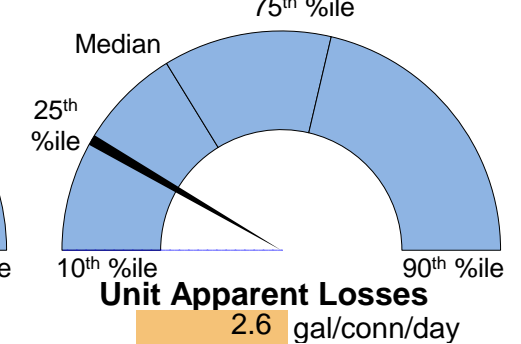
Real Losses	Unauthorized Consumption
Systematic Data Handling Errors	Unbilled Unmetered Auth Cons
Customer Metering Inaccuracies	Unbilled Metered Authorized Cons

	Volume MG/Yr	Value \$/Yr	Basis of Valuation
Apparent Losses	8.5	\$97,724	CRUC
Real Losses	142.8	\$47,138	VPC
Unbilled Authorized Cons	8.6	\$2,848	VPC
Non-Revenue Water	160.0	\$147,711	Blended



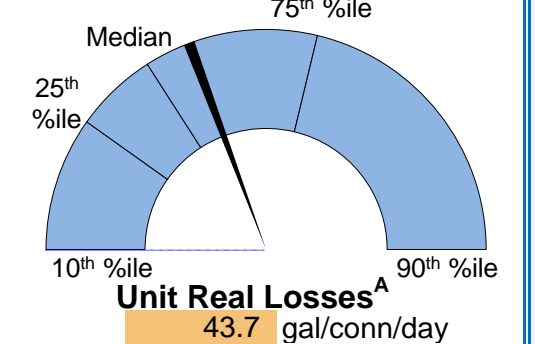
**Unit Total Losses**

**46.3** gal/conn/day



**Unit Apparent Losses**

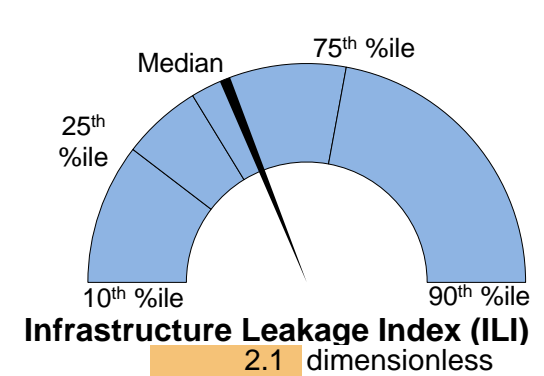
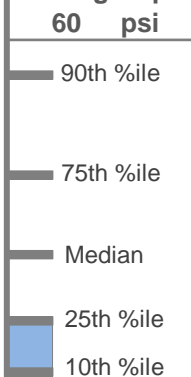
**2.6** gal/conn/day



**Unit Real Losses<sup>A</sup>**

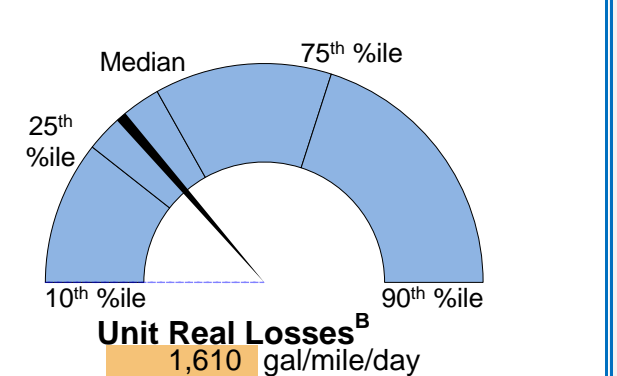
**43.7** gal/conn/day

## Average Operating Pressure



**Infrastructure Leakage Index (ILI)**

**2.1** dimensionless



**Unit Real Losses<sup>B</sup>**

**1,610** gal/mile/day

See UARL definition for additional guidance on the ILI

**(UARL) Unavoidable Annual Real Losses** **68.0** MG/Yr **20.8** gal/conn/day

## Guidance Information for Key Performance

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