

Valve Maintenance

By Scott Berry

Many water systems I deal with are reluctant to undertake a valve exercising program based on perceived expense, manpower requirements, and the repair work that may be created. These are real concerns, but ones that are far outweighed by the



When a water main breaks in the middle of a frigid night, you'll be glad the valves function correctly. A valve exercising program is much easier to manage with the right equipment.

benefits of a valve exercise program. Broken, inoperable, or lost valves can result in many negative consequences and costs from serious disruption of water service to customers, increased equipment and manpower required to complete repairs, and damages to other property or utilities. The benefits of a valve exercise program include having:

- accurate records of detailed valve information;
- valve reliability in emergencies;
- the ability to immediately isolate main breaks (resulting in lower water losses and the least possible disruption of service to customers;
- extended valve life; and
- less employee overtime in dealing with emergency repairs and more confidence in your system.

Exercise Those Valves

So, what is a valve exercise program? Basically, there are four components to a valve exercise program:

1. locate the valves;
2. fully exercise valves;
3. maintain detailed valve records and
4. schedule and perform needed repairs.

According to AWWA, “Each valve should be operated through a full cycle and returned to its normal position on a schedule that is designed to prevent a build-up of tuberculation [rust formation in pipes as a result of corrosion] or other deposits that could render the valve inoperable or prevent a tight shutoff. The interval of time between operations of valves in critical locations or valves subjected to severe operating conditions should be shorter than for other less important installations, but can be whatever time period is found to be satisfactory based on local experience. The number of turns required to complete the operation cycle should be recorded and compared with permanent installation records to ensure that full gate travel (i.e., it can be opened and closed) is maintained.

“A recording system should be adopted that provides a written record of valve location, condition, maintenance, and inspections of the valve,” AWWA standards continue, “Each valve should be operated through one complete operating cycle. If the stem action is tight as a result of buildup on the stem threads, the operation should be repeated until the opening and closing actions are smooth and free.

A full inspection should be performed and any problems should be reported immediately to the person responsible for necessary repairs.

“To carry out a meaningful inspection and maintenance program, it is essential that the location, make, type, size, turns, close direction, and installation date of each valve be recorded. Depending on the record keeping system used, other information may be entered into the permanent record.”

Easier Said Than Done

From my experience, most valve problems encountered during a valve exercise program are from one of the following five categories:

1. System personnel cannot locate the valve. It almost goes without saying that these valves will need attention.
2. The valve is already broken. You need to know how many and where, so replacements can be scheduled and costs budgeted.
3. The stem or operating nut breaks before valve movement can be accomplished.
4. Bonnet bolts are decayed and break off before the

valve turns, resulting in a water leak that needs to be repaired immediately. (I think that this situation is better found now than in the middle of the night when the valve is needed and failure further complicates the reason the valve was needed.)

5. You get the valve near closed, the gate gets lodged, and it breaks in or near the closed position. This is usually the result of something happening inside the valve as it nears the closed position: the worst tuberculation in the valve happens; the discs spread, requiring higher torque (rotational force) to pull them back together; or there is some pressure on the gate from the water pressure on either side of the gate.

I have seen valves that turn fairly easily all the way down to the near-closed position and then require 10 times more torque to get them to open back up. This is caused by using too much torque the first time you get into the near-closed position. Control of the torque is critical in this situation.

As the valve is turning, you should reduce the torque setting as low as possible to turn the valve. If the valve will turn at 85 foot pounds, then turn it at 85 foot pounds, not 125. Maintain the lowest possible torque setting throughout the turning process.

As you near the closed position, the initial low torque will not fully seat the valve. When you get as far as the low torque setting will allow, you should then open the valve some and try to close it again at the same low torque setting. If you gain some more on the valve, then you repeat the procedure without raising torque until full gate travel is realized.

Opening the valve at least three turns to allow flushing of debris from the valve should follow every three tries at low torque. Some opt to open hydrants to assure flushing of debris from the valve and system. If full gate travel cannot be realized, then you should raise the torque slightly and attempt another close. If, at this point, you force the valve too hard, then a much higher percentage of broken valves will result. The ability of controlling the torque combined with constant monitoring of the accurate counter mechanism will result in the end product you are looking for—a fully exercised and operational valve.

Starting Is the Hardest Part

The major stumbling block for most water utilities seems to be the misconception that a valve exercise program has to be of large magnitude, making it, therefore, impossible to accomplish.

In reality, a modest beginning can achieve immediate positive results. Mechanizing the process of valve exercising significantly increases the efficiency of the process. This results in a safer work environment for employees and enables them to achieve higher production. Electronic data collection of valve information is possible in the field, which saves time on record keeping and assures valve records' accuracy.

After deciding to implement a valve exercise program, a water utility should set an overall detailed plan that covers the complete process. Put a lot of thought into where you are going to spend your valuable time and how you are going to prioritize your tasks. I have seen written hydrant flushing procedures that were many pages long. I have seen written valve exercising procedures that were very brief and incomplete.

If your workers approach the first valve on the first day of your exercise program with a "turn it or break it attitude," then failure is imminent. In a good exercise program, they will know ahead of time the maximum torque they are going to put on the valve and how many cycles of the valve they are going to perform that day. These results will then be recorded, and a future plan for that valve will be determined.

With technological advancements in tooling and proper training, a well-conceived valve exercise program will have a high percentage of positive results. With good planning and execution, a valve exercise program will realize a very low percentage of negative results. These facts seem to contradict the general opinion throughout the water utility industry that an exercise program will cause more work and aggravation than it is worth. This is simply not the case. The majority of negative results are due to a lack of a valve exercise program in the past. Once problems are identified, repairs can be budgeted and scheduled.

Considering workforce size and available time, another option for a water utility is to contract out

your valve exercise program. For many reasons, this may be your best and most cost-effective solution. You can hire trained work crews whose expertise is valve exercising. They have the state-of-the-art equipment to assure you a proper and complete job. They are not bothered by the many activities that you encounter and that take your focus off the valve exercise program. A combination of contracted work and in-house work can also result in the goals you seek.

Better Late than Never

Every water utility must give serious consideration to this area to assure future reliability of the system. Many would argue that a proactive valve exercise program is the one thing that any water utility can undertake that will have the most positive results for the water utility and its customers.

Just about every water utility has a horror story that could have been averted if they had a valve maintenance program. Most of these troubles resulted in costs that exceeded the price of a valve exercise program. The hard thing for me to understand is: Why put this off? The next horror story may be one told about your system.

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