

Chlorine Residuals – And What Those Residuals Mean



As most water system operators know, it is more challenging to maintain chlorine residuals in the summer months. Kansas Rural Water Association receives many calls to help systems maintain adequate chlorine residuals in the storage tanks and distribution system during the warmest time of the year.

There is a purpose for all the monitoring of chlorine residuals. According to reliable sources, before the widespread introduction of chlorine disinfection in the early 1900s, cholera, typhoid fever, dysentery, and hepatitis A killed thousands of people every year. Not only does chlorine kill bacteria, viruses, and parasites, but chlorine can also reduce unpleasant tastes and odors in water. Because chlorine is so effective, the U.S. EPA requires treated drinking water to contain a detectable level of chlorine. This is known as a chlorine residual. A good residual helps protect the water to the customers' taps. The loss of chlorine residual makes a distribution system vulnerable to microbial contamination.

When dealing with low chlorine residuals, the system should first work to increase the residuals in the storage tanks. Most storage tanks in Kansas fill from the bottom and supply the system back through the same line from the

bottom. Depending on the system's operation and the system's hydraulics, 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 into the distribution system will not improve residuals. In most systems, getting good chlorine residual in the storage tank is important, and then the distribution system can be flushed.

Flushing water lines is counter-productive if during flushing low or no chlorine residual water is leaving the storage and entering the distribution system. That kind of flushing is spreading low or no chlorine water into and throughout the distribution system.

It is also essential to maintain good recordkeeping. Documenting the temperatures during the summer is

important. Good records can help you avoid the problem in the following years.

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

Most systems that have trouble maintaining chlorine residuals in the summer months have surface water or purchase surface water with combined chlorine residuals. If your system can do a free chlorine burnout, I recommend doing it before the warmer temperatures arrive, possibly in March or April. Free chlorine is a much more potent 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 generally not harmful to the customer and may not show up in regular bacteriological testing of the water. A burnout is where a 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 fall. This has proven to help maintain better chlorine residuals.

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Suppose you're an operator of one of the systems that cannot do a free chlorine burnout due to purchasing water from two or three different entities. In that case, consider installing a rechlorination system at your booster station.

Help is here . . .

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

A system I have been working with recently is installing rechlorination. That system previously installed automatic flush valves in the

distribution system. With little luck, they also flushed thousands of gallons of water to help them maintain the chlorine residual. Their biggest challenge, however, was low residuals coming into the booster station. The supply system's residuals were from 1.2 mg/L to 1.5 mg/L. This system would flush continuously at that level to maintain a good chlorine residual. With rechlorination, we can add 2 mg/L or even 3 mg/L if needed to increase the chlorine residuals in the distribution system. Having a higher residual should help the system reduce flushing and meet the required regulations. It costs a lot of money to

purchase water and then only need to waste it to maintain quality.

Chlorination is not a "set it once and forget it" type of venture. Only by monitoring the residuals throughout the distribution system can anyone determine the extent of a potential water quality problem.

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

Lonnie Boller is a Technical Assistant at KRWA. He has been employed by KRWA since 2001. 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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