

# The Challenges of Maintaining Adequate Chlorine Residuals During Hot Weather



**D**uring summertime especially, the Kansas Rural Water Association receives many calls from water systems concerning problems they are having maintaining adequate chlorine residuals in their distribution systems and storage. I want to take this opportunity to again review some ideas that can help systems better maintain chlorine residuals.

When dealing with low chlorine residuals, the system first should work to increase the residual in the storage 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 hydraulic factors, much 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 level drops 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 no residual in the tank, flushing this water through the distribution system will not improve residuals.

Maintaining adequate chlorine residuals is very important to ensure that customers receive safe, bacteria-free water, as well as complying with regulatory requirements. It is also not uncommon that a sediment buildup may develop in the bottom of some water storage tanks over time. There are many factors that determine if, how much, or over what period of time the sediment may occur. These include the quality of the incoming water, e.g. does it have a concentration of iron, manganese, or excessive hardness? These factors and the stability of the water all can be contributors to the loss of chlorine residuals.

Some water systems that normally use combined chlorine for maintenance disinfection in the distribution system (surface water supplies), have chosen to do a free chlorine

burnout to help improve chlorine residuals in the distribution system. 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. Many systems complete a burnout of the system to stop, mitigate or correct a problem of biofilms. A burnout is where a free chlorine residual instead of the regular combined chlorine residual is maintained in the distribution system and storage tanks 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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As we all know, it is important to monitor chlorine residuals in the water storage tank(s). I recommend that systems having problems maintaining chlorine residuals to consider installing a continuous chlorine analyzer at the storage tank. Once chlorine residuals begin to decline, the system can be more proactive to address the problem.

For instance, if the analyzer shows that chlorine residuals are declining in the water leaving the tank, and show results that are below a predetermined level, the response by the system operator would be to quickly begin overflowing the storage tank until chlorine residuals are improved.

If a system has tried these options without success, then rechlorination may be necessary. Kansas Rural Water Association has helped many systems set up rechlorination to help improve chlorine residuals. The process is to simply add chlorine and ammonia to the water to increase chlorine residuals. It is not very difficult to set up rechlorination, especially if the system has a booster pump system. A booster station is an ideal location because there is a known

flow rate at that location. The cost of rechlorination can vary, depending on the system, from between \$1,200 to \$20,000 depending on what options are chosen. Most of the rechlorination that KRWA has assisted with have been at pump houses using positive displacement pumps and liquid chemical supply tanks. The Kansas Rural Water Association has a portable rechlorination building that can be used by systems to demonstrate how the process works. In about 2009, KDHE's Bureau of Water encouraged KRWA to construct such a station for that purpose; KDHE provided funding assistance to allow KRWA to do so.

### Flush station

KRWA recently built a chlorine monitoring and flushing station. KRWA staff member Tony Kimmi explained the project in the July issue of *The Kansas Lifeline* on pages 76 and 77. (<http://krwa.net/portals/krwa/lifeline/1607/076.pdf>). This building will monitor chlorine residuals. If chlorine residuals are low, the equipment will automatically start flushing the line until better chlorine residuals are achieved. This installation would be very beneficial, especially for rural water districts that routinely have to go to the far ends of their distribution systems to flush lines. The control valving can be operated by cell phone or via the Internet. For some systems it can be very costly to drive to the far ends of the distribution system every day to check residuals and flush the lines. This unit saves the time and travel and in addition can log the residuals, depending on the equipment that is installed.

**All these processes and options will help improve water quality.**

### Mixers

A tank mixer is another option that is sometimes considered. While a mixer may be appropriate in some situations, there is no way that a mixer is going to improve the actual chlorine residual in a water storage tank. A mixer might keep water from stratifying but in some instances, the result may be that poorer water quality is created throughout the tank.

Good monitoring is very important to maintain chlorine residuals. All these processes and options will help improve water quality. I would also remind water operators and managers to appreciate what works for one system may not work for another. This is why several options are being offered here. But there is no

replacement for good monitoring and flushing procedures as the first step an operator should take to improve water quality.

If your system has any issue with maintaining water quality, I encourage you to contact KRWA. I can be reached via cell phone at 785.547.5523 or email me at [lonnie@krwa.net](mailto:lonnie@krwa.net).

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