

Advances in technology help reduce water loss

There are three things in life that we must have to live – the air we breathe, the water we drink and the food we eat. Of these three, water is ranked second. Did you know that the human body will die without water after four days, in some cases in as little as three days? Our body is approximately 55 to 65 percent water and it is recommended that we drink a minimum of eight glasses of water a day to replenish it. People would think that with over 80% of the planet covered with water, there would be a never-ending supply of it. Wrong. Of that 80%, approximately 97% is salt water and another 2% is frozen in ice. That only leaves 1% of all that water as usable for us.

has always redirected water away from its trip back to the oceans, where most of the evaporation takes place, and directed it into

One example of an ancient system was built sometime around 312 B.C. It was a gravity-fed system consisting of channels and

Distribution systems of today can be traced back over two thousand years, back to the times of the Romans, Egyptians and even the Greeks. They all distributed water, using methods that are similar in many respects to distribution systems used today.

pipes. Water is consumed and used, from there it enters wastewater systems or streams and then it begins its journey back to the oceans, to start the hydrological cycle all over again.

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pipelines made from stone and brick with a cement lining and the builders also used some lead pipes. One of the most important jobs for the workers of that “water system” was to locate and repair water leaks. Technology has changed a lot, but the basics have stayed the same. A community still needs a source of water, a

The water cycle

Most people take water for granted. They go to the tap and turn it on and expect clear, cool, clean water to come out. Where does it all begin? The water in your glass may have fallen from the sky as rain just

last week, but the water itself has been around pretty much as long as the earth has! It's like the age-old question, which came first, the chicken or the egg? Water runs in a cycle. It never changes. The Earth has always had cloud formations, rainfall and evaporation. Man has interfered in this cycle somewhere between the rainfall and evaporation. Mankind



*Gary Armentrout
Training Director*



KRWA helped find this leak in Crawford RWD 4 a couple of years ago. Timely fixes to such leaks ensure customers continue to receive water service.

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way to transmit or distribute it, storage, a way to meter it at the customer connection and maintenance to find the leaks and other problems.

Looking for leaks

All water systems experience water loss of one type or another. In the past, water often was plentiful and relatively inexpensive. Today, some water system officials do not focus on their water losses. It's sort of an "out of sight, out of mind" approach. Sometimes there's no rush to find and repair water leaks because no one is held accountable for all the water loss. Today, some states still do not account for water used by the different water systems within state borders. They have no real idea just how much water is lost by water systems because no type of water usage reporting is required.

In Kansas, those water systems that have water rights are required to submit a "Water Use Report." This report, among other things, shows the amount of "unaccounted for water," for each system. After this report is reviewed by the Division of Water Resources, the Kansas Water Office is informed of water systems that have a water loss of 30% or more. The Kansas Water Office and the Kansas Rural Water Association then contact the systems to offer assistance to try to correct the high water loss.

Meter accuracy

It cannot just be assumed that the water loss will always be in the distribution system. It is necessary to also test water meters (the system's cash registers) as well as the accounting system and record keeping procedures. Water meters are like any other mechanical device; they break down or go bad. Large meters, 2-inch and larger, should be tested yearly as their inaccuracy often contributes the highest percentage of loss. Small meters should be changed out at or near the 1,000,000-gallon mark. It is also recommended to change small

meters every 10 years. If the system uses meters with low readings that are nearly 10 years old, pull a few and test them. If still within standards, leave them in the system for a while longer. KRWA provides meter testing on request.

Accuracy of records

When reviewing the accounting system, while the numbers are there – do they add up? If the system is a self-read system, where customers read their own meters, there is a good chance there will be errors in reporting. Some customers will estimate a bill or misread their meters. Allowing customers to pay in advance may also contribute to tabulation errors. Determining water loss is simply comparing the amount of

water that is bought or produced, determining other authorized use such as flushing, and that sold to customers. Two numbers that must be known are the beginning and ending reading, or the amount of



KRWA Technical Assistant and Training Director Gary Armentrout uses an ultrasonic meter that not only gives the rate of water flow in the pipe but also shows the direction of water flow.



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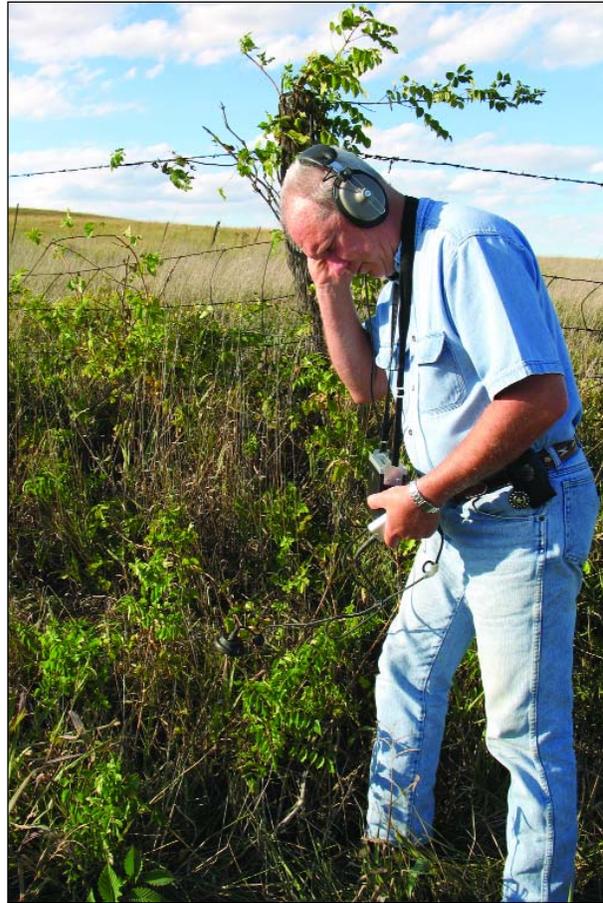
water entering the distribution system and the amount of water being metered as used or otherwise accounted for. The only way to determine these readings and to have any confidence in them is to have accurate meters and for system personnel to read all customer meters.

High tech is a help

More and more water systems today are reading meters each month and a lot of these systems have gone high tech. They are using the automated meter reading (AMR radio read systems) that many of the meter manufacturers are producing today. The radio read systems are very accurate and save substantial labor. When linked to the billing system, AMR allows bills to be mailed in record time. Most water systems that have gone this route have not only experienced less water loss, but have also shown an increase in revenues.

The third area to look at is the distribution system itself. There

Gary Armentrout walks a fence row following a water line, while using an acoustic leak detector. The device amplifies leak sounds coming from underground. It can also tell if a valve is open or closed by amplifying the noise level of water going through it. The experience of the equipment operator is key to efficient use.



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are a number of reasons for leaks to occur in distribution lines. Some of the most common are poor materials, poor workmanship or installation, incorrect trench backfill, excess line pressure, corrosion, lack of proper maintenance and environmental conditions such as heat or cold. These are by no means the only reason for leaks in a system.

Looking at distribution

When locating leaks in the distribution system, unless the area where the leak is located is already known, ascertain if there are any customer reports of water pressure loss, if so start in that area. Study system maps to be certain that all valves are working properly. It will also help to know of customers with automatic livestock watering. Another very important thing to know is where water lines are located. Are they where the system map indicates?

A system operator can only hope! Another area to check is area meters. These are meters installed in the distribution line used to measure total flow of water going to a specific area. When this

It can tell if a valve is open or closed. An ultrasonic meter can also be used to assist in locating the leak. It will not only give us the rate of water flow in the pipe but will also show the direction of

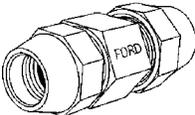
With more high tech information, a leak detective can then know if the leak is to the right or left. Water loss and leak locating is quickly becoming more like "rocket science."

reading is compared with total readings of customer meters, a leak can be detected along this line or in that area.

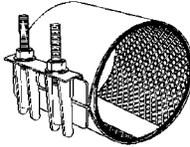
KRWA uses different types of equipment to locate water leaks in the distribution system. Some of that equipment is shown in the article photos. Outside of a sharp eye, one of the most important pieces is the acoustic leak detector. The device amplifies leak sounds coming from underground.

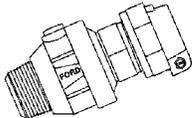
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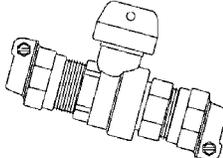
If a system needs assistance in dealing with water loss, or if assistance in determining what the system's water loss actually is, call KRWA at 785/336-3760.



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