

Appendix L.

Water Loss Audit Regulations

Drought and other water-shortage issues highlight the need to manage water loss in water distribution systems in California. Water loss can result from water theft or from seepage, leaks, and pipe failures caused by aging infrastructure or errors in data. Water utilities can increase water supplies and recover revenue by identifying the scale and cost of these losses. The benefits above can improve relations with the public — both ratepayers and members of the financial community, such as rating agencies. A water audit and the management of water losses can facilitate a broader adoption of more goal-oriented, metric-driven, financially sensible, and publicly accountable decisions.

To improve water loss reporting in California, Senate Bill (SB) 1420 was passed in 2014 requiring water suppliers to submit water loss audits as part of urban water management plans prepared once every five years. SB 555 (Wolk) adopted in 2015 during the 2012-2016 drought, required urban retail water suppliers to submit water loss audits to the state by October 1, each year. The reporting deadline was subsequently modified by AB 1414 (Friedman, Statute of 2019), which required fiscal year reporters to submit their report by January 1 of each year starting January 1, 2021. AB 1414 changes the reporting deadline for all urban water suppliers (whether reporting on a calendar year basis or fiscal year basis), to submit on or before January 1 of each year starting January 1, 2024. Submitted water loss audits shall be system-specific and in the case of an urban retail water supplier with two or more separate public potable water systems, the urban retail water supplier shall submit a separate report for each potable water system (CCR § 638.5).

Appendix L of the 2015 Urban Water Management Plan Guidebook summarized water loss auditing and is still available as an archive, but is not provided here because regulations have since specified how to conduct the audits. The archived version of the 2015 summarized guidance is available for download on the [California Natural Resources Agency website](#). Caution is advised when using this summarized and simplified version because it is not

an officially approved methodology and is not updated for any subsequent changes in methods used.

Since publication of the 2015 Urban Water Management Plan Guidebook, DWR has adopted the regulations for specifying how to monitor and report water loss.

In summary, these regulations require water suppliers to submit a water loss audit report annually to DWR. The audit must be conducted using the methods from American Water Works Association's (AWWA's) most recent Manual of Water Supply Practices and free water audit software. The current manual (as of publication of this UWMP Guidebook) is the M36 Fourth Edition. Each water loss audit report must be validated following the specifications in the California Code of Regulations (below), which then must be submitted to and approved by DWR.

Text below was accessed from the official [California Code of Regulations website](#) on July 31, 2020, and is considered current as of July 17, 2020.

California Code of Regulations, Title 23, Section 638.1
Section 638.1. Definitions.

As used in this Chapter, the following terms mean:

- a. "Apparent losses" means losses due to unauthorized consumption and/or nonphysical (paper) losses attributed to inaccuracies associated with customer metering, or systematic handling errors.
- b. "Authorized consumption" means the volume of water taken by registered customers, the water supplier, and others who are implicitly or explicitly authorized to do so. Authorized consumption may be billed or unbilled, metered or unmetered.
- c. "AWWA" means the American Water Works Association.
- d. "CA-NV AWWA" means the California-Nevada Section of the American Water Works Association.
- e. "Data grading values" means specific grade scores (on a scale from 1 to 10) applied to each input component in the AWWA Free Water Audit Software spreadsheet.

- f. "Data Validity Score (DVS)" means a measure of the overall trustworthiness of the data entered in the AWWA Free Water Audit Software. The DVS represents the validity of the water audit data and is a reflection of the level of best practices employed by the water supplier associated with the water supply system subject to the audit.
- g. "Department" means the Department of Water Resources.
- h. "General manager" means a person who holds an executive position with the urban retail water supplier with overall responsibility for managing operations, revenue, and costs. Such a position may also be described as a water department director, city manager, utilities manager, or the director of public works.
- i. "Level 1 validation" means a review of the water loss audit that includes an examination of the data sources used for each input and an evaluation of the DVS selected for each input of the audit, as described in Section 700.3.
- j. "Non-revenue water" means the portion of water consumption that is not billed and does not produce revenue. It equals the unbilled authorized consumption plus apparent and real losses.
- k. "Real losses" means the physical water losses from the pressurized potable water system and the utility's potable water storage tanks, up to the point of customer consumption.
- l. "Report" means the water loss audit report of a potable water supply required to be submitted to the Department as specified in Section 700.5.
- m. "Standardized water loss audit" means a water loss audit conducted in accordance with the method specified in Section 700.2.
- n. "Urban retail water supplier" means a water supplier, either publicly or privately owned, that directly provides potable municipal water to more than 3,000 end users or that supplies more than 3,000 acre-feet of potable water annually at retail for municipal purposes.
- o. "Validating" means a process whereby an urban retail water supplier uses a water audit validator to confirm the basis of data entries in the

Reports and to characterize the quality of the reported data. All references herein to “validating” or “validation” refer to “Level 1 validation.”

- p. “Water audit validation” refers to the process of examining water loss audit inputs to consider the water audit’s accuracy and document the sources of uncertainty.
- q. “Water audit validator” means a person who meets the requirements of Section 700.4 to perform the validation of a water loss audit.

Note: Authority cited: Section 10608.34, Water Code. Reference: Sections 10608.12 and 10608.34, Water Code.

California Code of Regulations, Title 23, Section 638.2
Section 638.2. Audit Standards and Frequency.

Urban retail water suppliers shall, on an annual basis, conduct water loss audits of their potable water systems in accordance with the methods in AWWA’s Manual of Water Supply Practices - M36, “Water Audits and Loss Control Programs” (4th ed. 2016) and Free Water Audit Software, pursuant to section 10608.34 of the Water Code.

Note: Authority cited: Section 10608.34, Water Code. Reference: Section 10608.34, Water Code.

California Code of Regulations, Title 23, Section 638.3
Section 638.3. Standardized Conduct for Validation of Water Loss Audits.

- a. All water loss audits shall receive a Level 1 validation.
- b. A Level 1 validation shall include:
 - (1) An interview between the water audit validator and the person or persons who prepared the water loss audit, and any member of the utility staff with information that the water audit validator believes is necessary to complete the Level 1 audit validation.
 - (2) A review and evaluation of the following documentation:
 - [A] The completed AWWA Free Water Audit spreadsheet.

- [B] The reported water volume from its own sources, as documented by the supply meter(s) or other means, as applicable.
 - [C] The reported volume of water imported and exported each month by connection.
 - [D] The documentation of the customer meter and supply meter accuracy testing and calibration.
 - [E] The reported volume of authorized consumption each month broken down by water rate, if different rates are applied to water users.
- (3) A review and evaluation of the accuracy of performance indicators included in the AWWA Free Audit Software.
- (4) A review of audit inputs and data grading values to confirm a correct application of methodology, and follow-up reviews (if indicated).
- (5) A summary of the validation, including:
- [A] Name and contact information of the water audit validator.
 - [B] A summary of the Level 1 validation utility staff interview, including the basis for the input derivations and the DVS selections.
 - [C] Any recommended changes to the water audit inputs by the water audit validator that were not accepted by the urban retail water supplier, and the rationale for not accepting the recommendations.
 - [D] A summary of any follow-up performance indicator reviews.
 - [E] Overall impressions, including the consistency of performance indicators with system conditions and water loss management practices.

- [F] Any recommendations for further validation or water loss audit improvements.

Note: Authority cited: Section 10608.34, Water Code. Reference: Section 10608.34, Water Code.

California Code of Regulations, Title 23, Section 638.4
Section 638.4. Technical Qualifications for a Water Audit Validator.

- a. For purposes of Reports submitted on or before June 30, 2019, a water audit validator means:
- (1) A contractor working in the CA-NV AWWA Water Loss Technical Assistance Program (“Water Loss TAP”) performing water loss audit training and conducting audit validations,
 - (2) An individual who can demonstrate having conducted water loss audits in accordance with the method specified in Section 700.2, and having conducted a minimum of 10 Level 1 audit validations in accordance with the Water Research Foundation Level 1 Water Audit Validation: Guidance Manual 4639A (Water Audit Validation), or
 - (3) An individual certified by the CA-NV AWWA as a water audit validator.
- b. For purposes of Reports submitted on or after July 1, 2019, a water audit validator means an individual certified by the CA-NV AWWA as a water audit validator.
- c. An urban retail water supplier may conduct a water loss audit validation for its own water loss audit, provided that the individual performing the validation meets the requirements of this Section.
- d. A water audit validator may not conduct a water loss audit validation if he or she participated in compiling the water loss audit.

Note: Authority cited: Section 10608.34, Water Code. Reference: Section 10608.34, Water Code.

California Code of Regulations, Title 23, Section 638.5
Section 638.5. Audit Reporting Requirements.

- a. Not later than October 1, 2017, and by October 1 of every year thereafter, urban retail water suppliers shall submit a Level 1 validated Report to the Department. The Report shall include data spanning 12 consecutive months, as follows:
 - (1) For utilities that prefer to provide Reports on a calendar year basis the reporting period shall be for calendar year 2016 and annually thereafter.
 - (2) For utilities that prefer to provide Reports on a fiscal year basis that is not on the calendar year, the first reporting period shall be for their 2016-2017 fiscal year and annually thereafter.
- b. Reports under subsection (a) shall be submitted in two separate files. One file shall be in a complete and fully operational water loss audit spreadsheet format generated from the AWWA Free Water Audit Software and contain the water audit information specified in subsection (1) below. The second file shall be in PDF format and contain the information specified in subsections (2)-(4) below:
 - (1) System-specific data entered into each field in the water loss audit spreadsheet worksheets of the AWWA Free Water Audit Software, with a DVS.
 - (2) In 2017, information identifying steps taken by the urban retail water supplier in the previous year to increase the validity of data entered into the final audit, reduce the volume of apparent losses, and reduce the volume of real losses, as informed by the annual validated water audit.
 - (3) Beginning in 2018, information identifying steps taken by the urban retail water supplier in the preceding 3 years to increase the validity of data entered into the final audit, reduce the volume of apparent losses, and reduce the volume of real losses, as informed by the annual validated water audit.
 - (4) A statement confirming the Level 1 validation of the submitted water loss audit, including the validation findings, and documenting the following:
 - [A] Identification of the water audit validator.

- [B] Qualification of the water audit validator.
 - [C] Date of the Level 1 validation review.
- (5) The following Water Loss Audit Certification Statement, signed by the chief financial officer, the chief engineer or the general manager of an urban retail water supplier:

“This water loss audit report meets the requirements of California Code of Regulations Title 23, Division 2, Chapter 7 and California Water Code Section 10608.34 and has been prepared in accordance with the methods prescribed therein.”

- c. In the case of urban retail water suppliers with two or more separate public potable water systems, the urban retail water supplier shall submit a separate AWWA Free Water Audit Software spreadsheet worksheet meeting the requirements in subsection (b)(1) for each potable water system.
- d. Reports required under subsection (a) shall be submitted using the Department’s Water Use Efficiency Data online submittal tool at https://wuedata.water.ca.gov/secure/login_auth.asp.

Note: Authority cited: Section 10608.34, Water Code. Reference: Section 10608.34, Water Code.

California Code of Regulations, Title 23, Section 638.6
Section 638.6. Validated Water Loss Audit Acceptance Criteria.

- a. The Department shall evaluate Reports submitted under Section 700.5. A Report shall be accepted if it contains the elements required under Section 700.5, subsection (b), and meets the following criteria:
 - (1) The Report was properly validated by an individual with the qualifications specified in Section 700.4.
 - (2) The data and data grading values in the audit sheet indicate that the system is operating in a manner that is congruent with known characteristics of potable water system operations. To evaluate congruency, the Department may consider the presence and significance of any of the following conditions:

- [A] The real losses are less than 0.0.
 - [B] The cost of the non-revenue water is greater than 100% of operating costs.
- b. If the Department does not accept a Report as described in subsection (a), the Department shall return the Report to the urban retail water supplier. The urban retail water supplier shall resubmit a completed Report within 90 days of a Report being returned.

Note: Authority cited: Section 10608.34, Water Code. Reference: Section 10608.34, Water Code.