



August 26, 2023

Rosemary Chiavetta, Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
Harrisburg, PA 17120
Re: Proposed Water Audit Methodology Regulation

Proposed Water Audit Methodology Regulation
52 Pa. Code § 65.20
Water Conservation Measures
Docket No. L-2020-3021932
Re: Reopened Public Comment Period July 13, 2023

Dear Secretary Chiavetta:

Attached for electronic filing are the Comments to the above proposed regulation during the reopened 2023 comment period from the below interested parties working to promote the best practice water audit methodology advocated by the American Water Works Association (AWWA).

George Kunkel, Kunkel Water Efficiency Consulting
Edward Osann, Natural Resources Defense Council
David Sayers, Black & Veatch
Gary Trachtman, Arcadis
Steve Cavanaugh, Cavanaugh
Will Jernigan, Cavanaugh
Drew Blackwell, Cavanaugh

Very sincerely yours, on behalf of the AWWA Committee Members

A handwritten signature in dark ink, appearing to read "George Kunkel".

George Kunkel
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Enclosures:

cc: Stephanie A. Wilson, Law Bureau (**email only**)
Colin W. Scott, Law Bureau (**email only**)
Karen Thorne, Regulatory Review Assistant Law Bureau (**email only**)

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Proposed Revisions To Water Audit:
Methodology 52 Pa. Code § 65.20:
Water Conservation Measures - Statement
of Policy

Docket No. L-2020-3021932

INTERESTED PARTIES – MEMBERS OF THE AWWA WATER LOSS CONTROL COMMITTEE
COMMENTS PROVIDED DURING THE 2023 REOPENED COMMENT PERIOD TO THE
NOTICE OF PROPOSED RULEMAKING

Interested members of the American Water Works Association's (AWWA) Water Loss Control Committee (collectively AWWA Committee Members) submit these Comments in response to the Public Utility Commission's (PUC's or Commission's) July 13, 2023, reopened comment period following comments gathered in response to the November 18, 2021, Notice of Proposed Rulemaking Order (NOPR). The Commission's Order was published in the Pennsylvania Bulletin on August 6, 2022. 50 Pa. Bull at 4406-4411. In the NOPR, the Commission asks stakeholders for comments on proposed language that will serve as a replacement of the Policy Statement at 52 Pa. Code § 65.20 with a Commission Regulation which will "develop a more comprehensive codified water audit method as a tool to increase the efficiency of a water public utility's efforts to conserve water, account for lost water, increase water supply sustainability, remediate infrastructure, and improve overall service reliability." 52 Pa. Bull. at 4407.

Note that the AWWA Committee Members (except Gary Trachtman) provided extensive comments to the Advanced Notice of Proposed Rulemaking (ANOPR) on November 24, 2020, and November 25, 2020. All members (including Mr. Trachtman) provided comments to the NOPR dated September 19, 2022. As set forth below, the AWWA Committee Members provide the following comments to the reopened comment period as instructed on July 13, 2023, and specifically to the individual questions included in this notice.

I. COMMENTS

The AWWA Committee Members are pleased that the Commission has determined to reopen the comment period around the proposed revision to the Proposed Water Audit Methodology Regulation. The AWWA Committee Members are happy to provide comments during this period in the form of answers to the specific questions that the Commission has assembled. However, it is necessary to confirm that the AWWA Committee Members correctly understand that the wording used in the questions regarding the “proposed regulation” is the language proposed by the Commission in the November 18, 2021, Notice of Proposed Rulemaking Order (NOPR). The AWWA Committee Members responses relative to the “proposed regulation” are addressing the language presented in that NOPR. The AWWA Committee Members provide the following answers to the Commission’s questions as listed below. Note that answers provided are consistent with the prior comments provided by the AWWA Committee Members and – in some cases – are repeated from prior comments.

1. a) What are the expected benefits of the proposed regulation? b) What are the possible adverse effects of the proposed regulation? c) What alternative do you recommend?

1. a) The AWWA Committee Members are pleased with many aspects of the language of the regulation proposed in the NOPR of November 18, 2021, including the strong focus on the AWWA Water Audit Methodology and use of the AWWA Free Water Audit Software (Software). As proposed, the regulation includes several important elements of the water audit process that we previously recommended. These elements provide a variety of benefits to the water companies, the Commission, and customers, including:

- Use of the AWWA water audit methodology and Software as the default method for compiling a water audit; this standardizes the reporting structure, providing consistency and transparency to the process.
- Reporting the volumes of both real losses and apparent losses and their cost impacts, as both types of loss are integral to the calculation of Non-Revenue Water (NRW);

these are the true water system inefficiencies that waste resources and elevate costs. Reliably quantifying them is the first step to better controlling them.

- ◆ Reporting annually, which is critical for embedding the audit process in a utility's business practices; an annual reporting aligns with annual financial auditing and reporting as well as water quality reporting to environmental regulatory agencies.
- ◆ Completing and filing an audit for each discrete water system, which avoids averaging across systems and obscuring the levels of losses occurring system-by-system; this is a particular benefit to small systems, which are less likely to attract water company investment if their data is obscured within a group that includes large water systems.
- ◆ Filing audit reports in working electronic spreadsheet format, allowing the Commission and the public to make more effective and efficient use of compiled data, and;
- ◆ Requiring that reports be "verified" by a water company officer, which equates to our recommendations that reports be attested to by an officer, to ensure that a utility's management is fully aware of the water audits findings and takes responsibility for the process by which it is compiled.

These aspects of the regulation will ensure consistent collection of data on an annual basis that will assist water companies, the Commission, and interested members of the public in assessing the water efficiency standing of individual systems. Loss volumes and their cost impacts will be quantified, and actionable performance indicators calculated, giving water companies a sound basis for evaluating cost-effective loss control interventions.

1. b) As detailed in the NOPR of November 18, 2021, the proposed regulation includes the use of an "unaccounted-for" (UFW) water volume and UFW percentage as the sole performance indicator that assesses the water efficiency standing of a water system, with a 20% UFW target that applies to all water companies. As stated comprehensively – and with emphasis – in the multiple sets of comments provided by the AWWA Committee members, the UFW approach is a flawed methodology that provides only confusion instead of clarity in NRW assessments. AWWA advocates against the use of this 'indicator.' Arguably, the Commission's use of the UFW approach for many decades has been unsuccessful in achieving verifiable and measurable reductions in losses in a cost-effective manner. Continuing to employ such an approach in the new regulation will ensure that the new regulation will not provide a coherent means to

measure losses and promote effective loss control interventions. Percentage requirements are easily gamed and will continue to be gamed if they exist.

The AWWA Committee Members also disagree with the Commission's (and NAWC/Aqua) assertion "that there is not an adequate empirical foundation for establishing a benchmark using the water audit methodology." The AWWA Committee Members provided several examples of regulatory agencies establishing benchmarks that employ AWWA performance indicators and avoid use of an UFW volume and UFW percentage indicator. (ANOPR comments pgs. 8-16).

1. c) the Commission has an opportunity to update its methodology and embrace the array of AWWA NRW performance indicators calculated by the Software. Collectively, these indicators are superior to the UFW percentage indicator because there are specific indicators that track actual loss volumes (apparent and real); with certain indicators assessing operational performance and others representing financial performance. Some are most effective for performance tracking and others more appropriate for benchmarking (comparing) with the data of other systems. Knowledge of the volume and value of apparent and real losses enables a water utility to make informed decisions when developing a cost-effective water loss control plan. The recommended indicators are a more complete, representative, and accurate means of assessing the NRW standing of a water system and tracking its success in controlling losses than imprecise and misleading UFW approaches. Additionally, many US state and regional agencies employ the AWWA method and Software (e.g., in the Delaware River Basin Commission for certain Pennsylvania water systems) and a large body of data and information is available from their programs for the Commission to use as an example and for comparison purposes.

- 2. A commentor recommended that the PUC require all jurisdictional water utilities to complete at least one water loss audit. If the PUC were to require all jurisdictional water utilities to complete one water loss audit, please identify the timeline and reporting schedule that would be feasible for Class B and Class C water public utilities to complete and submit the water loss audit to the PUC. Why or why not? If not, what proposal would be feasible?**

2. a. Auditing the water volumes and costs that a water company manages is a standard business practice that should occur annually for water systems of all sizes. Just as regulatory agencies require routine annual reporting of water withdrawals, water quality, and financial audits for systems of all sizes, the water audit should be compiled annually for all systems. From year-to-year, water systems encounter changing conditions such as cold winter weather that can accelerate leakage, customer meter replacement, billing rate increases, pipe renewal, and other system activities that change system conditions. Conditions and operations can and do change in any year and have an impact on the data generated by the water system. Thus, it is appropriate that the water audit be compiled each year to capture the data, and operational and financial conditions for each distinct year of operation. The AWWA Water Loss Control Committee members disagree with the proposal that all jurisdictional water utilities should compile *at least* one water audit – indeed, all water utilities should compile the water audit *every year* as a routine business practice. The Water Loss Control Committee members disagree with the notion that small water systems (Class B and Class C) would compile the water audit only once every five years, as has been suggested in some of the comments previously provided to the Commission. This would result in the systems' water efficiency standing going unmonitored for the intervening four years. Just as environmental regulatory agencies require annual water quality reporting, the water audit also warrants annual reporting by all systems.

2. b. Because Class B and Class C water public utilities may be new to the water auditing process, it may be appropriate to relax the reporting schedule for the first three years of this practice, giving the systems a longer reporting deadline of, perhaps, April 30th or June 30th of each year. It would be prudent for the Commission to provide training in the AWWA water audit methodology and use of the Software for these utilities during the first three years. After three years, all systems should have sufficient familiarity with the method to submit annual water audits according to the traditional schedule that has applied to Class A water companies.

3. Section 65.20a(c)(2)(viii), 52 Pa. Code § 65.20a(c)(2)(viii), requires an explanation for each reported metric value that varied greater than 10% in either direction from the previous year's reported value and that has not improved over three years of reporting. If stakeholders believe this provision is infeasible or unreasonable, please explain why, and

identify an alternative method(s) to require water public utilities to identify significant deviations in year-to-year values reported in the annual water loss reports.

3. a. The AWWA Committee Members agree with the Commission's proposal of a 10% variation, which is believed to be reasonable.

3. b. Some arguments have been made that explanations of why metrics have not improved in three years for certain water systems would be irrelevant, as many water systems are currently in good standing or are intended to maintain current levels. The AWWA Committee Members do not disagree with this observation, but, if metrics are truly unimproved due to being "in good standing" then that will be the explanation provided by the water company.

4. a. For municipal water authorities, what are the costs and/or savings associated with complying with the regulation, including any legal, accounting, or consulting procedures which may be required? b. How are those dollar estimates derived?

4. a. The AWWA Committee Members, in their Reply Comments to the NAWC letter dated October 31, 2022, stated that NAWC's estimate of 50 hours of work per system each year at a cost of around \$2,500 per report was accurate, and that economies of scale are likely to be achieved when audits for multiple systems under company ownership are prepared. The AWWA Committee Members believe this base estimate would also be true for municipal water authorities and that economies of scale would be applicable if such authorities operate multiple discrete systems for which a water audit would be required under the regulations. The AWWA Committee Members also contend that an annual cost of water audit preparation is a minimal expense and will clearly be outweighed by the multiple benefits of the auditing process, including identifying loss volumes and costs, and achieving reductions in water losses resulting from ensuing loss control interventions.

4. b. NAWC provided the estimate of 50 hours and \$2,500 per report, but the AWWA Committee Members agree that these expenditures are line with what they have experienced with water systems throughout North America compiling the water audit.

5. For Class B and Class C water public utilities, what are the costs or savings, or both, associated with complying with the proposed regulation, including any legal, accounting, or consulting procedures which may be required? How are those dollar estimates derived?

5. a. Water companies that are unfamiliar with the AWWA Water Audit Methodology and are assembling the water audit for the first time will typically expend more time to collect and assess data to be input into the water audit, than in subsequent years when they are familiar with the process, and it becomes part of the annual routine. This scenario may be typical for Class B and Class C water public utilities that have not encountered the water auditing process previously. Resources for the first one to three years may be up to 75 hours per report during these early years. Again, it would be prudent for the Commission to provide training in the AWWA water audit methodology and use of the Software for water companies. If training is provided, and if data validation is also required, water company staff will advance more quickly on the water audit 'learning curve' and costs to compile the water audit will be optimized more quickly. Again, the AWWA Committee Members contend that this annual cost is a minimal expense and will clearly be outweighed by the multiple benefits derived of a sound water audit, including identifying loss volumes and costs, and achieving reductions in water losses resulting from ensuing loss control interventions.

5. b. The projection of up to 75 hours for the water audits compiled by water systems unfamiliar with the AWWA Water Audit Methodology was determined from the judgement of the AWWA Committee Members.

6. A commenter believes that it is "wholly inappropriate" for the PUC to continue to employ the unaccounted-for water (UFW) approach in the proposed regulation. The commenter asserts that the proposed UFW approach under proposed Section 65.20a(d), 52 Pa. Code § 65.20a(d), is "outdated and archaic" and, further, "lacks empirical and scientific legitimacy." Provide responses to the following:

a. What are the advantages and disadvantages of reporting UFW?

The AWWA Water Loss Control Committee members firmly believe that there are *no advantages* to the use of UFW and the UFW percentage, only disadvantages. Some perceive that

the UFW percentage has an advantage of being better *understood* because it is “simple,” however, the experience of the Water Loss Control Committee Members is that the UFW is more commonly *misunderstood* and gives a misleading assessment of NRW occurring in a water utility.

The NOPR’s proposed language of “Subsection 65.20a(d) – Unaccounted-for water” proposes continued use of the UFW approach and the calculation of a “Percentage Unaccounted-for Water” (%UFW). This is problematic because NRW percentage performance indicators such as %UFW:

- are unduly skewed by year-to-year changes in the volumes of customer consumption that are unrelated to water losses and their underlying contributing factors.
- do not reveal the volumes of apparent and real (leakage) losses in a water utility or their cost impacts. Loss volumes and costs are the variables that can be *managed* by water companies. Percentages can be *gamed* by water companies. For example, the percentages can be lowered by simply selling more water without reducing the annual volume of losses.
- are not actionable¹: actions taken that reduce apparent or real losses may or may not be reflected by corresponding changes in the percentage. In some cases, measured volumetric loss reductions have occurred yet the %UFW increased!
- are not supported by AWWA, the drinking water industry’s leading trade association in North America. AWWA advocates against use of such percentages and the Commission – if it requires a %UFW – will be exposed to public claims of illegitimacy of the Commission’s chosen approach when it runs counter to leading industry practice. The current version 6.0 of the Software does not include any percentage indicators.
- Additionally, the %UFW approach is flawed in trying to represent – as a single metric – the varying types of losses (apparent, real) and cost impacts that occur in water systems. Simply put, a single performance indicator cannot reliably represent the multiple losses and cost impacts that occur in drinking water utilities.

¹ AWWA (American Water Works Association). 2019. *Assessment of Performance Indicators for Nonrevenue Water Target Setting and Progress Tracking*. Denver, CO: Prepared for AWWA by Arcadis and Alan S. Wyatt.

- b. Can this approach be used by the water utility industry to improve system performance and reduce water loss on a discrete system basis? If so, how is UFW specifically used to identify the most deficient systems and system processes to be improved to achieve measurable results?**

The answer to this question is 'No.' Research has found that there is a poor correlation between the %UFW indicator and measurable reductions in NRW¹.

- c. Is there a reliable correlation between UFW and the condition of a system as quantified by other performance indicators? If so, explain the correlation.**

The answer to this question is 'No.' The array of performance indicators included in the Software directly assess volumes of apparent and real (leakage) losses and their cost impacts. These volumes are the inefficiencies that must be managed by water system operators. The %UFW indicator does not measure volumes of apparent and real (leakage) losses. Additionally, the %UFW indicator is heavily influenced by the total customer consumption in the water system. As this consumption varies from year-to-year (due to customer expansion/contraction, wet or dry weather, water conservation, or other effects) the percentage changes more strongly due to these effects, than to changes in NRW volumes.

7. A commenter indicated that the proposed regulations would be improved if performance indicators were defined along with how priority areas are to be determined for a water public utility to address reducing future water loss. Provide responses to the following:

- 7. a. What industry-recognized performance indicators would best characterize the current financial and operational condition of a discrete water system on an annual basis? Why?**

Important objectives for water utilities subject to the Commission's proposed water loss assessment and control-related regulations should be identifying the volume and value of NRW including water losses, and the appropriate investment needed for implementing cost-effective intervention methods that will enable the water utilities to achieve an economic level of NRW.

In 2020, the AWWA Water Loss Control Committee adopted a report on key performance indicators (KPIs) including the Loss Cost Rate (LCR), a financial indicator that marries the volumes of apparent and real losses with their value. The LCR is expressed as dollars per service connection per year. The highest values for the Loss Cost Rate occur for utilities that have both high loss volumes and high costs associated with these losses during the annual audit period.

The appropriate volumetric complement to the financial KPI is the Unit Total Loss (UTL) and its components Unit Apparent Loss and Unit Real Loss. The UTL is the sum of the Unit Apparent Loss and Unit Real Loss KPIs, each of which are expressed as gallons per service connection per day. Reference values for the LCR and unit loss indicators are compiled by AWWA for Level 1-validated water audits submitted by water utilities to the States of California, Georgia and the Province of Quebec which are included in the Water Audit Reference Dataset (WARD), as described in the September 19, 2022, Comment Letter from the AWWA Committee Members.

Adopting the LCR and unit loss indicators for annual water audit reporting to the Commission would establish a reliable and transparent basis for comparison of NRW performance year over year and among peer utilities. The LCR is considered by AWWA to be suitable for assessment of current NRW performance and subsequent tracking and planning for interventions to improve NRW performance. The UTL is suitable as a high-level indicator for trending analysis. The Unit Apparent Loss indicator and the Unit Real Loss Indicator provide a suitable basis for NRW performance benchmarking and target setting. These indicators are useful in assessing the effectiveness of specific loss control interventions for apparent and real loss control.

7. b. How should measurable benchmarks be established for each discrete water system using both operational and financial performance indicators (e.g., AWWA's Real Loss and Loss Cost Rate)?

The AWWA Committee Members contend that the historic use of UFW as the sole measure of water inefficiency, and a 20 percent UFW target applying to all water systems, has accomplished little progress in water and cost savings over the many decades that it has existed. At the same time, many of Pennsylvania's water systems suffer from high losses: apparent and

real². A cold climate, older infrastructure, and insufficient investment in system upkeep have contributed to an overall state of poor water efficiency in Pennsylvania water distribution systems. Given that many systems exist with very high loss levels, the AWWA Committee Members believe that the Commission should not adopt regulations that establish a loss target representing universal optimized, or near optimized, efficiency as the goal at this time. It is believed to be more strategic and practical for the next 5-10 years to focus on the water systems with the highest and most costly losses, and focus efforts concertedly to make measurable and verifiable loss reductions in these systems at an incremental pace.

The AWWA Committee Members therefore recommend that the Commission initially consider high percentile levels (75% or 90%) of the KPIs included in the AWWA WARD to guide establishment of Commission target levels. For those water systems that have excessive losses and/or costs above the target level, the Commission should work with these water systems to establish an NRW reduction schedule that identifies incremental loss reduction targets over a reasonable period of years (perhaps 5 years) to meet the specified target volume or value. This approach should motivate the relatively small number of out-of-compliance systems to take action to bring systems with high NRW volumes and/or costs down to acceptable threshold levels of performance. This approach provides the Commission with a manageable means to track the progress of a limited number of specific water systems in moving toward their water loss reduction target using KPIs that are actionable and trend with the volumetric reductions of loss. As described in further detail in our September 19, 2022, Comment Letter, the Metropolitan North Georgia Water Planning District in the Atlanta, GA area is a good example of this approach.

The AWWA Committee Members strongly believe that the process of using a working group of stakeholders will be most effective in devising workable benchmarks for the water utilities to employ based on the LCR and UTL (and the UTL's two components), are actionable, and can be meaningfully interpreted by a wide range of stakeholders.

7. c. Quantify the proposed targets or goals for any proposed performance indicator and provide a justification for the proposed targets or goals and the timeframe for each proposed target or goal to be achieved.

² Kunkel, G., *Report on the Evaluation of Water Audit Data for Pennsylvania Water Utilities*. (2017) Natural Resources Defense Council (NRDC).

As detailed our response to question 7.b, the AWWA Committee Members believe that the Commission should primarily focus on the sub-population of water systems with excessively high loss levels as delineated by the high percentile levels (75% or 90%) in the AWWA WARD. Percentile values of the KPIs discussed in 7.b. are shown in Table 1. The Commission has several options to consider in applying the WARD percentiles. One option might be to identify all systems with Total Loss Cost Rate and Unit Total Loss values above the 90th percentile values of \$57.80/connection/yr and 125.2 gal/connection per day, respectively. Such systems are burdened with a high cost of the water supply and a high rate of loss and for which a target would be most appropriate. Using this approach, the Commission may determine to start with the 90th percentile threshold or may chose the 75th percentile as the threshold. The target for the remaining water systems could simply be set at current levels of losses, i.e., no backsliding. A review of the data will be needed to determine how many systems would exist above the various percentile levels. Note: ideally the Commission will require a validation process (see responses to question 8) that would allow for more trustworthy data to be evaluated. It would be best to have 2-3 years of validated water audit data from water systems before assessing the percentile-based target that they are assigned. Once targets are assigned, the AWWA Committee Members recommend that those water systems assigned a target be allotted a 5-year period to bring loss down to the target level. However, the intervention methods employed by these systems and the progress attained should be documented annually, with the intention of making meaningful progress toward the target level each year. Once the initial program is established, the target level – and any other program modifications – should be reevaluated every 5 years by the Commission, and adjustments made as determined.

AWWA Water Audit - Select Key Performance Indicators for Consideration by the Pennsylvania Public Utility Commission Range of Performance Indicators Shown as Five Percentile Values Data from the AWWA Water Audit Reference Dataset (WARD)							
System Attribute or Performance Indicator	Units	Data Source	Values showing key percentile values from the range of data				
			10th	25th	50th (median)	75th	90th
Total Loss Cost Rate	\$/conn/yr	WARD	\$5.08	\$9.33	\$18.28	\$31.58	\$57.80
Apparent Loss Cost Rate	\$/conn/yr	WARD	\$0.27	\$0.87	\$6.15	\$14.13	\$24.23
Real Loss Cost Rate	\$/conn/yr	WARD	\$1.90	\$3.73	\$7.95	\$16.29	\$35.55
Unit Total Losses	gal/conn/day	WARD	21.1	29.5	45.4	76.2	125.2
Unit Apparent Losses	gal/conn/day	WARD	1.2	2.8	5.3	9.4	16.3
Unit Real Losses	gal/conn/day	WARD	16.3	22.7	36.8	66.4	115.4
The AWWA WARD includes data from 1,124 water systems from the States of Georgia and California, and the Province of Quebec. The WARD data is from calendar year 2018 has been validated. The Performance Indicators are those included in the Version 6.0 AWWA Free Water Audit Software, while the data was collected in the Version 5.0 Software.							

Table 1

7. d. How should the identified specific targets or goals for each performance indicator be utilized by a water public utility in developing its annual or long-term capital improvement plan(s)?

Once water utilities have quantified and valued the water losses from the water audit, the priority loss levels/cost impacts can be identified. Appropriate intervention activities can be identified and assessed for their cost-effectiveness. For those water companies assigned a loss reduction target by the Commission, their priority is to implement loss control activities that are planned to reduce losses to the target level within the assigned timeframe. By limiting this approach to the systems with the highest loss levels (above the 75th percentile or 90th percentile WARD values as determined), it is very likely that loss reduction will be cost-effective to undertake. This is the 'low hanging fruit' of loss reduction practice.

Water companies without a Commission-assigned loss reduction target can develop cost estimates of intervention approaches needed to maintain current levels of losses without backsliding, or to make reductions they deem cost-effective to their operations, all the way down to the economic level of loss (i.e., where the intervention cost is equivalent to the value of the loss volume). The evaluation process may involve pilot-level assessments of the approaches before advancing to full-scale implementation. The water utilities' annual and long-term capital improvement plan(s) should reflect the approach chosen based on their internal or Commission-assigned target, while incorporating periodic re-evaluation to assess interim progress and adjust elements of the adopted program.

8. A commenter urged the PUC to include a formal validation process in the proposed regulation and indicated that without data validation, data from “self-reported” water audits can have questionable validity. Provide responses to the following:

8 a. What process should a water public utility be required to complete in order to ensure the data provided to the PUC eliminates, to the extent feasible, inaccurate information (e.g., by using the American Water Works Association Level 1 validation process)?

Water Audit data validation is a valuable quality control process that ascertains whether or not an acceptable level of data quality exists and that the water audit is free from egregious errors. A formal data validation process exists in regulatory agencies in the states of Georgia, California, Indiana, and Hawaii, with numerous other states investigating this practice.

The Commission is urged to include a formal validation process as part of the new rule. Validation of water audit data would occur after the company auditor compiles the water audit and before the water audit is formally submitted to the Commission. The water audit validator is a person who was not involved with the initial compilation of the water audit data. In most states where validation is required, the validator may be an employee of the Company, or a third-party person. However, in either case, the validator must be trained and certified in the validation process. The validation process must be established with a means to train prospective validators and formalize the process for validation and water audit submittal.

The methodology for Level 1 water audit validation was established and codified in the freely available Water Research Foundation Manual 5057 (2021)³ which defines and provides procedures for the Level 1 validation process. Three levels of water audit data validation are defined in the Manual. Level 1 validation – which is used by all regulatory agencies where validation is required – is a desk-top level review of data and utility practices that reveals general data anomalies and egregious errors. While providing a basic level of data quality control, the Level 1 process does not ensure that the water audit is free of all errors. The Level 2 and Level 3 validation processes investigate embedded errors that exist in the underlying source data that supply data inputs to the water audit. While more detailed and effective for validating water audit data, Levels 2 and 3 are more labor intensive and costly to conduct. Several US states – notably Georgia and California, and the Province of Quebec, CA – have established validator programs and serve as excellent models for a Level 1 data validation program.

The Level 1 data validation process has consistently proven instrumental in creating a reliable NRW management structure in regulatory agency programs. The AWWA Committee Members support a Commission requirement of Level 1 validation for all water company water audits. Water companies/utilities benefit from the guidance and assistance from experienced third-party providers in assessing their practices and data handling processes. The Commission will benefit from knowing that submitted water audit data has been scrutinized for data quality and is free of egregious errors. Invariably, the DVS for many water audits decreases after the data is validated to Level 1, because some water utility staff tend to grade their data in a favorable – but not always representative – way. The successful programs in the States of Georgia and California, and the Province of Quebec serve as strong examples of reliable water audit data collection and Level 1 data validation. The Commission can reference information on these programs to learn how they were implemented in various agencies.

8 b. What are the advantages and disadvantages of requiring each water utility to validate its annual water loss audits?

³ WRF (Water Research Foundation). 2021. *Level 1 Water Audit Validation Manual, 2nd Edition*. Denver, Colo.: WRF.

Without data validation, data from “self-reported” water audits can have questionable validity. Indeed, many of the water audits submitted to the Commission for the 2021 reporting year (and likely prior years) contain the same data inputs for multiple systems owned by one water company. Every water system’s operating condition, costs, and practices are unique. Applying the same inputs for multiple systems is not representative of actual system performance. One water company with many systems input values of 2.00% meter under-registration for the production flow measurements and customer metering inaccuracies of all of its systems. This would suggest that performance of all water meters in all of their systems averages out to exactly the same value, which is not possible. Not coincidentally, the 2.00% under-registration level reflects a strong level of accuracy, but inputting this value in a rote, repetitive manner, means that the water company is very likely erring in representing its metering inaccuracies, perhaps skewing the data of the entire water audit.

In other water audits, companies listed customer metering inaccuracies as zero year after year. This suggests that the performance of all customer meters in their system average out to a level of perfect accuracy; again not possible. The data validation process flags these suspect data inputs and encourages the water company staff to input more realistic values. In some cases, these types of input issues might also be addressed by providing training to water company staff on a periodic basis.

Again, as examples, in the states of Georgia and California, utility water staff can serve as validators, subject to specific rules. The essential rules are that validators must be trained and qualified/certified by a program approved by the state agency, and a validator cannot also serve as the auditor who compiled the water audit for the water company. Having a validator on water company staff offers a distinct advantage for water companies that operate multiple systems in Pennsylvania. Once the water company invests in the training and testing for their staff member to become certified, that person can undertake the validation role for all of the audits prepared for their distinct systems each year. Also, with an in-house validator, the water company auditors can become more familiar with the water audit process and learn to compile a reliable water audit that has the potential to improve in data quality over time. For smaller water companies with only a single water system, it may be more cost-effective to hire a certified validator to review their water audit, or for such companies to cooperate in a joint procurement of validation services at lower cost than an individual contract.

There are no disadvantages to validation of water audits. However, there are modest costs to train and certify a validator (if done in-house), and for the time needed to conduct the validation. It is estimated that Level 1 validation can require an average of 6-12 hours to validate a water audit for the first time, but this time should reduce once a water audit has been compiled – and the audit process has matured – over several years. Validation is worth the cost, however, by providing trustworthy data that can be used reliably by water companies to plan loss reductions, and by the Commission to assess the progress of the water companies in reducing losses.

8 c. What would be the additional annual expense required to complete a validation process on water loss audits?

With a structured validator certification program, like those in Georgia and California, utilities would have the opportunity to get internal staff certified at a nominal cost. This scenario allows for water companies to then validate the water audit with internal staff at the hourly rate of the staff person. For smaller, single systems it may be more attractive to use the services of an external validator, particularly because water audit validation is only a once-a-year process that may not warrant certifying internal staff. The ultimate hours and costs will vary with the size of the water system, complexity of operations, and whether validation is performed by an inhouse certified validator or an external validator. However, it is a safe assumption that the validation process will require less time than the preparation of the audit itself. It is likely that most water companies will be able to validate an individual water audit for a few thousand dollars, which – as explained previously – is a minimal expense given the considerable benefits returned by annual, validated water audits.

II. CONCLUSION

The AWWA Committee Members appreciate the extensive comment process offered by the Commission to develop this important regulation. However, the Members also believe that “written comment exchange” has limitations and that a collaborative meeting process would be more beneficial at this stage of the rulemaking process. Thus, the AWWA Committee Members again recommend that, prior to finalizing the regulation, the Commission convene a working group

of stakeholders to draft improved language to offer to the Commission. The AWWA Committee Members support comments provided to the ANOPR by NAWC/Aqua (November 24, 2020, pg. 9) that “the Commission should convene a working group of stakeholders to review the Statement of Policy and draft an appropriate regulation regarding water loss by public utilities.” Specifically, the working group would identify recommended performance indicators and benchmarks (in lieu of the %UFW approach), compliance requirements, and consequences for utilities that exceed the benchmarks. The format of water audit submittals, transparency, and data validity are also paramount concerns that should be discussed by the working group. Once the working group has reached consensus on its work products and gains agreement with Commission staff on its recommendations, the Commission can proceed to finalize the rulemaking. The AWWA Committee Members believe that the working group tasked with review and analysis described below would be able to improve upon the language of the current NOPR in four areas:

- 1) Water audit submittal format, transparency, and accessibility to the public;
- 2) Elimination of the ‘unaccounted-for water’ approach, and identification of improved key performance indicators and rational and achievable target levels
- 3) Data Validation, and;
- 4) Water Audit Training.

The afore-mentioned AWWA Water Loss Control Committee Members appreciate the opportunity to provide these comments on the Commission’s Notice of Proposed Rulemaking regarding 52 Pa. Code 65.20.

Respectfully Submitted for AWWA Committee Members,



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