American Water Works Association
California-Nevada Section

CA-NV AWWA Water Loss Technical Assistance Program

Wave 4 Water Audit Level 1 Validation Document

Utility Provided

Water System Name: City of Pittsburg **Water System ID Number:** 07-10008 **Water Audit Period:** Fiscal Year 2016/17

Water Audit & Water Loss Improvement Steps:

Steps taken in preceding year to increase data validity, reduce real loss and apparent loss as informed by the annual validated water audit:

The City of Pittsburg has been changing out old meters and replacing with more current AMR meters. We are testing our larger meters with 2 strap-on meters we have recently purchased. City of Pittsburg is also monitoring all contractors and developer's usage of the water to make sure they are using meters that are registering the consumption.

Certification Statement by Utility Executive:

This water loss audit report meets the requirements of California Code of Regulations Title 23, Division 2, Chapter 7 and the California Water Code Section 10608.34 and has been prepared in accordance with the method adopted by the American Water Works Association, as contained in their manual, *Water Audits and Loss Control Programs, Manual M36, Fourth Edition* and in the Free Water Audit Software version 5.

Brad Farmer	Finance Director	Brad Farmer	9/28/17
Executive Name (Print)	Executive Position	Signature	Date

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Wave 4 Water Audit Level 1 Validation Document

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Audit Information:

Utility: Pittsburg PWS ID: 0710008

System Type: Potable Audit Period: Fiscal Year 2016/17

Utility Representation: Deana Cardona (Finance, Utility Billing), Jason Moser (Water Plan Superintendant), Margie Padua (Finance Manager), Freddy Rivera (Field Works Supervisor), Brad Farmer (Finance Director)

Validation Date: 8/25/2017 Call Time: 10:00AM Sufficient Supporting Documents Provided: Yes

Validation Findings & Confirmation Statement:

Key Audit Metrics:

Data Validity Score: 60 Data Validity Band (Level): Band III (51-70)

ILI: 1.49 Real Loss: 21.59 (gal/conn/day) Apparent Loss: 5.27 (gal/conn/day)

Non-Revenue Water as a Percentage of Operating Costs: 3.8%

Certification Statement by Validator:

This water loss audit report has been Level 1 validated per the requirements of California Code of Regulations Title 23, Division 2, Chapter 7 and the California Water Code Section 10608.34.

All recommendations on volume derivation and Data Validity Grades were incorporated into the water audit. ☒

Validator Information:

Water Audit Validator: Kate Gasner Validator Qualifications: Contractor for CA-NV AWWA Water Loss TAP

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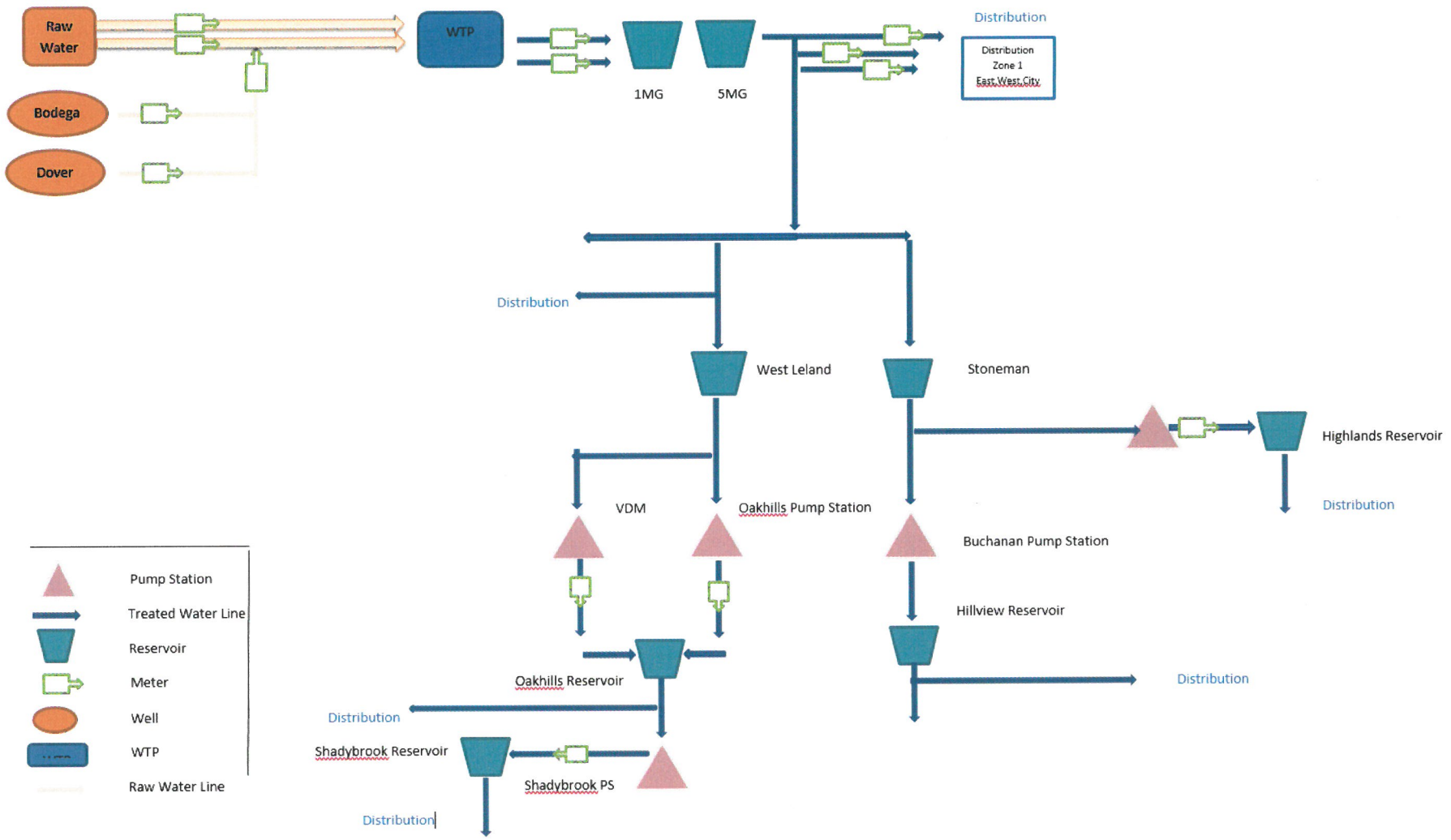
Raw Water
WTP
1MG
5MG
Distribution
Distribution Zone 1 East West City
Bodega
Dover
Distribution
West Leland
Stoneman
Highlands Reservoir
Distribution
VDM
Oakhills Pump Station
Buchanan Pump Station
Hillview Reservoir
Distribution
Oakhills Reservoir
Distribution
Shadybrook Reservoir
Shadybrook PS
Distribution
Pump Station
Treated Water Line
Reservoir
Meter
Well
WTP
Raw Water Line

#	AWWA Water Audit Input	Code	Final DVG	Basis on Input Derivation	Basis on Data Validity Grade
1	Volume from Own Sources	VOS	7	Supply meter profile: Three sources of water include purchased raw surface water from the Contra Costa Water District and two well fields. All supply goes through Water Treatment Plant. Source of supply data comes from finished water meters: North Clearwell and South Clearwell meters (Badger electromagnetic meters). VOS input derived from: Manual reads from production meters as archived. Comments: Input derivation from supporting documents confirmed. Exclusion of non-potable volumes confirmed.	Percent of own supply metered: 100% Signal calibration frequency: Twice every year. Calibration records provided. Volumetric testing frequency: Annual. Strap-on meter comparison; however test results for accuracy tests (beyond calibration not furnished). Volumetric testing method: Strap on ultrasonic comparison. Percent of own supply tested and/or calibrated: 100% Comments: No additional comments.
2	VOS Master Meter & Supply Error Adjustment	VOS MMSEA	8	Input derivation: Meter read correction left blank in absence of available test data. Value composed of storage change correction. Net storage change included in MMSEA input: Yes. Comments: No additional comments.	Supply meter read frequency: Daily. Manual reads completed at midnight every day; SCADA read continuously. Supply meter read method: Manual. Supplemented by continuous SCADA monitoring. Frequency of data review for trends & anomalies: Each business day by operator, once or twice a week by supervisor. Storage levels monitored in real-time: Yes. Comments: Raw water and well water numbers are compared to clearwell totals on a daily basis. Operator and supervisor review prompts investigation when a discrepancy is observed. Program runs reported volumes at any frequency/time period. 19.3 MG in storage capacity (operated at consistent levels determined by a winter flow level, and summer flow level).
3	Water Imported	WI	n/a	n/a	n/a
4	WI Master Meter & Supply Error Adjustment	WI MMSEA	n/a	n/a	n/a
5	Water Exported	WE	n/a	n/a	n/a
6	WE Master Meter & Supply Error Adjustment	WE MMSEA	n/a	n/a	n/a

#	AWWA Water Audit Input	Code	Final DVG	Basis on Input Derivation	Basis on Data Validity Grade
7	Billed metered	BMAC	3	Customer meter profile: Age profile: Halfway through new meter push (started in 2012). Reading system: New meters are AMR; old meters are manually read. Read frequency: Monthly. Comments: Lag-time correction is partially employed in input derivation. Reads completed on dates within the audit period are incorporated (splitting accounts within cycles), but consumption volumes per bill are not prorated. Input derivation from supporting documents confirmed. Exclusion of non-potable volumes confirmed. Hydrant classification included in billing summary is majority construction use and billed.	Percent of customers metered: 100% Small meter testing policy: None. Number of small meters tested/year: 0 Large meter testing policy: None. Number of large meters tested/year: 0 Meter replacement policy: Replacement based on failure. Ongoing via meter conversion project at ~8% each year. Number of replacements/year: Budgeted for ~1500. Billing data auditing: Standard billing QC, plus review of volumes by use type each billing cycle. Comments: Invested in field testing equipment, customer complaint testing to be established going forward.
8	Billed unmetered	BUAC	n/a	n/a	n/a
9	Unbilled metered	UMAC	n/a	n/a	n/a
10	Unbilled unmetered	UUAC	5	Profile: Operational flushing and fire department usage. Comments: Flushing activities greatly scaled back due to drought. Custom California default of 0.25%xWS utilized.	Comments: Default grade applied.
11	Unauthorized consumption	UC	5	Comments: Default input applied.	Comments: Default grade applied.
12	Customer metering inaccuracies	CMI	1	See BMAC comments regarding meter testing & replacement activities. Input derivation: Rudimentary estimate. Comments: Under-registration estimate of 1% estimated given prevalence of newly installed meters.	Characterization of meter testing: None. Characterization of meter replacement: Ongoing (proactive), annual. Comments: No additional comments.
13	Systematic data handling errors	SDHE	5	Comments: Default input applied.	Comments: Default grade applied.
14	Length of mains	Lm	6	Input derivation: Totaled from GIS based map. Hydrant leads included: Yes. Comments: No additional comments.	Mapping format: Digital. Asset management database: In place but separate from GIS system. Work orders serve as asset condition inventory, informing replacement.

#	AWWA Water Audit Input	Code	Final DVG	Basis on Input Derivation	Basis on Data Validity Grade
					Map updates & field validation: Accomplished through normal work order processes. Comments: No additional comments.
15	Number of service connections	Ns	9	Input derivation: Standard report run from billing system. Basis for database query: Location or other premise-based ID. Comments: Query of meter IDs (one meter associated with each service connection)	CIS updates & field validation: Accomplished through normal meter reading processes. Estimated error of total count within: <1%. Comments: No additional comments.
16	Ave length of cust. service line	Lp	10	Comments: Default input and grade applied, as customer meters are typically located at the property boundary given California climate.	
17	Average operating pressure	AOP	4	Number of zones, general profile: Four pressure zones, one of gravity fed, others managed via pumps and reservoirs. Typical pressure range: 40 – 100 PSI Input derivation: Inferred from observations of pressure readings in field or review of pressure measurements. Comments: No additional comments.	Extent of static pressure data collection: Some static pressure collected for customer complaints. Characterization of real-time pressure data collection: Basic - telemetry or pressure logging at boundary points (supply locations, tanks, PRVs, boosters). Hydraulic model: One exists but is not known to have been calibrated within the last 5 years. Comments: Water master plan developed by third party; designed hydraulic models for demand projections, fire flows.
18	Total annual operating cost	TAOC	10	Input derivation: From official financial reports. Comments: Confirmed costs limited to water only, and water debt service included.	Frequency of internal auditing: Annually. Frequency of third-party CPA auditing: Annually. Comments: Operating expenses for water lines, treatment plants, and billing department.
19	Customer retail unit cost	CRUC	8	Input derivation: Total consumptive revenue divided by Billed Metered Authorized Consumption. Sewer charges are based on water meter readings for a sub-population of non-residential customers. Sewer revenues are not incorporated into calculation. Comments: No additional comments.	Characterization of calculation: Weighted average composite of all rates. Input calculations have not been reviewed by an M36 water loss expert. Comments: No additional comments.
20	Variable production cost	VPC	5	Supply profile: Own sources only. Primary costs included: Treatment chemicals, supply & distribution power, and purchase costs. Secondary costs included: None currently included.	Characterization of calculation: Primary costs only. Input calculations have not been reviewed by an M36 water loss expert. Comments: No additional comments.

#	AWWA Water Audit Input	Code	Final DVG	Basis on Input Derivation	Basis on Data Validity Grade
				Comments: No additional comments.	

Key Audit Metrics

(~)	VALIDITY	Data Validity Score: 60	Data Validity Band (Level): Band III (51-70)	
(#)	VOLUME	ILI: 1.49	Real Loss: 21.59 (gal/conn/day)	Apparent Loss: 5.27 (gal/conn/day)
($)	VALUE	Annual Cost of Apparent Losses: $171,918	Annual Cost of Real Losses: $304,591	

Infrastructure & Water Loss Management Practices:

Infrastructure age profile: 30 – 50 year old average (up to 100 years old)

Infrastructure replacement policy (current, historic): Ongoing replacement of mains, $2.5MM per year allocated, realized in phases to do proactive work (upcoming $10MM investment); 3 miles

Estimated main failures/year: 46 main breaks Estimated service failures/year: 80 service connection failures

Extent of proactive leakage management: 150 miles of leak detection completed per year

Other water loss management comments: No additional comments.

Comments on Audit Metrics & Validity Improvements

The Infrastructure Leakage Index (ILI) of 1.49 describes a system that experiences leakage at 1.49 times the modeled technical minimum for its system characteristics.

The Data Validity Score falling within Band III (51-70) suggests that next steps may be focused simultaneously on improving data reliability and evaluating cost-effective interventions for water & revenue loss recovery. Opportunities to improve the reliability of audit inputs and outputs include:

- Temporal alignment of Billed Metered Authorized Consumption with Water Supplied: consider pro-rating the first and last months of the audit period to better align consumption with actual dates of use, and using read date as basis for reporting.
- Customized estimate of Unbilled Unmetered Authorized Consumption: consider producing itemized, agency-specific estimates of unbilled unmetered (operational) uses, rather than using the default. Ensure leakage estimates are excluded.
- Improved estimation of CMI: consider a customer meter testing program which tests a sample of random meters whose stratification (by size, age, or other characteristics) represents the entire customer meter stock.

When the CA-NV AWWA Water Audit Validator (WAV) program comes online after this year, is the utility planning on having a staff member become certified to perform the Level 1 Validation for future audits? Unsure.