

**WATER SYSTEM AND WATER LOSS CONTROL WORKSHOP**  
**April 13, 2011**  
**Rutgers EcoComplex, Bordentown NJ**

**AWWA Free Water Audit Software© Application Exercise 1**  
**Actual Small System Example**  
**System Description**

**Instruction:**

Please read the actual water system description provided below. The description contains all necessary information to complete and populate the AWWA Water Audit Software©, Version 4.2, to obtain actual water balance and performance indicator results. The data was provided by an actual small system that conducted an IWA/AWWA Water Audit. The utility additionally completed a water loss survey and a component analysis of losses to further calibrate their audit process.

Note: although the water utility in this example is a Canadian water utility, for purposes of this exercise, all water volume units are given in gallons (not metric units) and all costs are given in US currency.

**Actual Small System Description:**

This small water utility (SWU) is located in beautiful central Ontario, Canada and is known for its summer vacation and cottage getaways. The SWU services a population of approximately 19,750 people and is primarily residential with small commercial and some industrial users. In total, there are 5,374 active water service connections and 43 in-active service connections. The SWU is supplied via 6 active wells and the distribution network is comprised primarily of cast iron and ductile iron watermains with some PVC watermains totaling 61.7 miles of piping. System pressures vary within each of their 3 pressure zones but generally average 72 psi. Currently, the annual cost of operating and maintaining the water system runs at \$1,131,500.

The system supply from each of the 6 well sites is metered and logged daily and reviewed each business day. Flows across the distribution system are balanced with inflow/outflow of supply at SWU's sole elevated water storage tank taken into account. An annual report of total water production is compiled from July 1 to June 30. For the reporting period of July 1, 2009 to June 30, 2010, the total water produced from all 6 wells was recorded as 787.5 million gallons. Source meter accuracy testing is conducted yearly at this SWU near the end of the production year. Results from June 2010 show that on average the production wells were over-registering by approximately 2.65%, which is 20.87 million gallons. There are no other sources of water within the SWU nor do they export any water to other utilities. The marginal production cost of the water is recorded as 30.28 cents per 1000 gallons.

The utility's customer population is 100% metered and meters are read monthly by the local electric utility company, which also performs a series of account auditing procedures on the monthly data. Data from the electric utility is generally reliable, but occasional lapses result in a lack of readings for a month at a time, meaning water consumption estimates must be used. For the reporting year of July 1, 2009 to June 30, 2010, the recorded billed metered consumption was 660.4 million gallons. A meter reading lag-time adjustment calculation was completed which made a 1.4 million gallon reduction to the recorded billed metered consumption. SWU handles

customer billing and billed consumption and, generally, revenues are relatively stable. However, in March 2010 SWU's billing clerk discovered that a group of 40 new cottages built in early 2009 had not been established with accounts in the customer billing system. Therefore these properties had not been billed for water service despite being occupied during the summer months of July and August 2009. These types of cottages typically consume 5,000 gallons per month. SWU's finance manager became concerned at this finding and launched a small scale investigation which uncovered other sources of unbilled water that amounted to 100,000 gallons of unbilled water due to billing operations oversights. The billing software used by SWU is over 20 years old and, while it still provides basic billing functions, is outdated and SWU is planning to install a new billing system within the next two years.

In the SWU service area all customer water meters are located inside of homes and buildings due to local weather conditions to prevent freezing in the winter. The average length of the private service pipe from the property line (curb stop) to the meter was estimated based on property allowances at 24.6 ft. Detailed meter accuracy testing of the customer meters is not generally conducted unless requested by the user. Thus accurate meter under-registration information is not readily available. None the less, an assessment was made based on the age and usage of the meters and an estimated 1.85% meter under-registration amount was determined. The customer meter population is a mix of mostly newer meter models (less than 10 years old), but with roughly 20% of the population older models, some dating back to the origins of the system in the early 1970's. The current retail cost of water is \$5.53 per 1000 gallons.

The SWU keeps some records to track operational water consumption within the distribution system. These usages include water main flushing, blow offs, storage facility servicing and new watermain flushing and cleaning and are not normally metered. Two fire companies operate within the SWU service area and consume water by operating fire hydrants for inspection and training purposes. SWU has requested records of this water consumption from the fire companies, but feels that the data provided by the fire companies is lacking and only a portion of the water consumed in their operations is tabulated. In total, the estimated value of this consumption for the audit period is 3.3 million gallons.

Unauthorized consumption, although known to exist on occasion (hydrant theft and meter by-passing), is not tracked. It is believed to be relatively insignificant and is currently being estimated at 0.25% of water supplied.

### **Hints:**

Some basic conversions of units will be required during this exercise, although you won't require the use of a calculator. Please be sure to convert the appropriate values before you enter into the AWWA Free Water Audit Software© Reporting Worksheet.

Do not be afraid to ask questions to your assigned moderator, who is there to assist you in this process and has the "answer sheet" and thus will be able to assess that you have entered appropriate values!

Most important hint – learn from the process and the other workgroup participants. By sharing your experiences, you gain helpful tips in collecting the right data for your own water audits!

**Have Fun and Good Luck!!!**