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

Validator Provided

Audit Information:

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

System Type: Potable **Audit Period:** 1/2019 – 12/2019

Utility Representation: Horacio Perez, Operations Technical Assistant

Validation Date: 11/25/2020 **Call Time:** 11:00 **Sufficient Supporting Documents Provided:** Yes

Validation Findings & Confirmation Statement:

Key Audit Metrics:

Data Validity Score: 53 **Data Validity Band (Level):** Band III (51 – 70)

ILI: 1.57 **Real Loss:** 20.40 (Gal/conn/day) **Apparent Loss:** 39.81 (Gal/conn/day)

Non-revenue water as percent of cost of operating system: 6.5%

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 **CA1510029**
Water Audit Period: 1/2019 – 12/2019

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:

- Increased budget and priority for meter replacements beginning in 2019
- Will evaluate costs & budget requirements to perform VOS Meter accuracy testing in 2021

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.		December 4, 2020

Level 1 Validation Summary Notes

Pre-Interview Notes	Vaughn Water Company started business in 1928. The company has grown from 3 connections in 1928 to over 10,800 connections in 2019. 100% of Vaughn's water supply comes from ground water. All but (1) well currently go through a range of treatment vessels. These currently consist of six activated carbon plants, four ozone treatment facilities, and one catalytic carbon plant. Final receipt of all required documents for Validation received on 11/4/2020

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 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 spreadsheets 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 yet tested volumetrically on any routine or annual basis. **Confirmed input value: 3,864.074 MG**	**Percent of VOS metered:** 100% **Signal calibration frequency:** Not performed; No SCADA **Volumetric testing frequency:** Inconsistent. None in CY 2019 **Volumetric testing method:** Not applicable **Percent of VOS tested and/or calibrated:** 0% in CY 2019 **Comments:** Vaughn staff is in the planning stages to introduce annual volumetric testing of all (12) VOS production meters, beginning in 2021. **Confirmed DVG: 3**
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 (7) existing interconnections for exporting water to neighboring agencies; ➢ Manon & Manor ➢ Harvest Moon ➢ Goose Lake Water Co. ➢ City of Bakersfield Meacham/Calloway ➢ City of Bakersfield Brimhall/Calloway ➢ Agape Mutual ➢ Maher Mutual **WE Data Source:** Meter registers are manually read daily as well as on a monthly basis when the connection is in use. **Comments:** No water was exported in CY 2019 **Confirmed input value: 0.0 MG**	**Percent of WE metered:** 100% **Signal calibration frequency:** Unknown **Volumetric testing frequency:** Unknown **Volumetric testing method:** Unknown **Percent of WE tested and/or calibrated:** 0% in CY 2019 **Comments:** The WE meters are also being included within the plan to review annual volumetric testing in CY 2021 **Confirmed DVG: 4**

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, 2.2% commercial businesses & 1.4% Industrial and Landscaping irrigation. Total active service connections reached 11,039 by December, 2019. - **Age profile:** The latest Engineering Report would put the estimated average age profile of 13 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: 3,396.064 MG**	**Percent of customers metered:** 95.0% **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 limits replacements to customer requests or damaged / inoperable meters. **Number of replacements/year:** 120 meters (1.15%) were replaced in CY 2019. 125 meters (1.15%) were replaced in CY 2018. 120 meters (1.15%) were replaced in CY 2017. This shows consistent, but very low % of overall service count being modernized **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 will increase each year as the average age of the meters progresses beyond the current 13 years overall age. **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 based on 593 unmetered, flat rate customer services. **Input Derivation:** Consumption estimates based on Agency formula to produce accurate monthly totals for billing and recording purposes. **Comments:** Unmetered service connections account for only 5.5% of overall Authorized Consumption volume. **Confirmed input value: 197.226 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 of flat rate customers 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 backwash records with metered volumes are recorded monthly and annually. **Comments:** Each occurrence is metered or calculated on flow x time to accurately account for all UMAC volumes. **Confirmed input value: 18.503 MG**	**Policy for billing exemptions:** Strict policy for approval and tracking are in place. **Comments:** Records are kept updated and available for 3rd party review. **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:** Default of 0.25% x WS was utilized **Confirmed input value: 9.660 MG**	**Default or Adjusted Default Applied:** Default utilized **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: 9.660 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 the validation process for documentation and future reference. **Confirmed DVG: 5**
Customer Metering Inaccuracies (CMI)	**Input Derivation: S**ee BMAC activities for meter testing and replacement practices. Meter accuracy estimated on average meter age of 13 years. **Comments:** Inconsistent record keeping and tracking exists, making overall meter age difficult to ascertain. A relatively high inaccuracy % is estimated due to minimal meter replacements, reactive test practices and an increasing age of the overall meter population. **Confirmed input value: (4.0%) 142.274 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:** 120 Meter replacements annually has been demonstrated for several years, but will not introduce new meters fast enough to positively impact overall meter inaccuracy. Without meter testing, estimates of diminishing accuracy will be expanded upon from the year prior. **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: 8.490 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, recently calibrated Hydraulic Model, and updated paper maps. **Hydrant lateral length included:** No **Comments:** Base maps and As-Builts are cross referenced for accuracy. Sound policies exist for updating maps following new main installation. Construction Department tracks and retains detailed red-line as-builts from all main abandonment and installations. **Confirmed input value: 223.9 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 a GIS or an Asset Management System. **Confirmed DVG: 5**
Number of Active and Inactive Service Connections	**Input Derivation:** Billing software is used to query accurate record of accounts. Annual audit produced number of service account changes per month for verification. **Basis for database query:** Account ID or Parcel ID **Comments:** Monthly tabulation of Account activation or deactivation combined with long standing procedures and computerized accounting software produces highly reliable results **Confirmed input value: 11,039**	**CIS updates & field validation:** Accomplished through normal meter reading process **Estimated error of total count within:** 2% **Comments:** Vaughn Water was able to quickly produce a report that documented monthly changes in service account quantity. 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 system has 14 pressure zones - supplied by 16 storage reservoirs. The 12 VOS Wells produce water at various locations within the system to meet overall customer demands. **Typical pressure range:** 20 – 80 psi in general w/ 50 psi average across all pressure zones. **Input derivation:** Hydraulic Model, facility elevations, and monitored analog pressure gauges at facilities **Comments:** Pressure zone integrity is tightly monitored and no valves are left in a position to breech pressure zones. **Confirmed input value: 50 psi**	**Extent of static pressure data collection:** Analog gauges + Hydraulic Model **Characterization of real-time pressure data collection:** Limited. Physical monitoring of analog gauges is the only real-time method currently available. **Hydraulic model in place? Yes** **Calibrated?: 6/2018** **Comments:** Vaughn Water utilizes a hydraulic model. The model was most recently calibrated in June, 2018 by Jasper & Associates Engineering. **Confirmed DVG: 4**
Total Operating Cost (TOC)	**Input Derivation:** From internal budgeting reports and 3rd party Audit confirmation. Document reviewed titled "Income Statement" for year ending 2019 **Comments:** Vaughn has now completely transitioned to O'Dell Cross CPA. The same annual auditing performed and budget documents provided. TOC includes 21 subcategories defined as "Operating Expenditures" of $6,665,837 + separately itemized Depreciation of $1,038,843. **Confirmed input value: $7,704,680.00 / Year**	**Frequency of internal auditing:** Monthly **Frequency of third-party CPA auditing:** Annually **Comments:** Well-structured cost accounting system is in place with internal review taking place monthly, and 3rd party audit of accounts occurring annually. **Confirmed DVG: 10**
Customer Retail Unit Cost (CRUC)	**Input Derivation:** Sales Revenue divided by billed water sold (Metered & Unmetered Connections) **Sewer Charges Volumetric?** N/A **Sewer Charges Included?** N/A **Comments:**. 3-Tiered rate structure reviewed and updated costs implemented 1/2018. **Confirmed input value: $1.85 / 100 Cubic Feet**	**Characterization of calculation:** CRUC $$ amount equals $ (Water Sales Revenue) = $8,894,939 Divided by 4,803,863.363 CCF (Sales Generating Revenue) = $1.85 / 100 cubic feet (CCF) Input calculations have not been reviewed by an M36 water loss expert prior to submission for Validation. **Comments:** Tiered, composite rate structure in place **Confirmed DVG: 9**

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 CY 2019. **Direct variable costs included:** Power & Treatment (No Imported water in CY2019) **Secondary costs included:** Provided report includes 21 subcategories defined as "Operating Expenditures" + separately itemized Depreciation. **Comments:** Cost accounting system in place with well trained staff administering and annual internal + annual 3rd party CPA audits. **Confirmed input value: $952.42 / Million Gallons (MG)**	**Characterization of calculation:** Replicated the formula from CRUC. (Comprehensive TOC including Depreciation divided by Total WS) **Comments:** All variable costs are well known and tracked. The provided details are line itemized within EOY Income Statement. The annual audit process does not include an M36 water loss expert. **Confirmed DVG: 7**
Pending Items needed to complete the validation	None	