Certified Level 1 Validation Report, Part A: Validator Provided Details

Validator Provided

Audit Information:

Water Supplier Name: Vaughn Water Company **PWS ID:** 1510029

System Type: Potable **Audit Period:** 1/2017 – 12/2017

Utility Representation: Horacio Perez, Operations Technical Assistant

Validation Date: 2/21/2019 **Call Time:** 11:00 **Sufficient Supporting Documents Provided:** Yes

Validation Findings & Confirmation Statement:

Key Audit Metrics:

Data Validity Score: 56 **Data Validity Band (Level):** Band III (51 – 70)

ILI: 2.90 **Real Loss:** 37.92 (Gal/conn/day) **Apparent Loss:** 47.75 (Gal/conn/day)

Non-revenue water as percent of cost of operating system: 9.7%

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. ☒

If not, rejected recommendations are included here.

Validator Information:

Water Audit Validator: Justin Bailey, Rubio Cañon Land and Water Association

Qualifications: Water Audit Validator Certificate issued by the CA-NV Section of the AWWA

Certified Level 1 Validation Report, Part B: Utility Provided Details

Utility Provided

Audit Information:

Water Supplier Name:	Vaughn Water
Water Supplier ID Number:	1510029
Water Audit Period:	1/2017 – 12/2017

Water Audit & Water Loss Improvement Steps:

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

- Assessing and budget planning to implement annual VOS volumetric meter testing, to begin in CY 2019.
- Assessing and budget planning to increase existing meter replacement practices, expanding beyond reactive meter replacement only. To begin in CY 2019
- Management evaluating introduction of SCADA system, and future budgeting to integrate local facility telemetry to full time monitoring.

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 Audit and Loss Control Programs, Manual M36, Fourth Edition* and in the Free Water Audit Software version 5.

Executive Name (Print)	Executive Position	Signature	Date
Horacio Perez	Operations Technical Asst.		3/27/2019

Level 1 Validation Summary Notes

Pre-Interview Notes	Vaughn Water Company was founded in 1928, and started with only (3) service connections at the time. The service area developed rapidly to over 9,300 services by 2010, and proudly serves 10,741 connections as of December, 2017. Vaughn Water relies exclusively on ground water. The Distribution System is supplied by 12 Agency production wells and (3) booster stations. Vaughn Water currently operates a variety of Treatment Plants to process the ground water and assure all drinking water standards are met.

Audit Input	Confirmation of Input Derivation	Confirmation of DVG Assignment
Volume from Own Sources (VOS)	**Supply meter profile:** Water entering the system is comprised of combined flows of 12 independent wells. Each well has its own production meter that is manually read daily and reviewed monthly. **VOS Input Data Source:** Meter registers are manually read daily as well as on a monthly basis. Vaughn Water does not yet have a fully functional SCADA system that can record inputs continuously. Production reports track cumulative production throughout the year. **Comments**: 100% of water entering the system is provided by these own sources. The meters for these production wells are not tested volumetrically on a routine or annual basis. **Confirmed input value: 3,799.410 MG**	**Percent of VOS metered:** 100% **Signal calibration frequency:** Not performed; No SCADA **Volumetric testing frequency:** Inconsistent. None in CY 2017 **Volumetric testing method:** Unknown **Percent of VOS tested and/or calibrated:** 0% in CY 2017 **Comments:** Vaughn staff is in the planning stages to introduce annual volumetric testing of all (12) VOS meters, beginning in 2019. **Confirmed DVG: 4**
VOS Master Meter Error Adjustment	**Adjustment Basis: N/A** **Net Storage Change Included:** No **Comments:** No MMEA value able to be reported **Confirmed input value: N/A**	**Supply meter read frequency:** Daily **Supply meter read method:** Manual Read only **Frequency of data review:** Monthly **Storage level monitoring frequency:** Unknown **Comments:** None **Confirmed DVG: N/A**

Level 1 Validation Summary Notes

Audit Input	Confirmation of Input Derivation	Confirmation of DVG Assignment
Water Imported (WI)	**Import meter profile: N/A** **WI Data Source:** **Comments:** **Confirmed input value: N/A**	**Percent of WI metered:** **Signal calibration frequency:** **Volumetric testing frequency:** **Volumetric testing method:** **Percent of WI tested and/or calibrated:** **Comments:** **Confirmed DVG: N/A**
WI Master Meter Error Adjustment	**Adjustment Basis: N/A** **Comments:** **Confirmed input value: N/A**	**Import meter read frequency:** **Import meter read method:** **Frequency of data review:** **Comments:** Left blank for lack of test data **Confirmed DVG: N/A**
Water Exported (WE)	- **Export meter profile:** There are currently (5) existing interconnections for exporting water to neighboring agencies; • City of Bakersfield Meacham @ Calloway • City of Bakersfield Brimhall @ Calloway • Goose Lake Water Co. • Harvest Moon • Manon & Manor **WE Data Source:** Meter registers are manually read daily as well as on a monthly basis when the connection is in use. Reports are maintained to track all water export volumes and durations. **Comments:** No water was exported in CY 2017 **Confirmed input value: 0.0 MG**	**Percent of WE metered:** 100% **Signal calibration frequency:** N/A **Volumetric testing frequency:** Unknown **Volumetric testing method:** Unknown **Percent of WE tested and/or calibrated:** 0% in CY 2017 **Comments:** The WE meters are also being included within the plan to initiate annual volumetric testing in CY 2019 **Confirmed DVG: 4**

Level 1 Validation Summary Notes

Audit Input	Confirmation of Input Derivation	Confirmation of DVG Assignment
WE Master Meter Error Adjustment	**Adjustment Basis: N/A** **Comments:** Left blank for lack of test data **Confirmed input value: N/A**	**Export meter read frequency:** Weekly when operational + Monthly. **Export meter read method:** **Frequency of data review:** **Comments:** **Confirmed DVG: N/A**
Billed Metered Authorized Consumption (BMAC)	**Customer Meters & Reads Profile:** The customer base is comprised of a mix of service types; 96% single family residential, 0.4% multi-family residential, 2.1% commercial businesses, 0.2% Industrial & 1.1% Landscaping irrigation. - **Age profile:** The latest Engineering Report estimated an average age profile of 12 years. However, Vaughn staff are aware of sections of service meters dating more than 20 years old. - **Reading system:** Manual meter read entered into hand-held unit for computer syncing with billing system - **Read frequency:** Monthly **Billing Data Pro-rated?** Yes, in the event of meter failure. Historical billing data is utilized to best inform pro-rated billing amount. **Comments:** Includes all metered & estimated (unmetered) water sales. **Confirmed input value: 3,209.0 MG**	**Percent of customers metered:** 94.2% **Small meter testing policy:** Reactive meter testing based on customer requests or complaints only. **Number of small meters testing/year:** Unknown **Large meter testing policy:** Reactive meter testing based on customer requests or complaints. **Number of large meter tested/year:** Unknown **Meter replacement policy:** Yes. Current policy is limited to customer requests or damaged / inoperable meters. **Number of replacements/year:** 120 meters (1.2%) were replaced in CY 2017. **Billing data auditing practice:** Computer billing software w/ monthly in-house auditing and annual 3rd party auditing **Comments:** Meter testing only occurs under limited conditions and is reactive. Meter replacement is scheduled to increase each year with the goal to reduce the current overall average meter age of 12 years. **Confirmed DVG: 4**

Level 1 Validation Summary Notes

Audit Input	Confirmation of Input Derivation	Confirmation of DVG Assignment
Billed Unmetered Authorized Consumption (BUAC)	**Billed Unmetered Profile:** Volume is from 618 unmetered, flat rate, customer services. **Input Derivation:** Consumption estimates based on Agency formula to produce accurate monthly totals for billing, recording purposes. **Comments:** Each occurrence is metered or calculated using formulae of time and flow to accurately estimate volumes. **Confirmed input value: 220.809 MG**	**Policy for metering exemptions:** Strict policy for approval and invoicing are in place. Sale of property defaults service to metered connection installation. **Comments:** Records are kept updated and available for 3rd party review. **Confirmed DVG: 7**
Unbilled Metered Authorized Consumption (UMAC)	**Unbilled Metered Profile:** Volumes are from metered backwashing of Hageman 2 and Willow Pond Treatment Plants + metered flushing for water quality. **Input Derivation:** Staff-maintained records of all backwashes with metered volumes are recorded monthly and annually. **Comments:** Each occurrence is metered to accurately record UMAC volumes. **Confirmed input value: 14.738 MG**	**Policy for billing exemptions:** Strict policy for approval and tracking are in place. **Comments:** Records of all backwashes are kept updated and available for 3rd party review. Most backwashes are performed on a preset timeline, making it easier to prepare for and maintain accurate records. **Confirmed DVG: 9**
Unbilled Unmetered Authorized Consumption (UUAC)	**Unbilled Unmetered Profile:** Operational flushing and fire department use. **Input Derivation if Estimated:** Records of Flushing volumes & frequency + estimated volumes **Comments:** Routine flushing practices were reduced for Ca. Draught, but Vaughn staff believes necessary water quality flushing likely exceeded the Default volume of 0.25% x WS. Input was estimated at 0.50% of WS to provide a more accurate estimate. **Confirmed input value: 18.997 MG**	**Default or Adjusted Default Applied:** Adjusted default **Completeness of Documentation:** Records kept of estimated frequency and volumes **Comments:** All fire flow volumes and hydrant flushing are monitored and calculated by time and flow formulae to minimize UUAC volumes. **Confirmed DVG: 5**

Level 1 Validation Summary Notes

Audit Input	Confirmation of Input Derivation	Confirmation of DVG Assignment
Unauthorized Consumption (UC)	**Default Applied?** Yes **Input Derivation if Customized:** Default input utilized **Comments:** All suspicious activities are investigated and active efforts are built into routine patrols to guard against UC. **Confirmed input value: 9.499 MG**	**Instances and extent of UC documented:** None identified. **Comments:** Vaughn Water has standard practices in place to actively identify instances of UC. However, since known instances occur so infrequently, no auditable documentation has been put in place to track and query each instance. An auditable form will be created as a recommendation of this validation for continuous documentation and future reference. **Confirmed DVG: 5**
Customer Metering Inaccuracies (CMI)	**Input Derivation:** See BMAC activities for meter testing and replacement practices. Meter accuracy estimated on average meter age of 12 years. **Comments:** Inconsistent record keeping and tracking exists, making overall meter age difficult to ascertain. A relatively high inaccuracy % is estimated due to minimal replacement practices, minimal test practices and currently increasing age of meter population. **Confirmed input value: (5%) 169.670 MG**	**Characterization of meter testing:** Currently, meter testing only occurs at request of customer, of which, there are no records. **Characterization of meter replacement:** Reactive. Meters only replaced at request of customer or when leak / inoperability identified. **Comments:** Proactive meter replacement has become an increased priority for CY 2019. Plans are underway to introduce service meter accuracy tests and to increase the annual quantity replaced to above 120 per year. **Confirmed DVG:3**
Systematic Data Handling Errors (SDHE)	**Input Derivation:** Computerized billing software and reporting is in place. In house audits of data occur monthly and a 3rd party auditor review takes place annually. **Comments:** Account management practices are reviewed annually by staff. Software automatically flags for zero, hi, and low usage. Reports and billing are processed monthly and internal audits of data are performed monthly for each billing cycle. **Confirmed input value: 8.023 MG**	**If custom estimate provided –** Default input utilized **Characterization of read collection & billing process:** Manual meter read entered into hand-held electronic units. Electronic units docked and synchronized with computerized billing software **Characterization of billing process and billing data auditing:** In house monthly and 3rd party annually. **Confirmed DVG: 5**

Level 1 Validation Summary Notes

Audit Input	Confirmation of Input Derivation	Confirmation of DVG Assignment
Length of Mains	**Input Derivation:** Historic data of pipeline installations, As-Builts, Hydraulic Model, and updated paper maps. **Hydrant lateral length included:** No **Comments:** Base maps and As-Builts are cross referenced and field verified for accuracy. Sound policies exist for updating maps following new main installation. Confirmed input value: **221.0 Miles**	**Mapping format:** Combination of paper maps and Hydraulic Model interface. **Asset management database:** None dedicated. **Map updates & field validation:** Map updates take place following each project and are a combination of edits both in-house and outsourced to engineering consultant. **Comments:** There is no current timeline for the implementation of GIS or an Asset Management System. Confirmed DVG: **6**
Number of Active and Inactive Service Connections	**Input Derivation:** Billing software is used to query accurate record of accounts. **Basis for database query:** Account ID or Parcel ID **Comments:** Service count has remained relatively flat with only small quantities of account activations or deactivations occurring annually. Monitoring the transition from Unmetered connections to metered connections has kept overall service counts a frequently reviewed detail. Confirmed input value: **10,741**	**CIS updates & field validation:** Accomplished through normal meter reading and billing process. **Estimated error of total count within:** 2% **Comments:** Infrequency of Account activation or deactivation combined with long standing procedures and computerized accounting software produces highly reliable results. Auditing of electronic records takes place by a 3rd party annually. Confirmed DVG: **9**
Average Length of Customer Service Line	**Are customer meters at the curbstop? Yes** **Where are customer meters installed if not at curbstop?** **Customer service line derivation** **Comments:** Default input grade applied. Customer meters are typically located at the property boundary. Confirmed input value: **YES**	**Comments:** Default input grade applied. Customer meters are typically located at the property boundary. Confirmed DVG: **10**

Level 1 Validation Summary Notes

Audit Input	Confirmation of Input Derivation	Confirmation of DVG Assignment
Average Operating Pressure	**Number of zones, general setup:** The distribution system has 14 pressure zones, supplied by 16 storage tanks. 12 VOS wells produce water at various locations throughout the system to meet overall customer demands. **Typical pressure range:** 20 – 90 psi w/ 50 psi average across all pressure zones. **Input derivation:** Facility pressure gauges and Hydraulic Model **Comments:** Pressure zone integrity is tightly controlled and no valves are left in a position to breech pressure zones. **Confirmed input value: 50 psi**	**Extent of static pressure data collection:** Analog meters read daily during routine system patrols. Pressures recorded and reviewed monthly. **Characterization of real-time pressure data collection:** Manual collection only. No SCADA for full-time monitoring system **Hydraulic model in place?** Yes **Calibrated?:** 2014 **Comments:** Extensive Hydraulic Model built in 2013. Model has been reviewed and revised on several occasions; 2014 and again in 2018 (outside of this Audit period). **Confirmed DVG: 4**
Total Operating Cost (TOC)	**Input Derivation:** Vaughn Water Company Income Statement – Year Ending 2017 **Comments:** Income Statement captures all operating costs as well as depreciation, employee benefits and insurance liability costs. **Confirmed input value: $6,443,341 / Year**	**Frequency of internal auditing:** Monthly **Frequency of third-party CPA auditing:** Annually **Comments:** Itemized cost accounting system is in place with internal review taking place monthly, and 3rd party audit of data occurring annually by outsourced CPA. **Confirmed DVG: 10**
Customer Retail Unit Cost (CRUC)	**Input Derivation:** Internal balancing of cumulative operating costs divided by total unit sales. **Sewer Charges Volumetric?** N/A **Sewer Charges Included?** N/A **Comments:** Tiered rate structure w/ 6 service type categories. **Confirmed input value: $1.27 / 100 Cubic Feet**	**Characterization of calculation:** Calculation of volumetric charges divided by metered consumption. Input calculations have not been reviewed by an M36 water loss expert. **Comments:** Tiered rate structure implemented 11/2015 with a follow on review and revision completed 5/2017. **Confirmed DVG: 8**

Level 1 Validation Summary Notes

Audit Input	Confirmation of Input Derivation	Confirmation of DVG Assignment
Variable Production Cost (VPC)	**Supply profile:** 100% of water supplied was produced by Vaughn Water own sources in 2017. **Direct variable costs included:** Gaseous chlorine, supply and distribution power, and purchase costs. **Secondary costs included:** Employee wages, Liability Insurance costs plus benefits & pension plans. **Comments: Itemized** cost accounting system in place with well trained staff administering and annual internal + annual 3rd party CPA audits. Confirmed input value: **$1.27 / 100 Cubic Feet**	**Characterization of calculation:** Primary costs plus many secondary costs. **Comments:** Although variable costs are well known and tracked, the completed report and CPA Audit is not reviewed by an M36 water loss expert. Confirmed DVG: **7**
Pending Items needed to complete the validation	None	