**Sample AWWA Water Audit Procedures**

**(Using v6 of the AWWA’s Free water audit software)**

1. Introduction

In [Year], [Utility] began conducting an annual internal water usage audit using the American Water Works Association (AWWA) / International Water Association (IWA) water audit methodology to determine volumes of non-revenue water.

[Utility] uses the AWWA’s free Water Audit Software (WAS) to develop its annual audit, because the WAS is recognized as the industry standard tool to account for non-revenue water. Non-revenue water is divided into three categories: unbilled authorized usage (either metered or unmetered), apparent losses (unauthorized consumption, customer meter inaccuracies and systematic data handling errors), and real losses (leakage from services and mains, and leakage and overflow from storage tanks.)

[Utility] has chosen to conduct its annual water audit based on a [fiscal or calendar] year – [insert dates].

[Utility] staff members with responsibility for developing water audit data and compiling the annual audit should verify that all audit input data, particularly consumption and use volumes aligns to audit period.

Meter reading schedules and billing cycles will not always align with the audit period. Input data such as supply or consumption volumes that overlaps the start and/or end of the audit period should be pro-rated to align it to the audit period. Where pro-rating is necessary, clear explanations of the methodology used for arriving at a prorated value must be provided. Where data cannot be aligned to the audit period for any reason, the data compiler should provide a clear explanation of challenges faced and determine whether the variation from the audit period will materially impact the audit results.

The following internal procedures document sources of the audit data entered by the Water Auditor into the water audit software and assign responsibility to staff and departments for developing and maintaining the data necessary to complete the audit in a timely fashion each year.

1. **WATER LOSS CONTROL TEAM MEMBERS & MEETINGS**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ recognizes that effective water loss control requires a team effort and input from departments across the utility. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ has therefore created a standing Water Loss Control Team (WLCT) with membership drawn from multiple utility departments. WLCT Membership is position based and, the duties and responsibilities associated with WLCT membership are tied to specific positions at the utility

Water Loss Control Team Members:

|  |  |  |
| --- | --- | --- |
| **Department** | **Position** | **Current Incumbent** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

[Utility] Staff should coordinate their efforts to avoid duplication of efforts and to ensure that the most accurate data possible is collected

1. Audit Definitions

The following definitions are used throughout the AWWA’s WAS and M36 water audit manual. A water balance figure is shown after the definitions to provide a visual of each audit component and how it contributes to either revenue or non-revenue water volumes.

* **Volume from Own Sources**: the annual volume of water withdrawn from Water Authority wells and surface water resources and treated for potable water distribution.
* **Authorized Consumption**: the annual volume of metered and/or unmetered water taken by registered customers, or used by the Water Authority for legitimate uses such as treatment processes, water quality flushing, street cleaning, etc. Authorized usage can either be billed or unbilled.
* **Apparent Losses**: unrecorded consumption resulting from customer metering inaccuracies, theft of service, and systematic data handling errors.
* **Real Losses**: the annual volume of water lost through all types of leaks, breaks/overflows on mains, finished water reservoirs, and service connections on the Water Authority’s side of the customer meters.
* **Non-Revenue Water**: all water that is not billed to a customer including unbilled authorized usage, all real loss, and all apparent loss.
* **Water Balance**: (example shown below) a standard graphical representation of water as it moved through the Water Authority distribution system during the audit year from source to customer, dividing water into Supply, Authorized Consumption and Losses, as well as Revenue Water and Non-Revenue Water (NRW.)



1. Audit Development Guidance

Water Supplied

Volume from Own Sources

The volume from own sources is the volume of potable water withdrawn from supply sources (rivers, wells, etc.) that is controlled by the utility and then treated for distribution. This value includes the flow from [Insert details]

**File Name & Description**: [Insert details]

**Data derivation methodology**: [Insert details]

**Data provided by**: [Insert details]

Water Imported

Water imported includes any water that is purchased from another utility.

**File Name & Description**: [Insert details]

**Data derivation methodology**: [Insert details]

**Data provided by**: [Insert details]

Water Exported

The water exported volume is the bulk water conveyed and sold by the utility to neighboring water systems that exist outside of their service area.

**File Name & Description**: [Insert details]

**Data provided by**: [Insert details]

**Data derivation methodology**: (Query or screen shots)

Master Meter and Supply Error Adjustment

For each of the previous three inputs, a master meter and supply error adjustment must be calculated and given a validation score. The adjustment is the weighted average of the collective error for all metered and achieved flow for all days of the audit period. A meter may be inaccurate by under-registering flow (not capturing all flow, negative value or percentage in the water audit software) or by over-registering flow (overstating the actual flow, positive value or percentage). Error in metered data can also occur due to data gaps caused by temporary outages of the meter or related instrumentation. All meter testing conducted during the audit year on all wells, finished water from the treatment plant, import, and/or export meters should be included. The error values should be averaged for a percentage input and totaled for a volume input.

**File Name & Description**:

Volume from own Sources: [Insert details]

Water Imported: [Insert details]

Water Exported: [Insert details]

**Data provided by**: \_\_\_\_\_\_\_\_\_\_\_

Volume from own Sources: [Insert details]

Water Imported: [Insert details]

Water Exported: [Insert details]

**Data derivation methodology**:

Authorized Consumption:

Billed Metered Authorized Consumption

Billed metered volume is all metered consumption that is billed to retail customers, excluding wholesale and/or non-potable usage customers.

**File Name & Description**: [Insert details]

**Data derivation methodology**: [Insert details]

**Data provided by**: [Insert details]

Billed Unmetered Authorized Consumption

The billed unmetered volume is all billed consumption that has been approved to not be metered by the utility. Any water that is supplied to neighboring utilities that is unmetered and billed should **not** be included in this value.

**File Name & Description**: [Insert details]

**Data derivation methodology**: [Insert details]

**Data provided by**: [Insert details]

Unbilled Metered Authorized Consumption

This input is any metered consumption which is authorized by the utility but for any reason is deemed by policy to be unbilled. This volume includes water consumed by the utility itself during distribution. It does **not** include water supplied to neighboring utilities (water exported) which may be metered but not billed. This information includes well wash and unaccounted events such as reservoir drainage.

**File Name & Description**: [Insert details]

**Data derivation methodology**: [Insert details]

**Data provided by**: [Insert details]

Unbilled Unmetered Authorized Consumption

Unbilled unmetered is authorized consumption that is neither billed nor metered. This water includes water used in activities such as firefighting, flushing of water mains, street cleaning, fire flow tests, and more. The Water Audit Software includes a default value of 0.25% of Billed Authorized Consumption that can be used in the absence of utility specific data for this water loss category. However, it is a best practice to attempt an estimate or calculation of Unbilled Unmetered Consumption.

[Determine whether the utility will use the Audit Software default value, or a calculated value. Include details of Utility processes used to uncover and document Unbilled Unmetered Authorized Consumption. If the default value is used, include procedures for determining whether default value is reasonable for the Utility.]

**File Name & Description**: [Insert details]

**Data derivation methodology**: [Insert details]

**Data provided by**: [Insert details]

WATER LOSSES:

Apparent Losses

Apparent losses include all types of metering inaccuracies, theft of service (unauthorized consumption), and systematic data handling errors.

SYSTEMATIC DATA HANDLING ERRORS

Inaccurate readings, consumption estimates, billing system account activation, archiving, retrieval, and reporting software glitches, and other data-handling issues are common sources of error which may result in the over or under reporting of consumption. The Water Audit Software includes a default value of 0.25% of Billed Authorized Consumption that can be used in the absence of utility specific data for this water loss category.

**File Name & Description**: [Insert details]

**Data provided by**: [Insert details]

**Data derivation methodology**: [Insert details]

CUSTOMER METERING INACCURACIES

Customer meter under-registration is often a significant source of lost revenue and unrecorded consumption. Such under-registration may be the result of meter wear over time, or due to the mis-sizing of meters for specific applications.

The water audit uses one value (either a percentage, or a calculated volume) to account for all consumption errors due to metering inaccuracies and applies it to both billed and unbilled metered consumption. No default value is provided and, although a 0 value may be used for this category it is not recommended.

Customer metering inaccuracies should be calculated using a weighted average from the small and large meter testing in the audit year including both billed and unbilled metered consumption.

[Include details of meter testing programs (if any) including information about meter types/sizes, and the testing protocols used for each and how the value for this data point was calculated.]

**File Name & Description**: [Insert details]

**Data provided by**: [Insert details]

**Data derivation methodology**: [Insert details]

UNAUTHORIZED CONSUMPTION (THEFT)

Unauthorized consumption is water that is taken from the utility through illegal connections, bypasses, hydrant tapping, meter tampering or any other method where water is consumed without utility permission and no revenue is generated. The Water Audit Software includes a default value of 0.25% of Billed Authorized Consumption that can be used in the absence of utility specific data for this water loss category. However, it is a best practice to attempt an estimate or calculation of unauthorized consumption.

[Determine whether the utility will use the Audit Software default value, or a calculated value. Also include details of any Utility processes used to uncover and document theft. If the default value is used, include procedures for determining whether default value is reasonable for the Utility.]

REAL Losses

The Water Audit Software calculates a Real Loss volume by subtracting all documented and estimated consumption from documented and estimated supply. This value is presented as a “lump sum” and is not broken down into further into mains, service line and tank overflow losses.

[Include any procedures in place to collect and analyze loss related data for comparison to Audit calculated values. The calculated Real Loss volume should be reviewed for reasonableness in light of other system data and a leakage component analysis (LCA) is recommended. If the Utility plans to conduct an LCA the details should be included here.]

System Data

Length of Mains

The length of main includes all active water distribution main for potable water, **not** including the customer service connections. Pipeline leads to fire hydrants should be included.

**File Name & Description**: [Insert details]

**Data provided by**: [Insert details]

**Data derivation methodology**: [Insert details]

Number of Active and Inactive Service Connections

The number of active and inactive service connections includes all potable water main distinct piping connections including customer fire flow lines. This number does **not** include the pipeline leads to fire hydrants.

**File Name & Description**: [Insert details]

**Data provided by**: [Insert details]

**Data derivation methodology**: [Insert details] (Query or screen shots)

Average Length of Customer Service Line

The average length of the customer service line is the length of line measured from the point of ownership transfer to the customer water meter. If the customer water meter exists near the ownership transfer point (usually the curb stop), this distance is zero because the meter and the transfer point are the same. This situation is often encountered when a customer water meter is in an underground meter box or pit outside of the building. If water meters are typically located inside the customer premise, it is up to the auditor to estimate a system-wide average length based on the various customer land parcel sizes and building locations in the service area. The length will be shorter in areas of high density and longer in areas of low density. If the auditor selects “Yes” for this input, this distance is set to zero and the data grading score for this component is set to 10.

**File Name & Description**: [Insert details]

**Data provided by**: [Insert details]

**Data derivation methodology**: [Insert details] (Query or screen shots)

Average Operating Pressure

The average operating pressure input value is the average pressure for the system during the audit year

**File Name & Description**: [Insert details]

**Data provided by**: [Insert details]

**Data derivation methodology**: [Insert details] (Query or screen shots)

COST DATA

Customer Retail Unit Charge

The customer retail unit cost is the weighted average cost across all customer classes and rate tiers, excluding wholesale customers, for one unit of water. All differences in customer charges and fees should be analyzed to calculate the average cost.

**File Name & Description**: [Insert details]

**Data provided by**: [Insert details]

**Data derivation methodology**: [Insert details] (Query or screen shots)

Variable Production Cost

The cost to produce and supply the next unit of water. This cost is determined by calculating the summed unit costs for ground and surface water treatment and all power used for pumping from the source to the customer. The variable cost includes at a minimum energy and treatment cost, as well as the costs of water acquisition (if any).

**File Name & Description**: [Insert details]

**Data provided by**: [Insert details]

**Data derivation methodology**: [Insert details] (Query or screen shots)

Total Annual Cost of Operating System

Total Annual Cost of Operations is an optional input and is not required to complete the water audit.

**File Name & Description**: [Insert details]

**Data provided by**: [Insert details]

**Data derivation methodology**: [Insert details] (Query or screen shots)

Key Performance Indicator Targets

The Water Audit Software allows targets for the following four Key Performance Indicators (KPIs) to be documented:

Unit Total Losses (gal/conn/day)  
Unit Apparent Losses (gal/conn/day)  
Unit Real Losses (gal/conn/day)  
Unit Real Losses (gal/mile/day)

Any input target values are graphed on the Dashboard tab of the Water Audit Software.

[Include details of whether KPI targets are to be included and how they are derived.]

1. **COMMUNICATING AUDIT RESULTS TO STAKEHOLDERS**

Communicating successes, setbacks and needs to stakeholders is critical to the development and maintenance of a successful water loss control program. The knowledge gained through water loss auditing and other water loss control measures can, and should, be shared with stakeholders.

[Utility] has identified the following list of stakeholders:

[Insert details]

|  |  |  |  |
| --- | --- | --- | --- |
| Stakeholder | Role | Information to be shared | Frequency of communication |
| [Insert details] |  |  |  |
|  |  |  |  |
|  |  |  |  |