

The Challenges of Maintaining Adequate Chlorine Throughout a Water Distribution System

As most water system operators are aware, it is much more difficult to maintain chlorine residuals in a public water system during periods of hot weather. Many systems contact the Kansas Rural Water Association for help as they try to maintain adequate chlorine residuals in the storage tanks and distribution system during the summer months.

When dealing with low chlorine residuals, the system should first work to increase the residuals in the storage

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tanks. Most storage tanks in Kansas fill from the bottom, and also supply the system back through the same line from the bottom. Depending on the operation of the system and the hydraulic factors, some of the water can often remain in the storage tank without being replaced by incoming, fresher water. It may help to change the control settings so that the storage levels drop lower before the tank is resupplied. I recommend overflowing the storage tank and collecting a sample of the overflow water to determine the chlorine residual. If there is little or no residual

in the storage tank, flushing this water to the distribution system will not improve residuals. In most systems it is important to get good chlorine residual in the storage tank, and then the distribution system can be flushed.

It is also important to do good recordkeeping. Documenting the temperatures during the summer is important. This can help operators gain experience for the problem in subsequent years.

As we all know maintaining adequate chlorine residuals is very important to ensure customers receive safe, bacteria-free water, as well as complying with regulatory requirements. It is also not uncommon for biofilms to build up in storage tanks and also within the distribution system's piping in the absence of good residuals.

Most systems that have trouble maintaining chlorine residuals in the summer months are systems that use surface water or purchase surface water with combined chlorine residuals. If your system is capable of doing a free chlorine burnout, I recommend doing it before the warmer temperatures arrive, possibly in March or April. Free chlorine is a much stronger disinfectant than combined chlorine. Free chlorine will help remove bacterial growths, commonly referred to as biofilms, in the storage tank and the distribution system. These biofilms are not normally harmful to the customers and may not show up in regular bacteriological testing of the water. A burnout is where a



This two compartment, portable rechlorination building was being placed at a booster station after a rain.



Lonnie Boller installs a tank-mounted pump on the ammonia side of the rechlorination building

free chlorine residual, instead of the regular combined chlorine residual, is maintained in the distribution system and storage tank for approximately two to four weeks. Some systems do a free chlorine burnout in the spring and in the fall. This has proven to help maintain better chlorine residuals.

If your city or water district is one of the systems that cannot do a free chlorine burnout due to purchasing water from two or three different entities, then you may want to consider installing a rechlorination system at a booster station or other location. This would help increase chlorine residuals in the storage tank and distribution system.

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The Kansas Rural Water Association has helped many water systems install rechlorination and has also worked with engineering firms to help improve chlorine residuals for water systems.

A rural water district that I have been working with recently, had previously installed some automatic flush valves in the distribution system. They also flushed tens of thousands of gallons of water to help maintain adequate chlorine residuals, with little benefit. Their biggest challenge, however, was low residual coming into the booster station, which ranged from a 1.2 mg/L to 1.5 mg/L. They would most likely have to flush continuously to maintain a good chlorine residual. With rechlorination, 2 mg/L or even 3 mg/L if needed can be added to increase chlorine residuals in the distribution system. This should help the district reduce flushing and meet the required regulations.

Good monitoring is very important to maintain chlorine residuals. All these processes and options will help improve water quality.

If your system has issues with maintaining water quality, I encourage you to contact KRWA. I can be reached at 785/547-5523 or email me at lonnie@krwa.net.

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Lonnie is a Class II certified operator; he previously was Water Plant Supervisor for the City of Horton. He has also attended and completed training at the University of Kansas Law Enforcement Training Center.





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