

Water loss means wasted resource, expenses and lost revenue

Water loss will cost water systems across Kansas hundreds of thousands of dollars of lost revenue in 2005. Sounds pretty bad. Sounds like a real waste. It is. What's the problem? Sometimes water loss is easy to identify while other times it may be cause for a lot of head scratching. In this article I will discuss water loss and some of the ways we can work together to reduce the damage that it causes.

All system operators have had or will have experience with water loss issues at some point in their water utility careers. What is water loss? Simply stated, it is water that cannot be accounted for after it is

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diverted from the source. The source might be a well, a river, a lake or even a master meter as the point of purchase from another system. Once water is diverted from the source, it can go through a myriad of processes before actually reaching the customer. It is very easy to lose track of significant amounts of water depending on the path the water travels before reaching the customers.

A variety of factors can contribute to unaccounted for water. The likely culprits include errors in bookkeeping or record keeping, inaccurate meter readings, inaccurate meters, unmetered usage and leaks. There are others. And any water system operator knows that fixing the

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problem that is causing the loss is often much easier than identifying the cause. Too often, when systems contact KRWA for help or they have been identified as having extremely high loss, they have already concluded that the problem is leaks. It is natural to think that leaks are the problem. It is lost water – so, there must be leaks, right? Often, KRWA can reduce loss without ever finding a leak. In fact, "looking for a leak"

The blue form

One of the first steps KRWA likes to take when conducting a water loss survey is to visit with the bookkeeper or whoever keeps track of the water production and sales. Once in a while we find problems with data entry or unit conversion. One system recently had purchased new billing software. The city clerk, being unfamiliar with the program,



Willy Morrison, Crawford County RWD 4, works on a 50,000-gallon per day leak that required three weeks to locate. Found behind a brushy fence row and running away from the road ditch, this leak – like many others in RWDs – was difficult to locate. Once exposed and with valves that didn't fully close, this photo shows how an operator begins to make a repair.

is only conducted after other issues are checked. It begs the question of, "how a utility can be certain it has leaks if that utility has not read or verified customer or master meter readings?"

inadvertently left out a large section of commercial customers when filling out the annual Water Use Report. The result was a distortion of the water loss; in fact, it was over-stated by 30

percent. The error was found, corrections made; that system's problem was solved. It is situations such as that, where there is new software or new employees unfamiliar with procedures that may create a fictional water loss. Such problems are not always readily detectable. In this case, the city employees did a great job of getting a handle on the problem.

If the record keeping checks out okay, then the next step is to review the metering situation. Generally too few systems regularly test master meters. It is often a goal of a water system to do the tests but with so many demands on time the testing of master meters or customer meters is often overlooked or pushed aside. Accurate metering is crucial for proper monitoring of water loss. There's no way of verifying water loss if there is any question as to the accuracy of metering. Correct installation and application of meters is critical to proper operation and accuracy. Generally speaking, with proper preparation,

a meter can be pulled, tested and back in service in less than an hour. Identifying and fixing problems in master meters solves a large number of water loss issues.

Another metering concern is the customer meters. Customer meters are the cash registers of a water system. It is not uncommon to find customer meters that are old or that have had excessive gallons pass through the measuring chamber. Again, remember that these meters are the primary source of revenue for the water utility. Maintaining and changing the meters as needed will result in better cash flow and assist in reducing unaccounted for water. A common practice among rural water districts is to allow customers to read their own

meters. This practice is not recommended, as there is no way to ensure accuracy of the reported readings. Customers may be busy; they often will estimate usage. If meters are not regularly read by



Locating a leak may not mean a lot to someone who's never worked in a water system – but locating leaks in a timely way is critical to many water utilities to ensure that customers continue to have water service. This is another angle of the leak KRWA helped locate in Crawford RWD 4.



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LOST AND FOUND: WHERE WE LOOK FIRST

Typical preliminary information gathered by Kansas Rural Water Association when conducting water loss survey (all data in thousands of gallons)

Month	Raw Water Diverted	Water Purchased	Water Sold Wholesale	Water Sold Bulk	Water Sold Residential	Metered Free	Unaccounted For Water	Percent by Month
January	5804	9002	44	770	10574	96	3322	22.4%
February	5150	10096	38	871	10486	95	3756	24.6%
March	3759	9106	42	962	8854	86	2921	22.7%
April	3322	9214	49	1244	7605	1175	2463	19.6%
May	5486	6736	44	1470	6570	1574	2564	21.0%
June	7426	8487	64	1040	12139	734	1936	12.2%
July	7784	8779	64	1051	14078	735	635	3.8%
August	8853	8921	81	1161	13307	1040	2185	12.3%
September	4989	8646	56	850	11013	78	1638	12.0%
October	5232	8963	39	841	10800	82	2433	17.1%
November	4570	8629	43	952	9800	73	2331	17.7%
December	6607	7688	51	1475	10012	31	2726	19.1%
Total	68982	104267	615	12687	125238	5799	28910	16.7%



The above chart demonstrates part of the process that Kansas Rural Water Association completes when a utility requests a water loss survey. In the case of this city in Kansas, the “Unaccounted For Water” ranges from a low of 3.8% in July to 24% in February. These fluctuations indicate there are problems with meter reading or reporting rather than necessarily the loss being due to leakage.

In 1989, the Kansas Rural Water Association added new emphasis to reducing water loss. Since then, KRWA has tracked every water loss or leak detection assistance project undertaken by KRWA to cities and RWDs. “KRWA has conducted 842 water loss surveys since 1989, accounting for more than 3.6 billion gallons of water loss and more than \$6 million in costs.

“When a water system has a high unaccounted for water loss, we often find that the operator or board/council members immediately assume they’ve got leaks,” says KRWA Tech Greg Duryea. That’s not necessarily the case at all,” Duryea says.

So, if there are no leaks, what’s causing the loss? Well, first off, no one said there were no leaks. What KRWA suggests is that spending time hunting down leaks often ends up futile exercises. The first thing to do is determine what other possible contributors there are to the unaccounted for water loss. KRWA’s first request of the water system then is to request the completion of the “Blue Form” – a summary sheet that almost always discloses whether the loss is in leakage or somewhere else – perhaps bookkeeping and accounting, or metering. Until these aspects of the operation are reviewed, there’s no way of knowing if the loss is real or not –

and if it’s not real, why spend time looking for leaks that may not exist.

The chart above shows a section of data from an actual city in Kansas for 2004. In this section of the “Blue Form,” KRWA enters the amounts of water produced/purchased and then in the next column, the amount of water sold by month. The last column calculates an overall loss percentage.

What this exercise proves is that while this city might have leaks from the distribution system, there’s a major concern with metering and accounting. Leaks don’t repair themselves and so it is impossible for any water system to actually sell more than it produces one month and then jumps to a 30% or higher water loss in other months.

the system then the system will never have an accurate accounting of the water sales.

Once water is diverted it is often sent through a treatment process to storage. The process of treatment alone creates a demand for water that is often a significant portion of the overall diversion. The water used to meet this demand needs to be metered as well. Treated water is used in the plant for backwashing filters, supplying chemical feeders and process analyzers. If this water is not metered or accounted for it can create very high losses.

Incentives

After the variables of bookkeeping and metering are removed is when we begin to look into the possibility of water leaks. Water leaks are often very difficult to locate. In rural water districts and the inherent open areas, leaks may go unnoticed for an extended period. Some systems pay a "finder's fee". If somebody spots a leak and reports that to the district, the district then offers a

cash reward. It is often a good incentive to get customers to report problems.

Nocturnal sleuthing

Leak detection consists of "listening" for the leak. It is generally accomplished at night by turning off valves and then cracking the upstream valve open while listening for the sound of water moving through a pinched off valve. Some systems are designed with test meters that allow the valve to be shut off, then diverting water through the small meters. The meter then tells you how much water is flowing through the pipe and into a certain area. With good and numerous valves a leak can be traced down to within the distance between the valves. It is then that the footwork comes into play and the line is walked and hopefully the leak is located. If the leak is not surfacing or traveling underground or surfacing elsewhere then the leaks can be very difficult to find. KRWA has specialized "ground mic" equipment that allows us to listen for leaks from the surface.

Leaks in different types of pipe make different noises or emit sounds at different noise frequencies. We are able to dial in a specific frequency and listen for the sound of a leak. Often leak detection is more of an art than a science but by utilizing every method we have available we can typically find the problem. Experience at this is gained by just getting out in the field and working at it.

Accountability

Keeping water loss under control is an ongoing battle that systems face everyday. While it is not realistic to be able to account for every gallon, systems do have an obligation to keep their water loss as low as possible. If you are having trouble with unaccounted for water give us a call. We will be more than happy to come out and lend a hand in bringing the loss down to an acceptable level. KRWA is able to provide these services, thanks to funding through the Kansas Water Plan on-site assistance program. The program provides real benefits to systems and the customers they serve.

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