By Jon Steele, Technical Assistant

Ensure That Waterline Valves Are in Good Functioning Order

The importance of operable mainline gate valves in a public water supply system cannot be overstated. Most systems are now paying much more attention to this critical piece of infrastructure. However, distribution system valves in many systems have been neglected for years. Valve maintenance has taken a back seat to other more visible things such as splash pads, pools, park beautification projects, street projects, and mowing grass. You name it, just about everything has taken priority over distribution system valves.

This photo shows KRWA Tech Assistant Jon Steele operating a 6-inch valve at the city of Hardtner.

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Let's start with locating valves, which can be a real challenge in a rural water district system or many towns in Kansas. In a rural water district system, valves get knocked around or broken by a farmer trying to eke out one more row of crops, even if in the public right-of-way. Valve risers are often covered or broken off. Or in towns, a lack of leadership by the public works director or maintenance personnel allows paving contractors to chip seal or even pave over valves. But when you're in a crisis with a major waterline break, there is nothing more frustrating than to get soaked because the valves have not been located or maintained. Other KRWA staff and I have located and exposed valve boxes buried a foot deep or more under dirt or asphalt.

KDHE now has valve maintenance as a focus during their water supply inspections. That's because someone decided that valve maintenance is directly be related to the safety of the public water supply system and people's health when pipeline failures occur. If an area of a system cannot be isolated, the entire water system may need to be shut down. Doing that requires notification to KDHE and a subsequent a boil water advisory to be issued until coliform bacteria samples can be taken and shown to be negative. Potential contamination could result from biological contamination entering the system from the area of the pipeline failure or anywhere in the distribution system from back-siphonage as a result of pressure loss.

I know of small public water supply systems with one good valve at the elevated storage tank that is closed when a pipeline failure occurs. The supply source is also turned off to make repairs. This is simply unacceptable. So, where do we begin?

As a KRWA Technical Assistant, I try to learn as much as possible about the system when assisting a water system operator. It's helpful to know about the system's financial status, employee knowledge and skill level, past and ongoing management practices, distribution system mapping and map accuracy, previous projects and other relevant information to help that system.

For example, a system like the one described earlier asks where to start. My answer: you must first be able to crawl before you can walk. That gets some puzzling looks but the analogy fits, let me explain. First, I would get out the best maps that are available. Next, we should identify which valves are essential to isolate sections of the distribution system. Then continue to determine where valves would be most beneficial. I worked in a small community years ago where the town was sectioned by quarters; they never touched other valves. That scheme worked very well for them.

After determining which valves were required to section the distribution system, verifying that the valves exist and are operable is essential. Knowing the age of the valves is also very helpful. The ID plate on the elevated storage tank shows when the original system was constructed.

Given that basic information has been gathered, KRWA works with operators and managers to exercise the valves. Doing so is not without some risk. I find many original valves from the 1900-1920 era can be successfully freed and operated if care is taken not to put excessive pressure on them. Then there are valves that never really get that difficult to turn but still break. I recall one small town where we had successfully operated a couple of 1930s-era valves and the third one broke with no warning and began leaking. At first, I thought it was just the packing but after a while, I realized it was more than that. After excavation, it became apparent that the whole valve had split apart; the bolts were so deteriorated that the valve broke in two. Remember that old valves have soft brass stems and the smaller diameter of the valve the smaller the stem and the less force they take to shear them off.


This valve was installed in 1913; workers prepared the location to replace this valve.

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Some of the older valves I have successfully gotten to operate will leak slightly around the packing. A small amount of water will run down the street for a month or two. The leaks then "scale off" and the dribble leak stops. Other times they will leak until opened tight against the stop. Generally, we leave gate valves and hydrant valves in somewhat of a slack position after fully opening, as this may help prevent sticking. Another vital factor is counting turns. The general rule of thumb is three turns per inch of diameter. That rule is not perfect, but it's close. I have seen slight

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Often valves are removed from a water system, cleaned up and reconditioned. These 8-inch valves were sold on Purple Wave in 2017 for $231.

The ID tag on many elevated storage tanks gives the original construction date.

variations, for instance, 6-inch valves closed anywhere from 19 to as many as 21.5 turns, and 4-inch valves from 12 to 14 generally. In one recent case, a new Hydra-Stop inserted 4-inch valve required 15.5 turns to close.

With as much information as gathered about the valves and system, it's time to start exercising valves, right? Not so fast! Before we ever attempt to turn a valve, it's essential to have a very frank conversation with the mayor, manager or whoever is in charge locally. During the discussion, KRWA staff give local officials point out the facts about the project. I encourage that locates be made at each site and that the local system have all the materials on hand to make a repair should a valve break during the exercise process.

KRWA has two hydra-vac units. Each has a hydro-vac to clean out valve risers, meter pits, etc. When using a hydraulic valve wrench to go slow, it is crucial to use the minimum torque to turn the valve and work back and forth taking small gains instead of taking too much at once. Sometimes valves must be replaced. This is now possible without pressure loss with the insertion tools but is expensive at more than $1,000 an inch. Yes, the system can be shut down with new valves cut in, but this requires the pressure to be off and a boil order to be issued.

A well-managed valve program makes the operator's life so much easier when repairs are necessary. Not enough can be said about this. Nothing is more frustrating than being unable to isolate a section of the distribution system when a mainline break occurs. Valves that require a lot of effort to operate will aggravate any operator, causing fatigue even before the line repair begins. The bottom line is to develop a good valve management plan: Identify, map, exercise, or replace valves as needed. Keeping good records on valve maintenance and exercising was always a good idea, but now it is required by KDHE. KRWA does charge a nominal fee of $25 per hour for the use of the hydro-vac unit and cover fuel costs. Plus, we provide the help and training to get many valves back into operable condition. There's no comparing doing that compared to replacing a valve. Give KRWA a call or send an email if your water system would like more information.

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