May 30, 2024

Mr. David White
Utilities Supervisor
Munster Public Works
400 E. Chicago Ave
Munster, IN 46312

RE: PROPOSAL FOR WATER AUDIT AND VALIDATION SERVICES

Dear Mr. White,

M.E. Simpson Co., Inc. is pleased to present the Town of Munster our proposal for Water Loss Audit Services and Level 1 Validation Services. We are honored to be considered for this work and are confident our team will help make the project a success.

M.E. Simpson Co., Inc. is a Professional Services Firm dedicated to developing and providing programs and services designed to maximize peak performance for our clients' water distribution systems. Many of these programs are universally recognized as a part of "Best Management Practices" (BMPs) for utilities. We pride ourselves on delivering solid solutions using the highest quality technical and professional services by way of state-of-the-art technology and a skilled and well-trained staff of professionals. Our highly educated engineers and technical team are committed to the success of this project. They will be ready at a moment's notice to relieve your staff's burden and ensure a seamless continuation of your services.

Our services were developed and refined to provide utilities with programs that can be customized to meet their needs. From complete "Turn-Key" services to assisting with the development of "in-house" programs for utilities, M.E. Simpson Co., Inc. serves our clients with this ultimate goal: to deliver to the public the implicit faith that the water is always safe to drink.

Thank you for your consideration and this opportunity to acquaint you with our water audit services and offer this response. We are committed to exceeding your expectations.

Sincerely,

Randy Lusk
Vice President of Innovations & Solutions

Randy Lusk
Vice President of Innovation and Solutions

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STATEMENT OF QUALIFICATIONS

M.E. Simpson Co., Inc. has been providing water loss control programs for over 39 years in various forms, ranging from large water production meter testing and calibrations for meters up to 108" in diameter, large meter testing, calibration and repair, state of the art leak detection surveying and leak pinpointing, and Water Audits, Audit Validations and Water Loss Reduction programs. MESCO has been providing peer reviews for some Chicago suburbs for their LMO2 (Lake Michigan Water Allocation) submittals, in some cases for over 25 years. Our firm has performed Real loss assessments (leak detection) on a combined total of over 100,000 miles of water main since 1986. We have provided Apparent loss assessments, having assessed over 50,000 commercial/industrial large meters for accuracy, assessed numerous production water meters not only in the Midwest but in several larger cities in the US. Our firm has provided formal water auditing with validation services to several cities and towns since 2003 when the IWA/AWWA Water Audit methodology was developed and released for use by the American Water Works Association (AWWA) Water Loss Committee.

Members of the MESCO staff are current and active members of American Water Works Association (AWWA) committees directly related to water loss control. John H. Van Arsdel, Vice President, was Chair of the American Water Works Association's (AWWA) largest committee, the Water Loss Control Committee from 2010-2014, as well as being a member of the sub-committees for the Water Audit Software and M36 manual "Water Audits and Loss Control Programs". He has over 29 years of water loss control project management experience. Michael Simpson, CEO, was a member of the Water Loss Control Committee and is currently a member of the subcommittee for the M36 Manual on "Water Audits and Loss Control". He has over 35 years of water loss control management experience. Dan Hood, President, is a member of the AWWA Meter Standards Committee (M6 Manual on "Water Meter Selection and Maintenance"). He also has over 35 years' experience in water loss control. Aaron Horbovetz, P.E., PMP, is a member of the M33 committee on "Flowmeters in the Water Supply" and the M22 committee on "Sizing Water Service Lines and Meters". He has over 19 years of experience in water loss control management. The combined total years of direct experience in water loss control programs with just these four MESCO employees is almost 120 years.

The M36 Manual on "Water Audits and Loss Control" was recently under rewrite where Mr. Van Arsdel has had input into the rewrite process by authoring one chapter and editing various other chapters of the manual. Mr. Van Arsdel has also participated on the Water Audit Software subcommittee with the revision and review of the free AWWA Water Audit Software, Version 5, which has been recently released for public use this past August. Mr. Simpson provided peer review of the M36 manual prior to being submitted for publication in late 2015. Mr. Hood was involved with input into the revised M6 Manual on Water Meters released four years ago. Mr. Horbovetz has been involved on a subcommittee for the rewrite of the M33 Manual on "Flowmeters in Water Supply". The practices outlined in this manual are directly tied to verifications of total water system inputs for water utilities. This manual is currently under peer review and due for publication this year (2018).

MESCO has been producing successful water loss reduction results in the Chicago metro suburban area for over 38 years. These services have also been provided to several water utilities across the United States from small utilities to some of the largest water utilities including Los Angeles, Chicago, Baltimore, Miami-Dade, and Phoenix. MESCO believes that through this work we have established a proven history of delivery, responsiveness, ingenuity and environmental stewardship. We share the same mission as the Utility and are encouraged by the leadership role that the Utility is assuming towards a holistic approach to address the water loss challenges in addition to compliance with the State of Indiana's Senate Enrolled Act 4.

MESCO has demonstrated its commitment to water loss control not only through its work, but also in the form of training by participating in various AWWA section education programs. Our firm continues reinforcing this commitment by providing Water Audit training using the AWWA Free Water Audit Software, including providing master instructors and curriculum for the "Train the Trainer" programs for the Illinois Section AWWA and IEPA, implemented in the fall of 2014 and for 2015. We did the same for the Indiana Section AWWA in 2016 for assistance with the water system infrastructure assessment program commissioned by the State of Indiana and operated by the Indiana Finance Authority. Currently, M.E. Simpson Company is teamed with the Indiana Section AWWA to provide water loss audit workshops and validator training and certification workshops in the State of Indiana for the Indiana Finance Authority.

Michael Simpson, John Van Arsdel, Randy Lusk, Jeff Cunningham and Steve Dennis are all Certified/Licensed State of California and State of Indiana Validators. This group of water professionals bring a wealth of knowledge and understanding in water loss control and water audits.

At MESCO, services are tailored to the specific needs of our clients. Our participation can range from the small specialized work supplementing the work of utility in-house staff, to complete development of full-scale water loss control programs.

M.E. Simpson Co., Inc. will provide a project team that will assist the Utility's efforts to control water losses. The benefits are the following:

- Considerable experience in Large Production/master meter testing and analysis, loss of head testing, fire flow testing, leak detection, and other distribution system field analysis
- Considerable engineering experience in large commercial/industrial meter testing and analysis.
- Considerable experience in leak detection programs administered both locally and nationwide.
- Considerable Water Audit experience both locally and nationwide, from small rural systems to 410,000 metered connections including Level 1 validations as well as Level 2 and Level 3 Validations.
- An organization which emphasizes the need to facilitate project execution by assuring that the appropriate technical expertise is readily accessible.

By implementation of this water audit validation, a platform can be developed to perform the Level 1 Validation for the audit each year. This will develop a track history to make sure Utility water loss controls stay on target. Our team brings to the Utility demonstrated experience in water loss control, water auditing and audit validations.

From MESCO's in depth experiences working with several water utilities performing water loss control programs and water audits, there have been some very similar issues from each utility that have been clearly exposed. Utilities expect the auditing and validation process to be able to be performed at a high level, with competent technicians and staff, and that it is done efficiently. There are three basic objectives that should be met by the Project Team:

1. **Expertise.** The Utility needs breadth and depth to help solve the variety of water loss challenges that it faces in maintaining the water infrastructure – which is large, complex, aging and requiring upgrading to address new water needs. Expertise is needed in:
   - Assessments of the total Water Supplied with a focus on specialized attention for water system input including wholesale purchases, wholes sale exports and making sure the amounts are true
   - Assessments of all Authorized water uses
   - Assessment of Apparent losses ranging from inaccurate metering and accounting issues.
   - Assessment of gaining control over Real losses (leaks) by determining what losses are truly economically recoverable
   - Assessments of the utility policies and procedures for the distribution system
   - Validation of **all** the data inputs to ensure the Audit is robust
   - Present realistic, measurable, and achievable water loss control goals
2. **Streamlined Access.** The Utility needs to be able to easily access and manage the Project Team's expertise to bring it to bear on water loss problems rapidly and with the least possible administrative burden to the Utility staff. However, the Utility will need to have considerable input to the process by providing needed data for the Validation process and analysis. In this respect, interaction with Utility staff will be needed to produce a quality water audit validation.
3. **Professional Working Relationships.** The Utility must be confident that the Project Team is working as true professionals – putting the Utility's interest first. The professionals in the Utility organization must have good working relationships with MESCO's professionals. Both parties should look for opportunities to help each other do their jobs better and more efficiently.

The strengths of the M.E. Simpson Co., Inc.'s organization and staff, as well as our specific approach to this assignment, will fulfill all of the Utility's needs for the water audit level 1 validation.

Streamlined Access

Our proposed organizational arrangements will allow the Utility fast and direct access to our technical resources.

M.E. Simpson Co., Inc. was founded in 1979 by Marvin E. Simpson. Our firm has become the industry leader in developing and providing programs and services aiding our clients in maximizing their peak performance for their water distribution and wastewater collection systems. We offer our clients the highest quality Professional Services, using state-of-the art technologies and highly skilled and trained professionals. Our staff has developed a host of high-tech programs that will ensure that your Utility will be proactive in dealing with both your water distribution and waste water collection systems.

"Crumbling infrastructure, inaccurate records, conservation, sustainability, water quality, water loss, economic conditions, revenue shortfalls, being green, having enough water"; these are all statements and buzz words in today's society. Currently in the water industry, these words are our reality, thus making them our responsibility.

The company began operations in Rochester, Indiana, in 1979. The corporate headquarters moved to Valparaiso, Indiana in 1989.

M.E. Simpson Co., Inc. is active in Water Works Organizations at the national and state levels such as American Water Works Association, Water Environment Federation, Water Operators Associations, Rural Water Association, American Backflow Prevention Association, American Public Works Association as well as local Districts, Branches, and Suburban Groups.

Our support of these groups goes beyond just holding a membership to truly taking an active role by allowing employees to fill elected and appointed positions as officers and committee chairpersons. M.E. Simpson Co., Inc. has always taken an active role in education by making presentations at no charge at meetings, training seminars, and providing continuing education credits for water operators through the various water groups.

Here are additional highlights of each company's qualifications that will demonstrate our suitability in performing the work of providing the proper Water Loss Audit and/or Level 1 Validation compliance.

- MESCO has worked with the Illinois Section AWWA in development of the "Train the Trainer" program for water audit workshops statewide in 2014-15. In 2015-2016, MESCO staff was involved with developing and presenting similar workshops for the State of Indiana so the new law on water auditing is met. Currently, MESCO is teamed with the Indiana Section AWWA and providing Water Loss Audit workshop and Validator Certification program services for the State of Indiana.
- MESCO staff have been regular presenters at various AWWA section meetings, ACE, DSS, WIC and NAWL on water loss control, water auditing, and water loss remediation efforts for well over 20 years.
- MESCO Staff serve on the M6, M22, M33 committees in addition to the M36 committee.
- For over 28 years MESCO staff have assisted several Chicago Suburbs with their reporting of the Lake Michigan Water Allocation (LMO2 forms) detailing water losses reported annually to the State of Illinois.
- MESCO was recently involved with providing workshops for CA NV AWWA on Leak Detection as well as Water Loss Control with in 2016, 2017 and 2019.
- MESCO has provided large meter assessments (testing and repairs) on over 75,000 large meters in the last 38 years.
- MESCO has performed leakage assessments on over 100,000 miles of pipe in the last 35 years across the US, as well as Puerto Rice, Turkey, Italy and Diego Garcia, with several deployments to military bases, state side and overseas.
- MESCO currently operates 15 plus leak computer correlators along with Echologics Echo Shore Large Main leak detection equipment and ePulse Acoustic Pipeline Condition Assessment tools.
- MESCO can flow test production meters as large as 108" in diameter (Venturi meters as well as Mag style meters)

PROJECT APPROACH & SCOPE

Water Loss Audit Program

A Water Loss Control Audit program is needed to be able to help the water utility control the water losses in the distribution system. This will be accomplished by using the standard AWWA Water Audit Software as well as following methods contained in the AWWA M36 manual on Water Audits and Loss Control Programs. This specific program will incorporate an approach of using a "top-down" analysis of the water system that will examine all the facets of water use and water loss in the utility. Therefore, it is imperative the selection of a qualified Project Team be conducted with the utmost care with thorough research. Any team selected should have no trouble determining some areas of water loss. It is especially important to be able to locate all areas of water loss in the system including real losses, apparent losses, including potential issues with the accounting and billing departments. That will be the real true test of the mettle and ability of the Water Loss Control Audit Team. In addition, gathering data for the general condition of the distribution system is something the project team will need to be well versed in. Therefore, a practical project management plan with a proven QA/QC plan is needed to insure this happens.

M.E. Simpson Co., Inc.'s philosophy behind water distribution system water loss audit services as incorporated in this work plan is to provide the Utility the following benefits:

- Conserve freshwater resources
- Determining the exact areas of true water losses
- Reduce the cost of lost water through leakage
- Conserve energy and reducing costs by reducing pumpage
- Help in monitoring potential system operation and maintenance problems
- Promote proper accounting and financial reporting (GASB 34)
- Reduce the risk of water shortage and customer hardship (drought management)
- Location of losses through commercial and residential meters which are improperly registering and recording water use
- Locating billing and accounting errors
- Ensure a sound and reliable water service for customers of the Utility
- Providing short- and long-term water loss reduction strategies for the Utility

A number of items uniquely qualify M.E. Simpson Co., Inc. in performing this Water Loss Audit Program. The Project Team's extensive practical experience in leak detection methodology coupled with other extensive Water Loss Assessment Program experience such as Water Audits, Meter Testing, and Master Meter Assessments, will allow for a thorough examination of the Distribution system records and operations to help reduce the total water loss occurring in the distribution system. In addition, the Team will be made up of individuals who are members of the AWWA national Water Loss Control Committee, including a current past chair of the committee.

Water Loss Control Survey – Audit Approach

Our **Water Loss Control Survey/Audit program** is a multi-phase plan encompassing a select group of our services that will assist your Utility in improving water accountability and optimizing your distribution system's operational performance. Our program will be structured around your specific needs so that you can optimize your results and maintain flexibility in the performance of the various tasks. The Project Team will submit a questionnaire for particular details required for the review.

The Utility will provide all relevant information to conduct the water audits. In the collection and review of the data, a hierarchical approach will be used.

- *Current* information found in the water utility reports and files will be used as the initial set of data. Some discrepancies among the data sets will be resolved by contacting water utility staff.
- *Past audits* will be consulted and used. Older legacy water utility data may be consulted as well. When appropriate, the information will be prorated to reflect changes in the system, including production and consumption for particular years or the audit period.
- In the absence of specific data for the water utility, information and assumptions from other audit workbooks and published literature may be used. Important references will include certain AWWA manuals and papers from the various IWA/AWWA water loss conferences (such as Leakage 2005, Leakage 2007, and Water Loss 2009), etc. For example, small and large meter accuracies have major impacts on the results of water audits. If the water utility does not have the data to support their estimated accuracy, then the Project Team may use data from the literature to estimate such Apparent Losses such as data from various Research Foundation water loss studies for AWWA. As an option to the utility, a statistical sample of meters can be tested by the utility to get a more accurate estimate of incorrect registration.
- Cost data such as the annual operational costs and marginal costs will need to be supplied to complete the audit.
- Physical parameters of the water system will need to be gathered in order to make certain calculations.

Task 1: Determine System Input

The first phase of our Water Loss Control Survey/Audit is to evaluate your water production through the master water meters to ensure the input into the system has been accurately documented. All water audits have to start with verification of the distribution system input to insure reliable water production amounts. Without this validation the audit will be flawed from the start.

Record Review

All master meter production data for the selected audit period will be reviewed along with an examination of any past master meter test results. This may include any reports periodically submitted to the state's regulatory agencies or regional water authorities. Total pumpage amounts for the audit period will need to be determined along with the marginal costs of water production.

Master Meter Evaluation

Part of the first phase may need to include evaluations of your master water meters to insure all the meters are in compliance with AWWA standards for water meters. These evaluations can help verify your total water production volume for the audit period and help determine the actual water loss. All master meters would be evaluated in accordance with American Water Works Association standards (reference AWWA M6 and M33 Manuals).

Evaluations

- The Project Team may need to assess all master meter sites. The settings would be analyzed to determine meter layout. This site assessment should be done prior to any data review so that factors possibly affecting meter accuracy can be determined.
- Schedule evaluations with the Utility during normal working hours. Exceptions to evaluations times will be made on a case-by-case basis, depending on accessibility to the meter.
- Past meter test flow data will be examined, if available.
- Production data for at least 12 months would need to be trended, and if available, the last 36 months as well.

Task 2: Determine Authorized Consumption

All studies and reports on previous water loss for the utility will be reviewed with the goal of refining and updating previous techniques. The Project Team will also carry out a detailed review of current water loss practices to identify cost effective loss reduction strategies. A brief review of the accounting and billing system is also imperative for this phase of the program the following items must be thoroughly researched and quantified for the 12-month audit period

- Billed Metered Water
- Billed Unmetered Water
- Unbilled Metered Water
- Unbilled Unmetered Water

Billed Metered Water

The meter accounting and billing evaluation can help locate inconsistencies within the accounting, meter reading and billing cycles, identify problems resulting from inaccurate reading or recording of the individual accounts of metered water and to identify possible potential meter accuracy problems. The evaluation will allow the development of cost-effective recommendations for the correction of the problems located.

Select information for various meter accounts and the historical consumption for at least 12 months of time (typical audit period of one year) may be copied from the Water Utility's database. This information would be imported to the Project Team's program for review and evaluation. The type of information maintained in the Water Utility's database will determine the depth of our evaluation.

The following consumption evaluation will be performed on the data that is available.

- Perform analysis of pumped finished water versus billed water
- Review of your account billing cycles, procedures and practices.
- Review of your account meter reading cycles.
- Review of your account meter reading procedures and practices.
- Consumption patterns and trends are developed to locate decreasing or erratic historical use.
- Usage patterns of meters by sizes are reviewed.
- An evaluation of revenue is performed.

Billed Unmetered Water

All account information regarding unmetered water that is billed such as possible bulk sales, estimated consumptions, fire service water used, etc. will be evaluated. This area of examination can often turn up water uses that have not been documented.

Unbilled Metered Water

Water used by municipal buildings or departments that is metered but for some reason is not billed such as park departments, pools, schools, government buildings, etc., will be evaluated. This water may very well be tracked as far as consumption is concerned but no revenue is generated from its use. Hence, this would be termed as a part of "Non-Revenue Water."

Unbilled Unmetered Water

Water use in this area is usually hard to predict and sometimes tough to estimate. It could be seasonal hydrant flushing, fire system flushing, street cleaning, and fire suppression. Theft of water, however, is not part of this. It is covered under unauthorized consumption. Unbilled Unmetered Water is part of "Non- Revenue Water" and the utility is not gaining an income from it. The account review can sometimes uncover accounts not being billed properly.

Our Project Team has extensive experience in the evaluation of metered consumption. We will use tried and true methods developed over the last 40 years and have the ability to ferret out bad practices both in metering and accounting/billing.

Once the Authorized Consumption has been totaled, it can be subtracted from Water Supplied to yield the water loss totals. The water loss total can be split into Apparent Losses and Real Losses.

Task 3: Determine Apparent Loss

This effort involves assessment of the three components of Apparent Losses shown in the Water Balance: Customer Metering Inaccuracies, Systematic Data Handling Errors associated with the water utility's read-to-bill process (anticipated to be minimal AMI is employed), and Unauthorized Consumption (typically attributed to theft, but also including unintentional and erroneous tapping of water lines).

Apparent losses will be calculated by gathering data from the utility on unauthorized use, calculating meter inaccuracies, and identification of potential data handling errors for the above task of record review. Unauthorized use is a tough area to determine and requires some estimates to be made. However, reviewing customer service requests and reporting of open hydrants, etc., will help validate this information. The use of the Utility's GIS system (if available) will contribute greatly to helping accomplish this task.

The degree of confidence in the validity of authorized consumption is largely dependent on having a firm understanding of customer meter accuracy and the completeness of the utility's customer billing database. An estimate of customer meter accuracy will be based on available testing data for residential and commercial customer meters and a sensitivity analysis will be applied, if appropriate, to assess the range of likely upper and lower limits of accuracy and resulting impacts on non-revenue water performance. Our team will also assume that the customer billing database is inclusive of all customers receiving water service.

Commercial-Industrial Meter Accuracy Levels

In order to validate corrected consumption for the audit, the large commercial/industrial meter accuracies need to be verified. Since the majority of water use occurs through these meters, this is a much-needed task. Statistically significant random sampling (95 % confidence) can be used to select meters by age, size and types for review from the consumption records. The Project Team can evaluate through the billing and accounting processes, the 1-1/2" and larger commercial / industrial water meters for right sizing, performance and accountability. We will review accounting, billing and reading practices with the goal of increasing revenues and improving accountability. Meters that may have been tested for accuracy in the field will have the test results evaluated and the weighted results of the tests can be applied to the Apparent Losses. 12 months of totalized meter data will be needed for the audit period. 36 months of data is preferred.

Small Commercial/Residential Meter Accuracy

In order to validate corrected consumption for the audit, the small commercial - residential meter accuracies need to be verified. While these meters may not individually be a big cause of water loss, cumulatively they can be, thus, this is a needed task. Statistically significant random sampling (95 % confidence) can be used to select meters by age, size and types for review from the consumption records. The Project Team can evaluate selected information for 5/8" through 1" water meters for performance and accountability. We will review accounting, billing and reading practices with the goal of increasing revenues and improving accountability. Meters that may have been tested for accuracy in the meter shop will have the test results evaluated and the weighted results of the tests will be applied to the Apparent Losses.

For the **Unauthorized Consumption** component, the AWWA Water Audit methodology provides for a straightforward estimate of such usage at 0.25 percent of System Input volume. We will discuss the estimation of this component with utility staff and review prior investigations conducted by the utility to determine whether this or some other basis is most appropriate for quantifying this component of the Water Balance.

Needed from the Utility

- The Utility will furnish all records necessary to properly conduct the evaluation program.
- The Utility will provide customer records such as the 12-month (36 months preferred) consumption history, meter sizes, meter types or any additional information that would make the meter evaluation easier to perform. This information shall be regarded as CONFIDENTIAL and will not be shared with anyone outside of the Utility without consent of the Utility.
- The Utility will also make available, on a reasonable but periodic basis, certain personnel with a working knowledge of the water system who may be helpful in the identification of particular issues and for general information about the water system. This person will not need to assist the Project Team on a full-time basis, but only on an "as-needed" basis.

Systematic data handling issues will also be looked at from the previous evaluation of the billing and accounting processes. It may be prudent to trace particular accounts through the initial meter reading process to the billing process to locate potential points of data failure.

Once the above tasks have been completed and validated, the total Apparent Losses will be calculated.

Task 4: Determine Real Losses

Once the Authorized Consumption has been determined and validated, the calculated Apparent losses derived, and then Real losses can be calculated. This will be done by subtracting the Apparent Losses from the Total Losses to yield Real Losses. The Real loses can be validated as well by conducting an evaluation and review of the current leak detection methods employed by the Utility. Real losses are defined as water lost to actual leakage.

We will review the utility's leakage records initially to establish the underlying basis for estimating the recovered quantities to characterize the validity of the reported volumes. We will analyze the leak repair data to discern significant trends in leak location, materials of construction, dates of original installation, soil types, operating pressure, and installation contractors that may be useful for establishing a prioritized program of repair and replacement.

Populating the data entries for components of the Water Balance for the utility's system is a straightforward procedure within the AWWA Water Audit Software. However, the software represents a "top-down" approach for which the individual components of Real Loss are not discretely quantified.

Task 5: Calculate Performance Indicators, Including Infrastructure Leakage Index

After the Real Losses, have been calculated, the physical parameters of the water system need to be accounted for. This is a straight forward process of data entry. It is assumed that since the utility has completed prior audits, this data (miles of pipe, number of service connection, operating pressure, and number of service connections) this information is readily available. In addition, we assume the GIS system data has been continuously updated. The same would be done for the cost data portion of the audit entry.

The AWWA Water Audit Software calculates performance indicators considered by the Water Loss Control Committee to be most appropriate for assessing water system performance. The Infrastructure Leakage Indicator (ILI), is calculated as the ratio of current annual real losses to unavoidable annual real losses. The utility should consider what the appropriate range of ILI should be, given the conditions noted, so that an economically sustainable leakage level can be established once programmatic costs are compared with the benefits of leakage management. The ILI should be considered as approximate guidance for leakage reduction target-setting, where a full economic analysis of leakage control options has not been performed. Past audits may indicate the ILI at a particular level; however, changes occur from year to year that are progressive and not always noticed.

As we have done for other large water systems, we will summarize the calculation of the performance indicators and review them with utility staff as to their meaning in characterizing the relative performance of water loss reduction activities to those of other systems, and as the basis for establishing the components of your water loss management program.

Non-Revenue water will be calculated indicating the amounts of water not generating revenue. Non-Revenue water can be calculated by adding the total water loss to unbilled metered water plus the unbilled unmetered water.

Performance Indicators

Certain cost data will be gathered from the Utility to help calculate the Performance Indicators. These indicators are made up of the Financial Indicators, as well as the Operational Efficiency Indicators.

The financial indicators will indicate how much revenue is lost due to Apparent losses (metering, billing, accounting issues) and Real losses (leakage in the system). By categorizing these losses, the amount of potential recovery for each area is identified to help plan for particular remediation techniques. An important aspect of the Real loss calculation will be the Unavoidable Real Losses. These are losses that occur even in the best run water systems. The calculation of Unavoidable Losses is done by applying a theoretical formula comprised of total water main lengths, lengths of service connections, number of service connections and system pressure. By dividing the Current Annual Real Losses by the Unavoidable Real Losses, the ILI, or Infrastructure Leakage Index is calculated. This ratio performance indicator is used for comparison of one water system to another.

This ILI level will help the Utility and Project Team decide on a strategy of where and how much money may need to be spent for remediation. ILI ratios are based on the current conditions of the water system and reflect the characteristics of the system and relate water resources to financial considerations as related to operational considerations.

Other indicators such as the Apparent losses per connection per day, Real losses per mile of pipe per day, Real losses per service connection per day, and Real losses per meter (head) pressure per day, are especially useful for smaller water systems less than 3,000 connections, or less than 80 miles of pipe in the distribution system where the ILI will be calculated but not displayed. This lack of display is because the ILI has not yet been proven for smaller water systems due to not having enough statistical data available at the time the Water Audit Spreadsheet was developed by the Water Loss Committee of the AWWA.

Assign/Determine Cost of Apparent and Real Losses

Valuation of the utility's real and apparent losses is directly based on the unit values assigned as input to the Water Audit Software. The marginal production cost used to value the real losses will be based on a weighted composite value of system-wide costs for all wells and water treatment plants and subsequent delivery costs applied to the entire system.

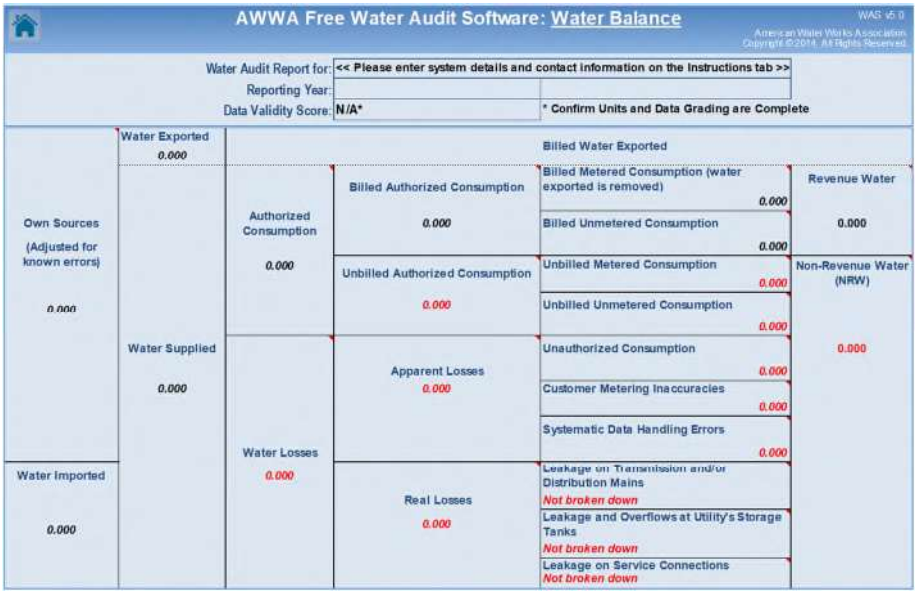
Apparent losses will be valued at the retail rate charged to customers. A suitable basis for the appropriate value to be applied to apparent losses will be developed from discussions with utility staff, considering the applicable rate schedule(s) system-wide.

Validity Scores

While the Audit Spreadsheet is being filled out, validity scores will be assigned to segments of the data. This is done to provide a basis of understanding of how robust the data from the utility is. The data validity score is a useful tool in helping determine areas of remediation in record keeping for a water utility. It also acts as a tool for "self-evaluation" to ensure data integrity. **This step is one of the most important steps of the audit process.** Without this data validation, the audit process is subject to serious flaws. This area will have a great deal of scrutiny applied and is by far the single most important QA/QC segment of the audit process.

Validate All Data and Compile Total Water Balance.

While the data validation process will occur in each above task, the final system-wide Total Water Balance (example below) will be developed and presented using the AWWA Water Audit Software, version 5.0 for review by the utility. The conclusions derived from this analysis will be discussed with the utility to reach a consensus on areas of opportunity to reduce non-revenue water, prior to undertaking water loss remediation planning.



Task 6: Recommendations for Economically Viable Water Loss Intervention Programs

The AWWA Spreadsheet has "built in" generalized suggestions of system improvements based on the scoring system ("ILI" or Infrastructure Leakage Indicator and confidence level of data used) that can help direct long-term programs. However, following the completion of the Water Audit Spreadsheet and the results of the previous tasks, the Project Team will also develop a detailed prioritized set of recommendations on cost effective ways to continue to identify and remediate Apparent and Real Losses.

Each suggested task for water loss reduction may encompass details as to length of time to implement, cost to the Utility, expected return on investment (ROI), frequency of suggested maintenance and/or replacement programs such as leak surveys, and meter testing/repair/replacements. Major CIP programs may be identified as well such as main replacements, implementation of an AMR system, or any other long-term program that may be considered.

Identify and Evaluate Candidate Water Loss Control Activities

The AWWA Manual M36 presents a series of worksheets that can be used to compare the benefits of additional water loss reduction against the estimated cost of achieving those reductions. The key question to be answered by this Task is "Is the utility taking reasonable steps to control water loss and maintain it at an economically sustainable level?"

Real Loss Control

An assessment of leakage management program effectiveness will include elements on the utility's costs for leak survey and repair activities and, if applicable, on pressure management. The project team will examine the organization, procedures and implementation of existing components of real loss control, such as proactive/reactive leak detection and repair programs and, if appropriate, a pipe replacement program and proactive pressure management.

Apparent Loss Control

In the Basic Scope of Services, a similar analysis will be applied for apparent losses to assess the cost effectiveness of existing revenue capture and potential additional or improved revenue recovery activities, such as refinements to meter typing, sizing, change-out and accuracy testing protocols.

We will estimate the economic level of apparent losses by looking at the effort that would be required to reduce apparent losses to the "economic level" based on staff and external costs and potential recovery, and examine how close the utility is coming to achieving that.

Recommend and Prioritize Water Loss Control Activities
Water Loss Management Plan

Based on the outcomes of all earlier tasks, the MESCO Team will identify and prioritize a program of activities to cost-effectively reduce identified water losses. These recommendations will include anticipated costs, technical and human resource needs, and a schedule for implementation.

Prepare and Issue System-wide Comprehensive Water Audit Reports

The project team will prepare a draft report comprising the system-wide analyses performed in the prior tasks, summarizing the analyses performed to reach conclusions regarding the utility's water loss performance, identifying opportunities to improve this performance, if warranted, and recommendations for achieving further reductions in non-revenue water through a prioritized, cost-effective program. We will also discuss with utility staff the possibility of creating, at a later date, other suitable display formats using data and financial considerations to bring out other key findings and conclusions of this project.

The draft report will be reviewed with utility staff and comments incorporated into a Final Comprehensive System-wide Water Audit Report.

AWWA Water Audit Software

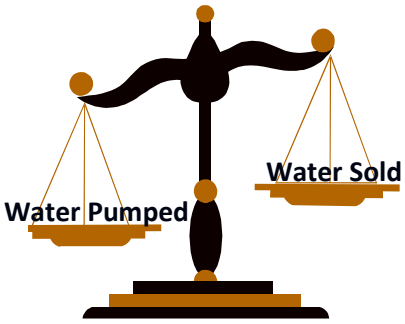
M.E. Simpson Co. Inc. will provide the Water Audit in a digital format. That format will be Version 5 of the AWWA Water Audit Software. M.E. Simpson Co. Inc. staff will provide detailed instructions on how to use this software to selected water division managers.

PROJECT APPROACH & SCOPE

Water Loss Control Audit Level 1 Validation Program

A Water Audit Level 1 validation program is needed to be able to help the water utility identify and then control the water losses in the distribution system and have the validation submitted to the state for compliance with Indiana Senate Enrolled Act 4. This will be accomplished by reviewing the Utility's AWWA Water Audit by following the Validation protocols outlined in the WRF manual for Level 1 Water Audit Validation: Guidance Manual, project #4639A and the State of Indiana "Water Audit Validator Certificate Course Training Manual, as well as following methods contained in the AWWA M36 manual on Water Audits and Loss Control Programs. This specific program will incorporate an approach of using a specific systematic validation technique that will provide a critical review of the "top-down" water audit of the Utility' water system that will examine all the facets of water use and water loss in the utility. It is especially important to be able to locate and validate the documentation of all areas of water loss in the system including real losses, apparent losses, including potential issues with the accounting and billing departments. That will be the real true test of the mettle and ability of the Water Audit Validation Team. In addition, providing a detailed analysis of the audit data for the general condition of the distribution system is something the project team will need to be well versed in. Therefore, a practical project management plan with a proven QA/QC plan is needed to insure this happens.

M.E. Simpson Co., Inc.'s philosophy behind water distribution system water loss audit validation services as incorporated in this work plan is to provide the Utility the following benefits:



- Conserve freshwater resources
- Determining the exact areas of true water losses
- Reduce the cost of lost water through leakage
- Conserve energy and reducing costs by reducing pumpage
- Help in monitoring potential system operation and maintenance problems
- Promote proper accounting and financial reporting (GASB 34)
- Reduce the risk of water shortage and customer hardship (drought management)
- Location of losses through commercial and residential meters which are improperly registering and recording water use
- Locating billing and accounting errors
- Ensure a sound and reliable water service for customers of the Utility
- Providing short- and long-term water loss reduction strategies for the Utility

A number of items uniquely qualify M.E. Simpson Co., Inc. in performing this Water Audit Level 1 Validation Program. The Project Team's extensive practical experience in various water loss control programs such as Water Audits, Meter Testing and proper meter applications, Master Meter Assessments, and Leak Detection will allow for a thorough examination of the Distribution system records and operations to help reduce the total water loss occurring in the distribution system. In addition, the Team will be made up of individuals who are members of the AWWA national Water Loss Control Committee, including a past chair of the committee.

Water Loss Control Audit Level 1 Validation Approach

Our **Water Loss Control Audit Level 1 Validation program** is a multi-phase plan encompassing a specific group of our services that will assist your Utility in improving water accountability and optimizing your distribution system's operational performance. Our program will be structured around your specific needs so that you can optimize your results and maintain flexibility in the performance of the various tasks. The Project Team will submit a questionnaire for particular details required for the review.

The Utility will provide all relevant information to conduct the water audit validation. In the collection and review of the data, a hierarchical approach will be used.

- *Current* information found in the water utility reports and files will be used as the initial set of data. Some discrepancies among the data sets are expected and can be resolved by meeting with water utility staff for clarification.
- *Past audits* and reports will be consulted and used. Older legacy water utility data may be consulted as well. When appropriate, the information will be prorated to reflect changes in the system, including production and consumption for particular years for the audit period.
- In the absence of specific data for the water utility, the project team will work with the utility to plan for completeness for future validation submittals. If the water utility does not have the data to support their audit date inputs, then the Project Team will have to assign the appropriate Data validity Grades reflecting this issue with guidance on obtaining the correct data for future submittals.
- Cost data such as the annual operational costs and marginal costs will need to be analyzed to complete the audit validation. Details on how these numbers are derived will be discussed with Utility staff.
- Physical parameters of the water system will need to be verified in order to make certain the performance indicator calculations are correct.

The Project Team will perform a Water Audit Level 1 validation using the WRF Project 4639A Water Audit Validation: Guidance Manual, based on data collected from the audit period of one year for the Utility's budget year or calendar year. This will include a review of:

- Water Supply data in a monthly table from all water supply sources
- A water system schematic detailing water inputs, water wholesale connections, pressure zones and consumption.
- Consumption data from the Utility's databases (billed, unbilled, metered, unmetered authorized uses) month by month for 12 months
- Customer meter test data
- Cost data
- Water System data (miles of pipe, number of service connections, pressure)
- Any other data that can assist with the overall evaluation of water use and water losses.

A questionnaire will be submitted to staff to assist with the preparation of records stating what the audit validation team will need to complete the process.

Task 1: Determine System Input

The first phase of our Water Loss Control Audit Level 1 Validations is to evaluate your water production through the master water meters to ensure the input into the system has been accurately documented. All water audits have to start with verification of the distribution system input to insure reliable water production amounts. Any wholesale sale of water to other water utilities will need to be documented as well. Without this validation the audit will be flawed from the start.

Record Review

All master meter production data for the selected audit period will be reviewed along with an examination of any past master meter test results. This should include any reports periodically submitted to the state's regulatory agencies or regional water authorities. Total pumpage amounts for the audit period will need to be determined along with the marginal costs of water production. The production records will need to be in a monthly table for evaluation.

Master Meter Evaluation

Part of the first phase may need to include evaluations of your master water meters to insure all the meters are in compliance with AWWA standards for water meters. These evaluations can help verify your total water production volume for the audit period and help determine the actual water loss by applying corrections to the total water supplied for the audit period. All master meters would be evaluated in accordance with American Water Works Association best practices for water meters (reference AWWA M6 and M33 Manuals).

Evaluations

- How water enters the distribution system from the water sources will need to be evaluated.
- Past master meter test flow data will be examined, if available.
- Production data for at least 12 months would need to be trended, and if available, the last 36 months as well.
- Any flow meter calibrations and flow testing results for the audit period will need to be evaluated as well.

Task 2: Validate Authorized Consumption

All studies and reports on previous water loss for the utility will be reviewed with the goal of refining and updating previous techniques. The Project Team will also carry out a detailed review of current water loss practices to identify cost effective loss reduction strategies. A brief review of the accounting and billing system is also imperative for this phase of the program the following items must be thoroughly researched and quantified for the 12-month audit period in monthly segments. Classifications of the accounts will need to be defined and made clear as to which accounts are billed, unbilled, metered and unmetered uses. Consumption records for the audit period would need to be provided in monthly tables for evaluation. The Validation team would look at the records to determine the proper inputs were performed for the following:

- Billed Metered Water
- Billed Unmetered Water
- Unbilled Metered Water
- Unbilled Unmetered Water

Billed Metered Water

The meter consumption evaluation can help locate inconsistencies within the accounting, meter reading and billing cycles, identify problems resulting from inaccurate reading or recording of the individual accounts of metered water and to identify possible potential meter accuracy problems. The top-down evaluation will allow the development of cost-effective recommendations for the correction of the problems located.

Billed Unmetered Water

All account information regarding unmetered water that is billed such as possible bulk sales, estimated consumptions, fire service water used in buildings for system flushing, etc. will be evaluated. This area of examination can often turn up water uses that have not been documented. Billed Unmetered accounts will need to be examined to determine if the proper volumes are getting tracked properly.

Unbilled Metered Water

Water used by municipal buildings or departments that is metered but for some reason is not billed such as park departments, pools, schools, government buildings, etc., will be evaluated. This water may very well be tracked as far as consumption is concerned but no revenue is generated from its use. Hence, this would be termed as a part of “Non-Revenue Water” but the use is defined as Authorized.

Unbilled Unmetered Water

Water use in this area is usually hard to predict and sometimes tough to estimate. It could be seasonal hydrant flushing, fire system flushing, street cleaning, and fire suppression. Theft of water, however, is not part of this. It is covered under unauthorized consumption. Unbilled Unmetered Water is part of “Non- Revenue Water” and the utility is not gaining income from it. The account review can sometimes uncover accounts not being billed properly.

Our Project Team has extensive experience in the evaluation of metered consumption. We will use tried and true methods developed over the last 40 years and have the ability to ferret out bad practices both in metering and accounting/billing for the validation.

Task 3: Validate Apparent Loss

This effort involves assessment of the three components of Apparent Losses shown in the Water Balance: Customer Metering Inaccuracies, Systematic Data Handling Errors associated with the water utility's read-to-bill process and Unauthorized Consumption (typically attributed to theft, but also including unintentional and erroneous tapping of water lines).

Apparent losses are calculated by gathering data from the utility on unauthorized use, calculating meter inaccuracies, and identification of potential data handling errors for the above task of record review. Unauthorized use is a tough area to determine and requires some estimates to be made. However, reviewing customer service requests and reporting of open hydrants, etc., will help validate this information. The validation of this area will be tied back to the consumption analysis to see what efforts the utility has made to document meter testing as well as other unauthorized uses.

The degree of confidence in the validity of authorized consumption is largely dependent on having a firm understanding of customer meter accuracy and the completeness of the utility's customer billing database. The validation of customer meter accuracy will be based on available testing data for residential and commercial customer meters and a sensitivity analysis will be applied, if appropriate, to assess the range of likely upper and lower limits of accuracy and resulting impacts on non-revenue water performance. Our team will also assume that the customer billing database is inclusive of all customers receiving water service.

Commercial-Industrial Meter Accuracy Levels

In order to validate corrected consumption for the audit, the large commercial/industrial meter accuracies need to be verified. Since a higher percentage of water use occurs through these meters, this is a much-needed task. Meters that may have been tested for accuracy in the field may have the test results evaluated and the weighted results of the tests can be applied to the Apparent Losses. 12 months of totalized meter data will be needed for the audit period.

Small Commercial/Residential Meter Accuracy

In order to validate corrected consumption for the audit, the small commercial – residential meter accuracies need to be verified. While these meters may not individually be a big cause of water loss, cumulatively they can be, thus, this is a needed task. We will review accounting, billing and reading practices with the goal of validating this area of consumption and meter accuracy. Meters that may have been tested for accuracy in the meter shop will have the test results reviewed.

For the **Unauthorized Consumption** component, the AWWA Water Audit methodology provides for a straightforward estimate of such usage at 0.25 percent of System Input volume. We will discuss the estimation of this component with utility staff and review prior investigations conducted by the utility to determine whether this or some other basis is most appropriate for quantifying this component of the Water Balance.

Needed from the Utility

- The Utility will furnish all records necessary to properly conduct the evaluation program.
- The Utility will provide customer records such as the 12-month consumption history, meter sizes, meter types or any additional information that would make the meter evaluation easier to perform.
- The Utility will also make available, on a reasonable but periodic basis, certain personnel with a working knowledge of the water system who may be helpful in the identification of particular issues and for general information about the water system. This person will not need to assist the Project Team on a full-time basis, but only on an "as-needed" basis.

Systematic data handling errors will be looked at. If the default value was not used, the validation team will look at how the data input numbers were generated. Of interest will be a review of the utility's accounting and billing processes and identify how often the process is audited, who performs the auiting and what functions are being audited.

Once the above tasks have been completed, the total Apparent Losses will be validated.

Task 4: Validate Real Losses

Once the Authorized Consumption has been validated, the calculated Apparent losses validated, then Real losses can be validated. Real losses are defined as water lost to actual leakage. The Real loses can be validated as well by conducting an evaluation and review of the current leak detection methods employed by the Utility.

We will review the utility's leakage records initially to establish the underlying basis for estimating the recovered quantities to characterize the validity of the reported volumes. We will analyze the leak repair data to discern significant trends in leak location, materials of construction, dates of original installation, soil types, operating pressure, and installation contractors that may be useful for establishing a prioritized program of repair and replacement.

Populating the data entries for components of the Water Balance for the utility's system is a straightforward procedure within the AWWA Water Audit Software. However, the software represents a "top-down" approach for which the individual components of Real Loss are not discretely quantified.

Task 5: Validate Performance Indicators, Including Infrastructure Leakage Index

After the Real Losses, have been validated, the physical parameters of the water system need to be validated. This is usually a straight forward process of review. It is assumed that since the utility has completed prior water loss reporting, this data (miles of pipe, number of service connection, operating pressure, and number of service connections) should be readily available. In addition, we assume the GIS system data has been continuously updated. The same validation would be done for the cost data portion of the audit entry. However, past experiences with several audits and validations have revealed that this data should be given a high degree of scrutiny. Service connection counts, miles of water main, and even water production costs have been incorrectly reported in the past causing a mis-representation of the fitness of the water system.

The AWWA Water Audit Software calculates performance indicators considered by the Water Loss Control Committee to be most appropriate for assessing water system performance. The Infrastructure Leakage Indicator (ILI), is calculated as the ratio of current annual real losses to unavoidable annual real losses. The utility should consider what the appropriate range of ILI should be, given the conditions of its water system, so that an economically sustainable leakage level can be established once programmatic costs are compared with the benefits of leakage management. The ILI should be considered as approximate guidance for leakage reduction target-setting, where a full economic analysis of leakage control options has not been performed. Past water loss reporting may indicate the ILI at a particular level, however, changes occur from year to year that are progressive and not always noticed so tracking the ILI is a needed check and balance.

As we have done for other water systems, we will validate the calculation of the performance indicators and review them with utility staff as to their meaning in characterizing the relative performance of water loss reduction activities for the utility, and as the basis for establishing the components of your water loss management program.

Non-Revenue water will be validated, indicating the amounts of water not generating revenue. Non-Revenue water will be calculated by adding the total water loss to unbilled metered water plus the unbilled unmetered water.

Performance Indicators

Certain cost data gathered by the Utility to help calculate the Performance Indicators related to lost revenue will be reviewed. These indicators are made up of the Financial Indicators, as well as the Operational Efficiency Indicators and will be used to help with water loss reduction planning

The financial indicators will indicate how much revenue is lost due to Apparent losses (metering, billing, accounting issues) and Real losses (leakage in the system). By categorizing these losses, the amount of potential recovery for each area is identified to help plan for particular remediation techniques. An important aspect of the Real loss calculation is the Unavoidable Real Losses. These are losses that occur even in the best run water systems. The calculation of Unavoidable Losses is done by applying a theoretical formula comprised of total water main lengths, lengths of service connections, number of service connections and system pressure. This is why the scrutiny of the physical characteristics of the system is needed, as mentioned above. By dividing the Current Annual Real Losses by the Unavoidable Real Losses, the ILI, or Infrastructure Leakage Index is calculated. This ratio performance indicator is useful to help with loss control planning for the utility.

This ILI level will help the Utility and Project Team decide on a strategy of where and how much money may need to be spent for remediation. ILI ratios are based on the current conditions of the water system and reflect the characteristics of the system and relate water resources to financial considerations, and as related to operational considerations.

Other indicators such as the Apparent losses per connection per day, Real losses per mile of pipe per day, Real losses per service connection per day, and Real losses per meter (head) pressure per day, are especially useful for smaller water systems less than 3,000 connections, or less than 80 miles of pipe in the distribution system where the ILI will be calculated but not displayed. This lack of display is because the ILI has not yet been proven for smaller water systems due to not having enough statistical data available at the time the Water Audit Spreadsheet was developed by the Water Loss Committee of the AWWA.

Assign/Determine Cost of Apparent and Real Losses

Valuation of the utility's real and apparent losses is directly based on the unit values assigned and input to the Water Audit Software. The marginal production cost used to value the real losses is based on a weighted composite value of system-wide costs for all water sources (wholesale water received, wells or surface water, and water treatment plants) and subsequent delivery costs applied to the entire system. These figures need to be validated in order to have proper water loss planning goals established.

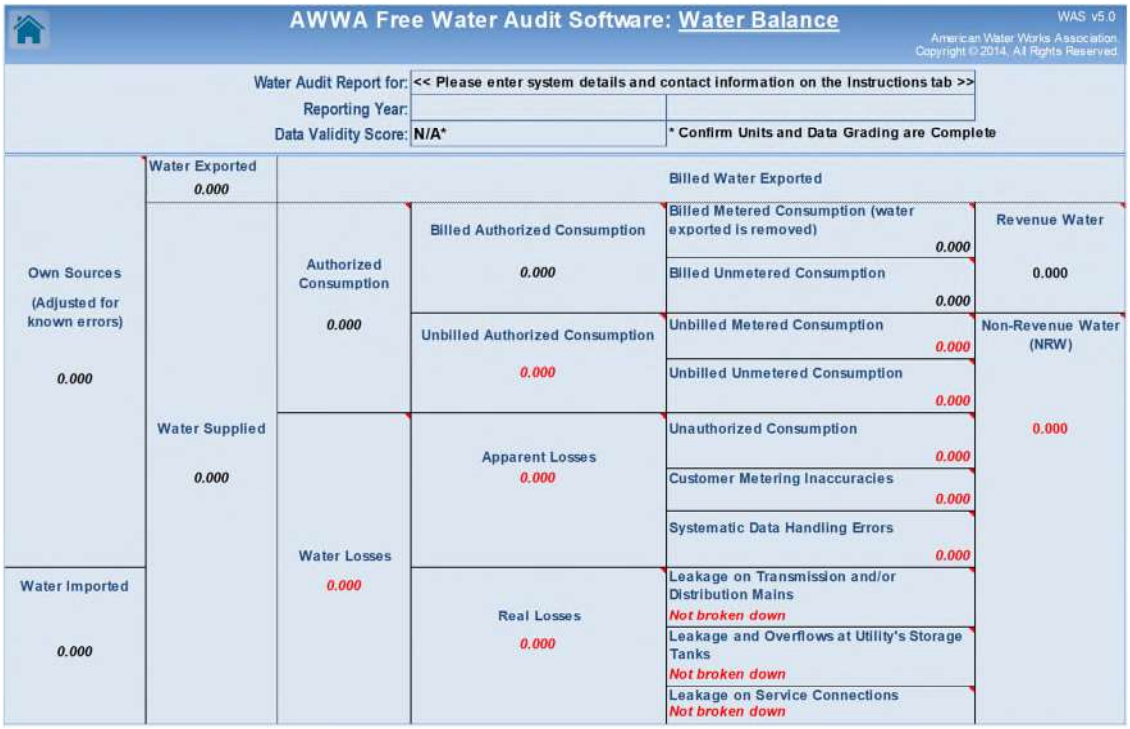
Apparent losses are valued at the retail rate charged to customers. A suitable basis for the appropriate value to be applied to apparent losses will be developed from discussions with utility staff, considering the applicable rate schedule(s) system-wide.

Validity Scores

While the Audit Spreadsheet is being validated, Data Validity Grades (DVG'S) assigned to segments of the data may change. These grade changes would be done to reflect how robust the data from the utility is by the validator. The data validity grade is a useful tool in helping determine areas of potential remediation in record keeping for a water utility. It also acts as a tool for "self-evaluation" to some extent, and is validated to ensure data integrity. The DVG'S for each data input are "weighted" and totaled to yield the "Data Validity Score." **This step for each data input into the audit is one of the most important steps of the audit process.** Without this data validation, the audit process is subject to serious flaws. This area will have a great deal of scrutiny applied and is by far the single most important QA/QC segment of the audit process.

Validate All Data and Compile Total Water Balance.

While the data validation process will occur in each above task, the final system-wide Total Water Balance (example below) will be validated and presented using the AWWA Water Audit Software, version 5.0 for review by the utility. The conclusions derived from this analysis will be discussed with the utility to reach a consensus on areas of opportunity to reduce non-revenue water, prior to undertaking water loss remediation planning.



AWWA Free Water Audit Software: Water Balance

WAS v5.0

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Water Audit Report for: << Please enter system details and contact information on the Instructions tab >>

Reporting Year:

Data Validity Score: N/A* * Confirm Units and Data Grading are Complete

Own Sources (Adjusted for known errors) 0.000	Water Exported 0.000		Billed Water Exported		
	Water Supplied 0.000	Authorized Consumption 0.000	Billed Authorized Consumption 0.000	Billed Metered Consumption (water exported is removed) 0.000	Revenue Water 0.000
				Billed Unmetered Consumption 0.000	
			Unbilled Authorized Consumption 0.000	Unbilled Metered Consumption 0.000	Non-Revenue Water (NRW) 0.000
				Unbilled Unmetered Consumption 0.000	
		Water Losses 0.000	Apparent Losses 0.000	Unauthorized Consumption 0.000	
				Customer Metering Inaccuracies 0.000	
				Systematic Data Handling Errors 0.000	
Water Imported 0.000			Real Losses 0.000	Leakage on Transmission and/or Distribution Mains Not broken down	
				Leakage and Overflows at Utility's Storage Tanks Not broken down	
				Leakage on Service Connections Not broken down	

Task 6: Recommendations for Economically Viable Water Loss Intervention Programs after each validation

The AWWA Spreadsheet has “built in” generalized suggestions of system improvements based on the scoring system (“ILI” or Infrastructure Leakage Indicator and Validity Score for the confidence level of data used) that can help direct long-term programs. However, following the completion of the Water Audit Spreadsheet and the results of the previous tasks, the Project Team will also develop a detailed prioritized set of recommendations on cost effective ways to continue to identify and remediate Apparent and Real Losses.

Each suggested task for water loss reduction may encompass details as to length of time to implement, cost to the Utility, expected return on investment (ROI), frequency of suggested maintenance and/or replacement programs such as leak surveys, and meter testing/repair/replacements. Major CIP programs may be identified as well such as main replacements, implementation of an AMR system, or any other long-term program that may need to be considered.

Identify and Evaluate Candidate Water Loss Control Activities

The AWWA Manual M36 presents a series of worksheets that can be used to compare the benefits of additional water loss reduction against the estimated cost of achieving those reductions. The key question to be answered by this Task is “Is the utility taking reasonable steps to control water loss and maintain it at an economically sustainable level?”

Real Loss Control

An assessment of the leakage management program effectiveness will include elements on the utility's costs for leak survey and repair activities and, if applicable, on pressure management. The project team will examine the organization, procedures and implementation of existing components of real loss control, such as proactive/reactive leak detection and repair programs and, if appropriate, a pipe replacement program and proactive pressure management.

Apparent Loss Control

In the Basic Scope of Services, a similar analysis will be applied for apparent losses to assess the cost effectiveness of existing revenue capture and potential additional or improved revenue recovery activities, such as refinements to meter typing, sizing, change-out and accuracy testing protocols.

We will estimate the economic level of apparent losses by looking at the effort that would be required to reduce apparent losses to the "economic level" based on staff and external costs and potential recovery, and examine how close the utility is coming to achieving that.

Utility Observations

The M.E. Simpson Co., Inc. Project Team will welcome having staff of the Utility observe field procedures while the Leak Survey is in progress. They will be happy to explain and demonstrate the equipment and techniques that are employed by M.E. Simpson Co., Inc. for detecting and locating leaks on the Water System.

Final Reports, Documentations & Communications

M.E. Simpson Co, Inc. will perform the following:

- Project Team will **meet** with assigned Utility personnel to go over all data and materials provided for the water audit.
- **The Project Manager will** meet with the Utility regularly for a progress report.
- **Prepare a progress report** at monthly intervals for the Utility if requested.
- **Prepare the final report** at the completion of the project a final report as well as the completed water audit spreadsheet, LMO2 form and related materials will be delivered to you. As a part of the water audit final report, recommendations for system improvement will be made. **This final report shall be made available for submission to the Utility within thirty (30) working days of the completion of the fieldwork.**

Effective communication…
accurate documentation…
Ensuring the success for the water audit

Assumptions & Services Provided by the Utility

- The Utility will furnish all pertinent data, materials, maps and relatable information in an electronic format to properly conduct the water audit.
- The Utility will assist as necessary to provide additional requested information and data to complete the audit.
- The Utility will provide a Primary Contact Person and/or secondary contact person for the auditor to speak with on a periodic basis. This person shall act as the official liaison for the duration of the water audit. This person shall have a working knowledge of the water system and will be helpful in attempting to locate particularly hard-to-find data, documents and general information about the water system. *This person will not need to assist the Project Team on a full-time basis*, but only on an "as needed" basis.

I N V E S T M E N T

A commitment to improving and maximizing the Town of Munster's water distribution system for future generations.

M.E. Simpson Co., Inc. is pleased to offer the Town of Munster our proposal for Water Audit Services and Level 1 Validation program. All procedures and practices will be done in accordance with the above Scope of Services. The water audit and Level 1 Validation will be completed by M.E. Simpson Co., Inc. personnel trained in water loss audits and Indiana Certified/Licensed water loss audit validation.

2024 Calendar Year

Water Loss Audit Services (2023 Water Fiscal Year)	**$15,000.00**
Level 1 Validation Services (Required in 2023 Water Fiscal Year)	**$2,000.00**
Total Program Costs	**$17,000.00**

We thank you for this opportunity to acquaint you with our Water Loss Audit Services, Level 1 Validation Services and offer this proposal. If you have further inquiries or you wish to discuss our service in more detail, do not hesitate to call us.