

Does Your Water System have a Water Meter Program?

by: James Dailey

What is the purpose of a water meter? To measure and track the amount of water delivered through a distribution system. More importantly a water meter registers the amount of water delivered to a customer so an appropriate bill for that water can be charged. That charge determines the amount of revenue a system receives. The potential for revenue loss can be staggering if the system has a large number of meters significantly under-registering. Loss of revenue is more significant particularly for systems that have a high water production cost or high purchase water costs. Consideration must also be given for customer billing equity. Major differences in meter accuracy translates to unequal customer billing. A water system with a high unaccounted for water loss may have leaks or other distribution problems that must be addressed. Without accurate meters the degree of these problems cannot truly be known. The accuracy of a utilities water meters should be high priority and efforts made to maintain all meters at a high and uniform level of efficiency. An alert meter reader should be able to spot an under-registering meter by a quick comparison with past reading. Meter stoppages should be noted immediately at the time of the meter reading and scheduled replacement planned.

Why does the accuracy of a water meter diminish? A water meter like any mechanical device is subject to wear and deterioration over time. The deterioration would be accelerated by poor water quality such as corrosive or abrasive water. Water meters can register over register but this rarely occurs because wear on internal meter parts generally cause lower measurements. It can be assumed that after a certain age the inaccuracy of the meter due to deterioration becomes an economical liability.

When should a water meter be replaced? There is no study that can show or recommend the exact age when a water meters accuracy is diminished to such a degree that replacing is economical. How long water meters retain their overall accuracy depends on many factors, such as the quality of the water being passed through the meter, the rate of flow and the total quantity of water that has been measured. Various conditions that water meters are exposed to prevent

any exact time frame for water meter decay due to differences in water chemical composition, temperature and humidity. Most studies do conclude residential meters should be repaired or replaced after 15 or 20 years. At this age the accuracy would have diminished to the point that the cost of meter replacement is less than loss of revenues with continued use of the meter. Residential meters the majority for any system generally cost between \$30 and \$40 which translates to less than \$3 a year for a 15 year service period.

It is important that all water systems establish a meter program to insure that the system is able to track water production and distribution. There are essentially three levels or types of meter programs:

- A comprehensive meter testing program
- A meter testing and repair program
- A comprehensive meter replacement program

A meter testing program would consist of periodically testing meters within the system to determine their accuracy. The meter testing would be based on meter age, meter use, water quality, cost of testing and water revenue loss. Older meters and those carrying the largest volumes should be given the highest priority. Small meters should be tested once every five to ten years. Larger meters every one to five years. In theory new meter should be tested before installation although only a fraction of utilities perform such tests. Meters have an inherent variation of 2 to 3 percent in registration over the entire range of flows, except very low flows just above those that the meter will not register. Meters are to be considered to be satisfactory if measurements are 95% accurate at low flows and 98.5 % accurate during normal flows. Those meters that fall outside of these ranges should be serviced or replaced. Establishing a meter testing program is often difficult, as it involves repetitive testing and manpower. Obviously the only way to determine whether a specific meter is operating efficiently is to test it. Probably no phase of water utility operation has been handled in so many different ways as that of testing water meters. There have been no nationally recognized water meter testing procedures however accuracy requirements are contained in the various AWWA meter standards and these standards have been widely used as a basis for establishing individual testing methods.

Repairing meters is an option that may be economical for larger systems that have the equipment and expertise for such a program. Meter repair work is not considered acceptable if repaired meters do not register 90 percent on the test. Most modern meters have sealed registers and easily changed measuring chambers. These meters are usually maintained and repaired by the utility. Older style meter with heads that must be worked on should be returned to the manufacturer for maintenance and repair if they are not to be replaced.

A meter replacement program is generally the best and most cost effective method for smaller systems due to the lack of manpower, equipment and expertise. An initial service period must first be established. This period may be 20, 15 or even 10 years. Once the service period is reached the meters are replaced with new meters creating a reasonable economic balance between the cost of replacing the meter versus loss of revenue incurred with continued use of the old meter. It is obviously economical if the cost of the replacing a meter is less than the loss of revenue that would occur if the meters were to be used longer than their established service period. Essentially the meter program would more than pay for itself.

A comprehensive meter program not only benefits the system creating a more efficient operation but allows the system to maintain the lowest possible water rates.