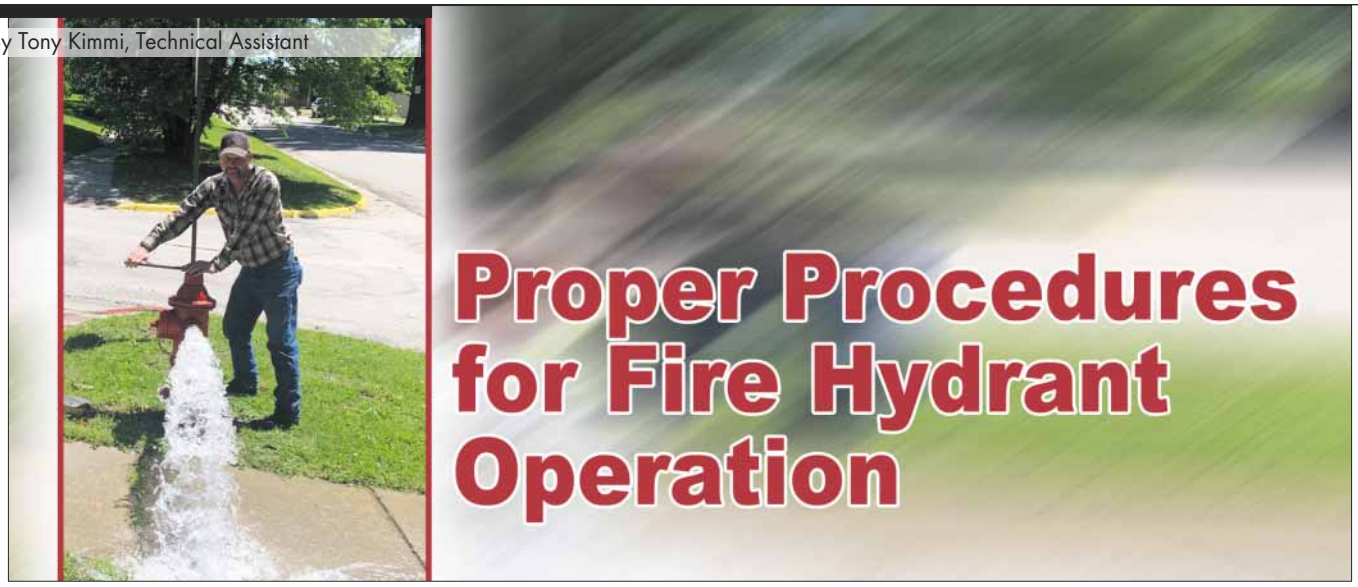
By Tony Kimmi, Technical Assistant



Proper Procedures for Fire Hydrant Operation

KRWA helps conduct many flow tests of fire hydrants. Cities and rural water districts may want tests performed for several reasons but the main one is to determine the availability of water. This could be for firefighting purposes or to evaluate development of water main extensions. Because of some recent experiences by several communities, I thought I'd try to explain proper operation of fire hydrants. This mainly centers on opening and closing hydrants.

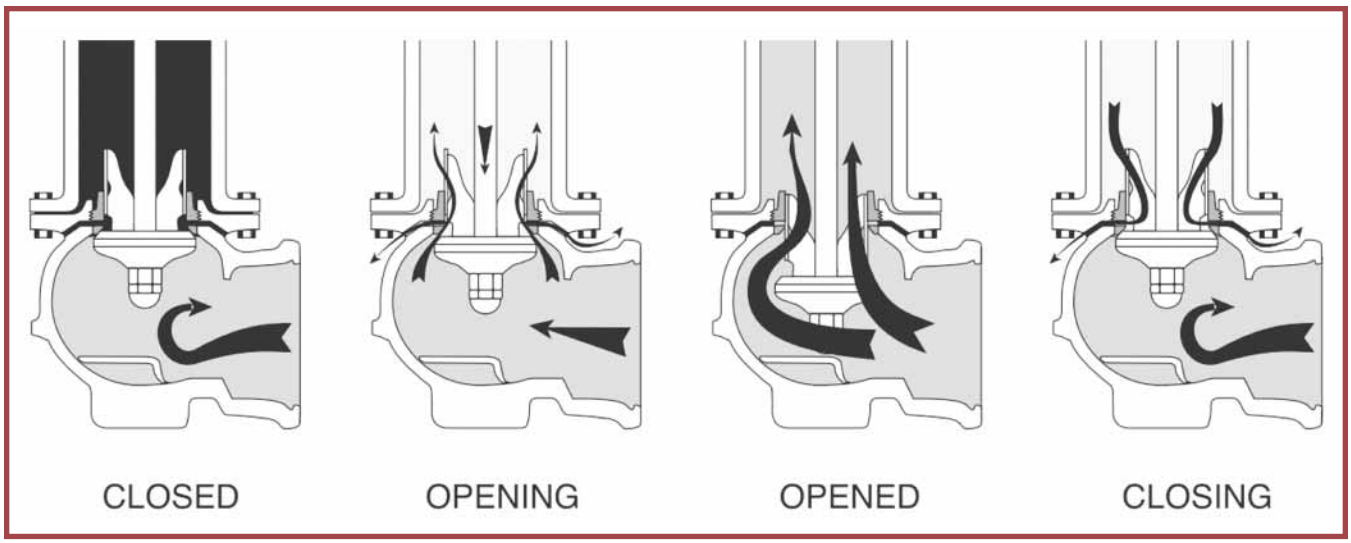
The ability to damage a fire hydrant is as simple as closing the hydrant too quickly. Closing a hydrant too quickly can cause significant damage to the hydrant and beyond the hydrant. This is why it is critically important to open and close a hydrant slowly.

Closing a hydrant too quickly causes what we call a water hammer. Water weighs approximately 8.3 pounds per gallon, can move many feet per second. This weight and speed of movement is what can cause the water hammer. A water hammer results from water slamming against a closed system and bouncing back. The water looks for a place to go as it quickly changes direction, and it ultimately bangs against the pipe walls or the shut-off valve in the water system. Even in plumbing in a home, water hammer will make a distinct pounding noise. Whether in a home system or on a city or RWD pipeline, water hammer can cause severe damage. It is my recommendation to never use quarter-turn valves on larger water lines. Quarter-turn valves can close quickly. It is fairly effortless for an operator to close a quarter-turn valve in seconds compared to a gate valve that takes multiple turns to completely close the system.

Air in a pipeline is another issue that will cause water hammer to be more excessive. If a repair has been made or a new installation of a water line, air will enter the pipeline. Removing the air will require flushing the system. Unlike water, air will compress and create extraordinary pressures in bubbles in the pipeline and when those move or separate, extreme cases of water hammer.

The most recent experience I have had with water hammer resulted in several leaks. Major leaks in some systems have led to very extensive work to repair pipelines.

One particular situation was flow testing in a RWD and several hydrants were flowing at 1,100 GPM. We were very careful in opening and closing these hydrants due to the high flow rates.



During the closing of a fire hydrant, the drain valve remains closed until the main valve is within one to five turns of being closed. At that time the drain valve will begin to open, allowing water user pressure to clear the drain holes. As the main valve reaches full closure, the drain valve returns to a fully open position. The water that remains in the barrel will drain through the drain holes, so long as the drain holes are not plugged.

Although we flow tested many hydrants that day, I believe the combination of all the work may have potentially contributed to some water hammer issues. That night the system experienced a major water leak which I believe might be credited back to opening and closing many high-flowing hydrants in a short amount of time. It was a learning experience for all involved.

In another system very recently, the city supplied water to the fire department to fight a fire outside of the city. Within a day of the fire, KRWA was called to pinpoint a leak along Main Street. I located a 10-gallon per minute leak. The search for additional leaks continued throughout the next week. I pinpointed two more significant leaks along the same line. We cannot say that it was any fault for a person opening or closing the hydrant too quickly, but it is suspected that loading out water for fire-fighting was likely a contributor to the problem.

One particular situation was flow testing in a RWD and several hydrants were flowing at 1,100 GPM. We were very careful in opening and closing these hydrants due to the high flow rates.

The drain valve system on a hydrant provides for the removal of excess water after closing to prevent freezing in the hydrant barrel. A pressure-activated rubber drain is designed to seal off at approximately four turns after opening the hydrant. It is recommended that hydrants operate to flow only in a fully open position; this assures that there is not a continuous high-pressure drain port discharge during use. Most fire hydrant valves are not designed to throttle the water flow; they are designed to be operated full-on or full-off. The valving arrangement of most dry-barrel hydrants is for the drain valve to be open at any condition other than full operation. Usage at partially-opened hydrants can result in considerable flow going directly into the soil surrounding the hydrant, which, over time, can result in other problems such as failure of the thrust blocking, etc.

Hydrants are designed to allow a burst of water to flush any debris in the drain system during the opening. This helps in draining the barrel after closing.

Every operator or fire department should open and close hydrants slowly. Failing to do so is likely to cause larger problems in the future.

Tony Kimmi has worked as a Tech Assistance for KRWA since October 2009. He has extensive experience in the operation of construction equipment. He has assisted in the construction of several rechlorination stations and ongoing monitoring of water quality issues. Tony enjoys providing assistance to public water systems.