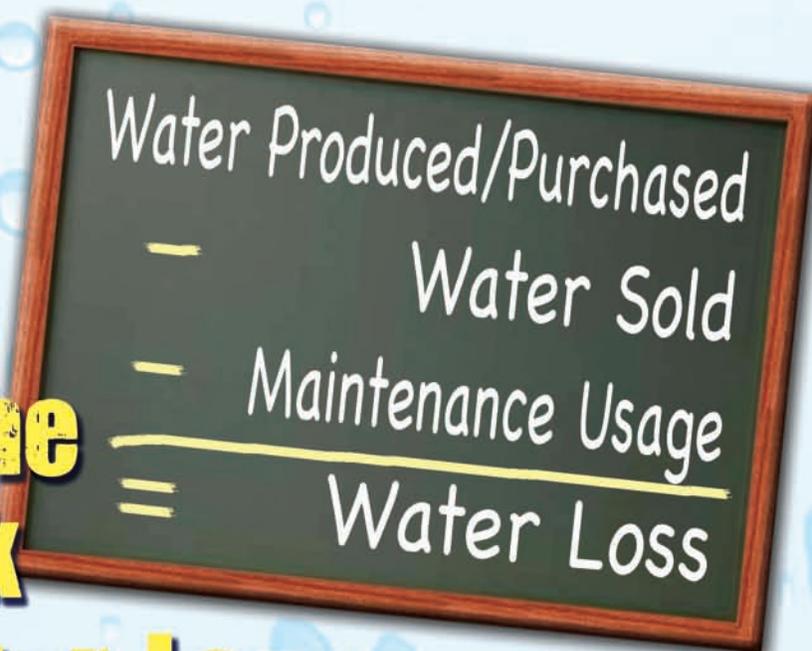


Taking Some of the Guesswork Out of Water Loss



There have been numerous articles in previous issues of *The Kansas Lifeline* reviewing the need to understand and know the process to determine the unaccounted for water loss for a water system. Since 1992, KRWA has operated a contract that has been funded through the Kansas Water Plan entitled “Technical Assistance to Public Water Suppliers”. That contract has focused on water and energy conservation. The Kansas Water Office has administered it. Supplemental funding was providing for several years by the Kansas Department of Health and Environment. In my opinion, the contract continues to provide invaluable assistance to water systems.

Where to look?

One of the first opinions of local water systems is that if there’s a water loss, then it’s time to look for leaks. Well, certainly leaks may be the cause – but leaking pipes are not the only contributor to water loss and in some cases, may not be contributing at all. So, how can a system operator or manager know the cause of the loss?

KRWA has developed an “easy tool” – internally referred to as the “Blue Form” to begin to determine where to look for a system’s unaccounted for water loss. KRWA’s “Blue Form” spreadsheet is the first step that KRWA takes in evaluating a system’s operations. Just by analyzing the information, KRWA can reasonably conclude if water loss is due to leakage or other factors. The Blue Form provides KRWA staff with a very good idea of where to begin searching for the contributors to high water loss.

The Blue Form asks for basic information including the size and type of pipeline materials, number of services, valves, if the system has updated maps, etc. The form is a simple inventory of system demographics including water source, amount of water purchased or produced, operating costs, rates, etc. Also, indicate if the system reads the meters or if the system is self-read. Knowing when meters are verified by the system, helps KRWA better focus on possible contributors to the unaccounted for loss.

After the form is completed, KRWA reviews it and focuses on an important section of the Blue Form. The section concerns the details about monthly purchase or production versus the amount of water sold, flushed and metered free. A simple calculation provides the percentage of Unaccounted for Water (UFW). Next, the loss per minute is calculated.

Significance of loss in GPM

If the water loss percentage fluctuates significantly from month to month and the gallons per minute of loss also fluctuate, then the meter readings are much more suspect than there being actual leakage. Such situations trigger a line of questions with the system operators. One example is to ask when are the master meters being read compared to the customer meters? If there is no coordination between the reading of the master and customer meters, then it is next to impossible for anyone to know if there is a true loss or not. Any inconsistency in the readings is sure to stand out.

Quantities are in 000's

2009	Raw Water Diverted	Water Purchased	Sold to Other Suppliers	Bulk & Other	Water Sold Residential	Metered Free	UFW	Percent by Month	Loss in GPM
January	3607	372	181	0	1593	100	2105	52.9%	47.2
February	3325	370	245	0	1520	180	1750	47.4%	43.4
March	3487	410	210	0	1824	100	1763	45.2%	39.5
Qtr totals	10419	1152	636	0	4937	380	5618	48.6%	
April	2716	450	35	0	1738	200	1193	37.7%	27.6
May	3090	506	67	0	2191	0	1338	37.2%	30.0
June	2653	289	154	0	2024	20	744	25.3%	17.2
Qtr totals	8459	1245	256	0	5953	220	3275	33.7%	
July	2304	417	222	0	1934	0	565	20.8%	12.7
August	2761	167	160	0	1899	50	819	28.0%	18.3
September	2695	197	172	0	2048	5	667	23.1%	15.4
Qtr totals	7760	781	554	0	5881	55	2051	24.0%	
October	2409	419	171	0	1874	30	753	26.6%	16.9
November	1855	399	146	0	1884	30	194	8.6%	4.5
December	2855	188	230	0	1960	15	838	27.5%	18.8
Qtr totals	7119	1006	547	0	5718	75	1785	22.0%	
Annual	33757	4184	1993	0	22489	730	12729	34%	

Monthly tracking of water production and sales is critical to alert any water system to existing or developing problems. The table above is an actual report on a small system in Kansas for the year 2009.

Knowing the months that the meter readings are estimated also makes a huge difference. There is no way of accurately calculating water loss until the meters are read and verified. If a system purchases water and uses the seller's readings to calculate the water loss, then it is critical that all meters are read reasonably close to that date. Verifying the master meter reading(s), even if the master meters are owned and controlled by the seller, is essential to the subsequent system.

Putting the system's unaccounted for water loss into a financial loss is the goal of the next section of the form. Surprisingly, KRWA staff frequently find that local systems never calculate an overall cost of producing and delivering water. The costs that KRWA includes are:

- Cost any water purchased
- Chemicals
- Electrical
- Approximate salaries
- Other production costs

These costs are totaled to determine an actual cost per thousand gallons. While it may seem appropriate to also include the cost of any debt (principal and interest payments), those are generally not considered "production costs".

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If a water system produces 38,230,000 gallons annually for a total cost of \$81,200, then the cost per thousand gallons produced is \$2.12. Taking this one step further, if the total unaccounted for water is 14,086,000 gallons, then multiply that loss by \$2.12 per thousand. Example $\$2.12 \times 14,086 = \$29,862$. This is a significant expense. But we need to keep in mind it will be nearly impossible to reduce that loss to zero. And the cost per thousand may also change due to economies of producing the higher amount of water. Nothing is finite but at least the calculation is close. Keep in

mind that recent analysis of water use in Kansas has the statewide average for unaccounted for loss at 18 percent. Ideally, the very best systems strive to achieve an unaccounted for loss in the five to ten percent range. Every system should strive to be as efficient as possible.

Use whatever tool is handy

Another tool that KRWA uses in determining water loss is a spreadsheet that we have designed to automatically calculate the water loss. We enter the purchased/produced information, bulk water sales, sold water, metered free. The spreadsheet calculates the loss quarterly and annually. If systems were to complete such a form monthly, they would be alerted to developing trends and could also be more

This section of the KRWA water loss report provides clues as to possible contributors to the unaccounted for water loss. In this case, because the loss per minute has such a variance, it is likely that metering or metering inaccuracy is significant. This is a very small system; the smaller the system, often the more difficult to pinpoint the problem if it is loss due to pipeline leakage.

Month	Purchased or Produced	Sold	Loss in GPM
Jan	605,000	298,175	7.10
Feb	489,000	262,540	5.24
Mar	522,000	264,090	5.97
April	551,000	268,520	6.53
May	610,000	370,290	5.54
June	687,000	480,610	4.77
July	922,000	773,080	3.44
Aug	1,021,000	839,240	4.20
Sept	592,000	428,975	3.77
Oct	459,000	285,325	4.02
Nov	480,000	380,000	2.31
Dec	501,000	412,000	2.06
Total:	7,439,000	5,062,845	Avg. 4.52

17 Cost of purchased water:	\$ -	Purchased or Produced:	7,439,000
Cost of chemicals:	\$ 1,130.00	Water Sold:	5,062,845
Electrical costs:	\$ 984.00	Flushed, Other:	2,000
Approximate salaries:	\$ 7,526.00	Unaccounted For:	2,374,155
18 Other production costs:	\$ 2,709.00	Unaccounted %:	31.91%
19 Total costs of above:	\$ 12,349.00		
20 Interest & principal payments:	\$ -		
21 Total Costs divided by Water Purchased/Produced (in thousands):			\$ 1.66

I invite readers to attend the 2010 KRWA conference, March 30 – April 1 at Century II Convention Center in Wichita. Sessions that I encourage taking a second look at include:

- Today's Rural Water District Office Professionals – Pre-conference
- The Inaugural City Clerks' Workshop, 2010 – Pre-conference
- Metering – Testing and Calibration – Concurrent Session
- Accounting Made Simple – Concurrent Session
- Cost Analysis for Pricing Water Treatment Chemicals – Concurrent Session
- Water: Does Kansas Have Enough For The Future – Concurrent Session

The KRWA conference provides a one-of-a-kind opportunity for boards and councils, operators, office personnel, associate members and agencies to have a great three days to attend sessions, view the largest display for the water and wastewater industry in Mid-America and also, time to make new friends and share ideas with peers.

proactive before a real crisis develops. Waiting until the end of the year to calculate unaccounted for water loss is a practice that goes on in many systems. But every water utility manager or city clerk or RWD office person ought to know what the unaccounted for water loss experience has been each month – or be able to retrieve that information rather easily. Not being able to do so would be no different than any retail store having no clue as to the amount of product in inventory to match what has been sold compared to the shipments of materials received. Boards and city council members ought to be fully informed about water loss in their local system. Governing bodies and system staff need to be aware of the costs associated with high unaccounted for water loss. It's a loss of money and a valuable resource.

KRWA has assisted utilities in setting up spreadsheet reports, often tailored for the unique configurations of the respective systems. Some are more complicated than others because of the treatment processes and system layout. The bottom line goal is the same. The utilities need to know how much water is not accounted for.

If you would like to know more about the spreadsheet that KRWA has developed, give us a call and we will provide additional information to you. Just don't sit at the next board or council meeting and wonder where all that loss may be. Let's aggressively develop a plan of action to identify and correct the contributors. Money and water will be saved.

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