# Certified Validation Report Template, Part B: Provided by Utility

Utility Provided

**Water Supplier Name:** Pasadena Water & Power **Water Supplier ID Number:** 1910124 **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:*

**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 |
|---|---|---|---|
| Bradley R Beman | Engineering Manager | Bradley R Beman | 10-1-18 |

Validator Provided

# Appendix B

## Certified Validation Report Template, Part A: Provided by Validator

**Audit Information:**

**Water Supplier Name:** Pasadena Water & Power **PWS ID:** 1910124

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

**Utility Representation:** Brad Bowman, District Engineer Tony Estrada, Pasadena Engineer

**Validation Date:** 9/26/2018 **Call Time:** 14:30 **Sufficient Supporting Documents Provided:** Yes

**Validation Findings & Confirmation Statement:**

**Key Audit Metrics:**

**Data Validity Score:** 65 **Data Validity Band (Level):** Band III (51-70)

**ILI:** 2.61 **Real Loss:** 43.04 (Gal/conn/day) **Apparent Loss:** 10.70 (Gal/conn/day)

**Non-revenue water as percent of cost of operating system:** 5.5%

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

**APPENDIX A: Level 1 Validation Notes Template**

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|---|---|
| Pre-Interview Notes | Pasadena Water and Power is a not-for-profit public service owned and operated by the City of Pasadena for the benefit of its customers and the community. The distribution system server more than 38,000 metered connections and supplied more than 28,000 Acre Feet of water in 2017. 61% of that volume was imported from MWD, and 38% of overall production was supplied by Pasadena owned and operated wells and facilities.<br><br>All of the required information and supporting documentation necessary to perform this validation was presented in an organized and timely manner. |

| 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 18 wells and (5) MWD imported water connections.<br><br>**VOS Input Data Source:** Meter registers are manually on a weekly basis and flows are tracked real time via SCADA. Produced volumes are recorded monthly and annually.<br><br>**Comments:** 38% of water produced is from the (18) ground water production wells. The meters for each are tested volumetrically on an annual basis.<br><br>Confirmed input value: **11,149.805 AF** | **Percent of VOS metered:** 100%<br><br>**Signal calibration frequency:** Reactive, following observed discrepancy between mechanical meter and SCADA flow.<br><br>**Volumetric testing frequency:** Annual<br><br>**Volumetric testing method:** Timed flow through test meter or pitot tube method<br><br>**Percent of VOS tested and/or calibrated:** 100%<br><br>**Comments:** The volumetric testing occurs annually and procedures are well known by staff.<br><br>Confirmed DVG: **7** |
| VOS Master Meter Error Adjustment | **Adjustment Basis:** Pump Check annual volumetric testing reports<br><br>**Net Storage Change Included:** No<br><br>**Comments:** Pasadena W&P conducts regular volumetric testing of each well on an annual basis.<br><br>Confirmed input value: **62.880 AF** | **Supply meter read frequency:** Meter registers are read each week and daily while running.<br><br>**Supply meter read method:** Manual<br><br>**Frequency of data review:** Weekly<br><br>**Storage level monitoring frequency:** Hourly<br><br>**Comments:** Known meter accuracy % is applied to each recorded monthly registered volumes to produce highly accurate actual volume produced by each well.<br><br>Confirmed DVG: **3** |

## Level 1 Validation Summary Notes Template

| Audit Input | Confirmation of Input Derivation | Confirmation of DVG Assignment |
|---|---|---|
| Water Imported (WI) | **Import meter profile:** Imported water is supplied by MWD through (5) separate metered connections.<br><br>**WI Data Source:** Meter registers are read weekly and flows are recorder by SCADA in real time. Production reports track cumulative production on a monthly basis throughout the year.<br><br>**Comments:** 61% of total water supplied was imported<br><br>**Confirmed input value: 17,719.278 AF** | **Percent of WI metered:** 100%<br>**Signal calibration frequency:** Annually<br>**Volumetric testing frequency:** Unknown<br>**Volumetric testing method:** Unknown<br>**Percent of WI tested and/or calibrated:** 100%<br>**Comments:** MWD performs annual signal calibration of all (5) of their imported water meters annually.<br><br>**Confirmed DVG: 7** |
| WI Master Meter Error Adjustment | **Adjustment Basis:** N/A<br><br>**Comments:** No adjustment made<br><br>**Confirmed input value: N/A** | **Import meter read frequency:**<br>**Import meter read method:**<br>**Frequency of data review:**<br>**Comments:**<br><br>**Confirmed DVG: N/A** |
| Water Exported (WE) | **Export meter profile:** N/A<br><br>**WE Data Source:**<br><br>**Comments:** No water exported in 2017<br><br>**Confirmed input value: N/A** | **Percent of WE metered:**<br>**Signal calibration frequency:**<br>**Volumetric testing frequency:**<br>**Volumetric testing method:**<br>**Percent of WE tested and/or calibrated:**<br>**Comments:**<br><br>**Confirmed DVG: N/A** |

## Level 1 Validation Summary Notes Template

| Audit Input | Confirmation of Input Derivation | Confirmation of DVG Assignment |
|---|---|---|
| WE Master Meter Error Adjustment | **Adjustment Basis:** N/A<br><br>**Comments:**<br><br>**Confirmed input value:** N/A | **Export meter read frequency:**<br><br>**Export meter read method:**<br><br>**Frequency of data review:**<br><br>**Comments:**<br><br>**Confirmed DVG:** |
| Billed Metered Authorized Consumption (BMAC) | **Customer Meters & Reads Profile:** Customer meters are a mix of residential Single family (77%), Residential Multi-Family (10%), Commercial (10%), Fire Service (3%), and City (<1%). Meters are electronically read on a monthly basis for billing and consumption totals.<br>- **Age profile:** Oldest meters are 13 years old. The entire system was upgraded to new meters and AMR registers<br>- **Reading system:** AMR electronic read with computerized billing software<br>- **Read frequency:** Monthly<br><br>**Billing Data Pro-rated?** Yes, in the event of meter failure. The corresponding month from the previous years is used to best inform estimated usage.<br><br>**Comments:** Detailed report of calculated breakdown of all customer accounts and by class provided by Pasadena W&P. Includes all metered water sales of 26,429.107 AF.<br><br>**Confirmed input value: 26,429.107 AF** | **Percent of customers metered:** 100%<br><br>**Small meter testing policy:** Reactive meter testing based on customer requests or complaints<br><br>**Number of small meters testing/year:** Unknown<br><br>**Large meter testing policy:** Reactive meter testing based on customer requests or complaints<br><br>**Number of large meter tested/year:** Unknown<br><br>**Meter replacement policy:** Yes. Meter replacement is performed annually.<br><br>**Number of replacements/year:** Unknown<br><br>**Billing data auditing practice:** Meter reads are electronically entered. Billing software generates consumption and flags inconsistent usage. Billing totals are audited in-house monthly and by a 3rd party annually.<br><br>**Comments:** Meter testing only occurs under limited conditions, however, Pasadena dedicates a departmental team to focused and ongoing meter replacement.<br><br>**Confirmed DVG: 5** |

## Level 1 Validation Summary Notes Template

| Audit Input | Confirmation of Input Derivation | Confirmation of DVG Assignment |
|---|---|---|
| Billed Unmetered Authorized Consumption (BUAC) | **Billed Unmetered Profile:** N/A<br>**Input Derivation:**<br>**Comments:** No estimated billing.<br>**Confirmed input value:** N/A | **Policy for metering exemptions:**<br>**Comments:**<br>**Confirmed DVG:** N/A |
| Unbilled Metered Authorized Consumption (UMAC) | **Unbilled Metered Profile:**<br>**Input Derivation:**<br>**Comments:** All metered water is billed<br>**Confirmed input value: N/A** | **Policy for billing exemptions:**<br>**Comments:**<br>**Confirmed DVG: N/A** |
| Unbilled Unmetered Authorized Consumption (UUAC) | **Unbilled Unmetered Profile:** Services such as public works, street sweepers, and fire department utilize unmetered connections.<br>**Input Derivation if Estimated:** known but incomplete records of approved unmetered water use.<br>**Comments:** Flushing volumes & frequency greatly reduced during Ca. drought. Default of 0.25% x WS utilized<br>**Confirmed input value: 72.015 AF** | **Default or Adjusted Default Applied:** 0.25% x WS used to calculate UUAC.<br>**Completeness of Documentation:** Documentation is incomplete and thus far based on calculated estimates.<br>**Comments:** All fire flow volumes and hydrant flushing are monitored and calculated by time and flow formulae to minimize UUAC volumes.<br>**Confirmed DVG: 5** |
| Unauthorized Consumption (UC) | **Default Applied?** Yes<br>**Input Derivation if Customized:** N/A<br>**Comments:** Default input of 0.25% WS is applied<br>**Confirmed input value: 72.016 AF** | **Instances and extent of UC documented:** Instances do occur and are investigated, but have not been consistently documented.<br>**Comments**: An auditable form will be created as a recommendation of this validation for continuous documentation and future reference.<br>**Confirmed DVG: 5** |

## Level 1 Validation Summary Notes Template

| Audit Input | Confirmation of Input Derivation | Confirmation of DVG Assignment |
|---|---|---|
| Customer Metering Inaccuracies (CMI) | **Input Derivation:** See BMAC activities for meter testing and replacement practices. Meter accuracy estimated on average meter age of 10+ years.<br><br>**Comments:** Good record keeping and tracking exists and entire system has been converted to AMR technology.<br><br>**Confirmed input value:** **(1.2%) 321.001 AF** | **Characterization of meter testing:** Currently, meter testing only occurs at request of customer or when billing software flags a discrepancy.<br><br>**Characterization of meter replacement:** Approximately 5% of our meters were replaced in order to maintain adequate meter accuracy<br><br>**Comments:** Practices are balanced between reactive and proactive replacements.<br><br>**Confirmed DVG:** **3** |
| Systematic Data Handling Errors (SDHE) | **Input Derivation:** AMR + Computerized billing software and reporting is in place. In house audits of data occur monthly and a 3rd party auditor review takes place annually.<br><br>**Comments:** Oversight and auditing of account data is ongoing, with regularly corrected totals applied each month for consumption and billing accuracy. Billing software is capable of generating multiple reports and queries.<br><br>**Confirmed input value:** **66.073AF** | **If custom estimate provided –** Default input volume applied<br><br>**Characterization of read collection & billing process:** Electronic meter reading with AMR is employed throughout the system and reading occurs on a monthly basis<br><br>**Characterization of billing process and billing data auditing:** Computerized billing software with In house review of data performed monthly and 3rd party audits performed annually.<br><br>**Confirmed DVG:** **6** |
| Length of Mains | **Input Derivation:** Hydraulic Model and regularly updated GIS were leveraged to determine accurate distribution system data.<br><br>**Hydrant lateral length included:** No<br><br>**Comments:** Pasadena operates a robust GIS asset management software and a regularly updated hydraulic model in project planning and oversight.<br><br>**Confirmed input value:** **531.1 Miles** | **Mapping format:** GIS and hydraulic model<br><br>**Asset management database:** Yes<br><br>**Map updates & field validation:** Engineering practices include field verification of each project after completion.<br><br>**Comments:** All policies and practices are in place to support DVG of 9<br><br>**Confirmed DVG:** **9** |

## Level 1 Validation Summary Notes Template

| Audit Input | Confirmation of Input Derivation | Confirmation of DVG Assignment |
|---|---|---|
| Number of Active and Inactive Service Connections | **Input Derivation:** Routine query from billing software to produce accurate record of accounts. Reviewed monthly and annually<br>**Basis for database query:** Account ID, Address, or Parcel ID<br>**Comments:** From Pasadena W&P billing query and consumption tracking.<br>Confirmed input value: **38,292** | **CIS updates & field validation:** Accomplished through normal meter reading process and in house audit of data<br>**Estimated error of total count within:** 2%<br>**Comments:** No additional comments<br>Confirmed DVG: **9** |
| Average Length of Customer Service Line | **Are customer meters at the curbstop? Yes**<br>**Where are customer meters installed if not at curbstop?**<br>**Customer service line derivation**<br>**Comments:** Default input grade applied. Customer meters are typically located at the property boundary.<br>Confirmed input value: **YES** | **Comments:** Default input grade applied. Customer meters are typically located at the property boundary.<br>Confirmed DVG: **10** |
| Average Operating Pressure | **Number of zones, general setup:** The system has 28 pressure zones and pumping facilities.<br>**Typical pressure range:** 30 – 90 psi<br>**Input derivation:** Hydraulic Model, SCADA, and GIS inputs<br>**Comments:** Pressure zone integrity is tightly monitored and no valves are left in a position to breech pressure zones. Inter-zone PRV's are kept maintained to further reduce the potential for pressure fluctuations.<br>Confirmed input value: **73.4** | **Extent of static pressure data collection:** SCADA records system pressures while pumps and wells are on or off, allowing static and dynamic pressures to be well identified.<br>**Characterization of real-time pressure data collection:** SCADA telemetry records real time system pressures at all pumping and storage facilities with some temporary pressure gauges capturing pressure data along the distribution system.<br>**Hydraulic model in place? Yes**<br>**Calibrated?: 2014**<br>**Comments:** Hydrant pressures are also recorded during testing / fire flows to further document static system pressures<br>Confirmed DVG: **5** |

## Level 1 Validation Summary Notes Template

| Audit Input | Confirmation of Input Derivation | Confirmation of DVG Assignment |
|---|---|---|
| Total Operating Cost (TOC) | **Input Derivation:** From internal budgeting reports.<br><br>**Comments:** Taken from Financial Statements and Supplementary Information provided by Pasadena<br><br>Confirmed input value: **$48,022,758 / Year** | **Frequency of internal auditing:** Monthly<br><br>**Frequency of third-party CPA auditing:** Annual<br><br>**Comments:** Cost accounting system is in place with monthly internal review and annual audit of data.<br><br>Confirmed DVG: **10** |
| Customer Retail Unit Cost (CRUC) | **Input Derivation:** Calculation of Commodity + CIC annual costs divided by 2017 water sales total. Reference 'Customer Retail Unit Cost' sheet provided by PW&P<br><br>**Sewer Charges Volumetric?** N/A<br><br>**Sewer Charges Included?** N/A<br><br>**Comments:** This value includes all tiers and is weighted appropriately.<br><br>Confirmed input value: **$3.40 / 100 Cubic Feet** | **Characterization of calculation:** Detailed cost tracking confirmed with generated reports using accounting totals.<br><br>**Comments:** Input calculations have not been reviewed by an M36 water loss expert.<br><br>Confirmed DVG: **9** |
| Variable Production Cost (VPC) | **Supply profile:** 39% VOS + 61% Imported from MWD.<br><br>**Direct variable costs included:** Cost defined as cost of imported water and average pumping cost per unit.<br><br>**Secondary costs included:** Unknown<br><br>**Comments:** Cost accounting system in place with annual CPA audits performed<br><br>Confirmed input value: **$1019.47 / AF** | **Characterization of calculation:** Primary costs only as of now. Calculation of volumetric charges divided by metered consumption.<br><br>**Comments:** Although variable costs are well known and tracked, the input calculations do not yet include liability insurance or depreciation costs. The input calculations are not reviewed by an M36 water loss expert.<br><br>Confirmed DVG: **5** |

## Level 1 Validation Summary Notes Template

| Audit Input | Confirmation of Input Derivation | Confirmation of DVG Assignment |
|---|---|---|
| Pending Items needed to complete the validation | None | |