

Metering and Sub-Metering of Existing Residential and Multi-unit Residential, Commercial and Industrial Users

Applicability

This BMP is intended for all water systems (“utility”) that do not have 100 percent metering of all customer connections. Improved accuracy of meters resulting from increased maintenance efforts should result in increased revenue and reduced water loss. Metering of all new customer connections and retrofitting existing connections are effective methods of accounting for all water usage by a utility within its service area.

Description

Proper installation of meters by size and type is essential for good utility management. Using and maintaining the most accurate meter for each type of connection will help to generate adequate revenues to cover the expenses of the utility, ensure equity among customers, reduce water waste and reduce flows to wastewater facilities. The American Water Works Association (AWWA) provides a number of helpful resources on metering. Those resources are listed in the reference section of this BMP.

The purpose of this BMP is to ensure that all aspects of meter installation, replacement testing and repair are managed optimally for water use efficiency.

For a utility’s meter program to qualify as a BMP which satisfies the requirements of Session Law 2011-374, it should include:

- Required metering of all connections.
- A policy for installation of adequate, proper-sized meters as determined by a customer’s current water use patterns. The use of compound meters for multi-family (“MF”) residential connections or other industrial and commercial accounts is recommended.
- Direct utility metering of each duplex, triplex, and four-plex unit whether each is on its own separate lot or whether there are multiple buildings on a single commercial lot.
- Meter all utility and publicly-owned facilities even if it the utility does not choose to bill these facilities. (This helps at the time of a water audit to account for all authorized uses).
- Use construction meters and access keys to account for water used in new construction.
- Require separate meters for all in-ground irrigation systems as per G.S. 143-355.4.
- Review capital recovery fees to determine whether the fees provide any disincentive to developers to use utility metering of apartment units.
- Annual testing and maintenance of all meters larger than 2 inches since a meter may under-register water use as the meter ages.
- Regular testing and evaluation of 5/8 inch and 3/4 inch meters which are 8 to 10

years in service to determine meter accuracy or a periodic, consistent replacement program based on the age of the meter or cumulative water volume through the meter. This program should be based on testing of meters at each utility to determine the optimal replacement/repair period since it depends on the quality of water and the average flow rate through the meter versus the capacity of the meter.

- An effective monthly meter-reading program where readings are not estimated except due to inoperable meters or extenuating circumstances. Broken meters should be fixed within seven days.
- An accounting of water savings and revenue gains through the implementation of the Meter Repair and Replacement Program.
- Meter hydrant flushing and fire use to the extent practicable.

Implementation

To accomplish this BMP, the utility should do the following:

- Conduct a Meter Repair and Replacement Program following the methodology and frequency currently recommended in NCDENR Efficient Metering Recommendations Report, which can be found at http://www.ncwater.org/drought/Efficient_Metering.pdf and/or use current industry practices as specified by the AWWA.
- Develop and perform a proactive meter-testing program and repair identified meters.
- When meters are accurate but customer-side leaks exist, develop a protocol to notify customers. An option would be to repair leaks on the customer's side of the meter or to provide guidance to customers on how to find leaks.

Schedule

To accomplish this BMP, the utility should do the following:

- The utility should develop procedures for implementation of this BMP within the first twelve months. The procedures should include annual or more frequent benchmarks for measuring implementation.
- The program participant should consider procedures for and maintain a proactive Leak Detection and Repair Program (See, System Water Audit and Water Loss Abatement BMP) within the first twelve months.

Scope

To accomplish this BMP, the utility should do the following:

- Develop and implement a metering program based on current North Carolina standards, which can be found at http://www.ncwater.org/drought/Efficient_Metering.pdf and/or AWWA practices

and standards.

- Produce a regular schedule for the utility meter repair and replacement program based upon total water use and the consumption rates of utility accounts.
- Effectively reduce apparent water losses through implementation of the meter replacement and repair programs.

Documentation

To track the progress of this BMP, the utility should gather the following documentation:

- A copy of meter installation guidelines based upon customer usage levels.
- A copy of the meter repair and replacement policy.
- Records of number and size of meters repaired annually.
- Report on the method used to determine meter replacement and testing intervals for each meter size.
- Estimate of water savings achieved through meter replacement and repair program.

Determination of Water Savings

Every year, the utility should estimate its annual water savings from the BMP. Savings can be estimated based upon a statistical sample analyzed as part of the meter-testing program. Water savings can also be realized through application of the water audit. As the percent meter error decreases through program enhancements, there should also be an associated decrease in apparent water loss shown in the audit. The utility should project potential savings into future years and also include water savings targets and goals in their projections.

Cost-Effectiveness

Capital costs to the utility in implementing this BMP may include the costs to install new meters and retrofit older ones, as well as one-time or periodic costs such as the purchase of meter testing and calibration equipment. A replacement meter can cost from as little as \$50 for a residential meter to several thousand for larger compound meters. Meter testing and repair can be done by utility staff or by contractors. Smaller utilities could consider sharing testing facilities. A typical residential meter test can be completed at a cost of between \$15 and \$50. Administrative costs may exist for additional tracking and monitoring of meter replacements.

For comments or questions regarding the Metering BMP, please contact the water efficiency specialist of the Water Supply Planning Branch at 919-707-9021.

References

- Water Loss Control Manual, Julian Thornton, McGraw-Hill, 2002.
- M6 Water Meters – Selection, Installation, Testing and Maintenance, AWWA 4th

Edition, 1999.

- Applying Worldwide BMPs in Water Loss Control, AWWA Water Loss Control Committee, Journal AWWA, August 2003.
- Recommendations for Efficient Metering of Water Use by Local Governments and Large Community Water Systems
http://www.ncwater.org/drought/Efficient_Metering.pdf.
- NC DENR-DWR Public Water Supply
http://www.ncwater.org/pws/srf/Pages/dwsrf_program.htm.

Case Study for Metering and Sub-metering

Brunswick County Utilities, North Carolina

Background

Brunswick County Utilities is located on the southeastern coast of North Carolina and serves a year-round population of 108,071 people based upon the 2010 Census and a seasonal population of 195,600 people. In 2011, the utility replaced 7,000 meters out of a total of 34,041 metered residential connections.

In 1999, Brunswick County had 10,249 retail water customers. With the explosive growth that has occurred in Brunswick County, the acquisition of one private water system, and assumption of operational responsibility and ownership of three municipal systems, the county has added approximately 24,000 customers to the water system in 13 years.

Brunswick County is the sixth largest county in terms of area in the state and provides retail service throughout the county. Due to the size of the county and complexity of reading each meter on a monthly basis, the county evaluated methods to remotely read its water meters. After a careful evaluation of all the alternatives, the county decided to implement an Advanced Meter Infrastructure (AMI)² meter reading system. With the AMI

² Due to advancements in technology, systems such as Advanced Meter Reading (AMR) and Advanced Meter Infrastructure (AMI) are now available in the utilities industry. The foundational premise upon which AMR and AMI systems work is the provision of greater efficiency and accuracy in resource accountability. AMR systems can be used to electronically record metered water usage, and transmit the data to a central location for billing and other operational uses. AMR systems provide for a reduction in labor costs, and eliminate operator error in reading and processing water usage data. As a result, application of AMR systems can also reduce apparent water loss. AMI systems have the capability to provide greater flexibility to the utility. These systems can record metered water usage and report the data in near real-time occurrence intervals. AMI systems also provides the utility with the option to remotely send instructions to customer meters such as disconnect/connect or upgrade firmware, and interface with data warehousing systems that store and manage collected data. The communication and to interface capabilities that AMI systems provide allows systems to timely and accurately manage water resources which reduces costs on the supply side, and increases efficiency and revenue on the demand side.

meter reading system, all meters can be read at one central location. The county selected a vendor to supply the AMI system and decided to use its own crews to install the meters during a seven-year period. The replacement of the meters has been taking place for the last three years and will continue for several more years. A full-time in-house team of six staff members spends five days a week replacing meters.

One of the major advantages of the AMI meter reading system is its ability to detect leaks in a customer's system. Since the meters transmit readings back to the central office, constant usage through normal low-flow periods can be detected. The AMI meter reading system has software that will print a daily list of customers with possible leaks. This allows the billing supervisor to flag possible leaks and contact the customer to alert them about the potential problem.

The capital cost of the project is \$8,733,076 and will be funded during a period of years. Since the meter change-out is new and a new billing system is being used for the first time this year, no calculations of revenue saving have been made thus far.

Depending on the type of construction, the county allows developers of multi-family projects, including apartment and condominiums, to install either a gang meter assembly, where one meter serves each unit; or a master meter, where one meter serves all of the units. When a master meter is installed, the property owner or Property Owners' Association is responsible for the water charges. When a gang meter is installed, the property owner or renter of each unit is responsible for his or her usage.