

KRWA Helps With Cleaning and Disinfection of Flooded Water Well

There was extensive flooding of the Ninnescah River in Pratt County on Labor Day, September 3, 2018, as a result of the six to eight inches of rain in the area on the night of September 2. Highways and streets in the south part of Pratt were closed for some time.

The Kansas Department of Wildlife, Parks, and Tourism (KDWP) offices, facilities, and lake east of Pratt received extensive flooding. The Department's public water supply well serving the offices and buildings was flooded. A video of the flooding of the KDWP grounds and lake can be seen at <http://www.cjonline.com/news/20180904/torrential-rains-flooding-hit-pratt-county-in-south-central-kansas>.

The Kansas Department of Health and Environment (KDHE) contacted KRWA on September 10 and requested assistance in assessing the condition of the well and in disinfecting the water well. KDWP officials had contacted KDHE about the flooding of the water well. The well water was not being used for drinking or cooking as the well had been flooded. The well water was turbid due to floodwater contamination. The floodwater had inundated the well, well house and the surrounding area.

Disinfection of well and system

KRWA Technical Assistant Jon Steele contacted the KDWP on September 10 and requested that pumping the well water to waste begin immediately in an attempt to fully remove much of the floodwater that had entered the well.

On the morning of September 11 KRWA Tech Jon Steele met with KDWP officials to assess the well and the contamination issue. Jon first prepared the equipment and piping necessary to prepare the chlorine solution and to introduce the solution into the well. It was determined that 7,000 gallons of 100-mg/l chlorine solution was needed. Commercial, liquid sodium hypochlorite solution was used to make the strong chlorine solution to be added to the well.

The chlorine solution was added to the well. The the chlorine solution in the well was pumped to the distribution systems and to all taps. The chlorine solution was allowed to remain in the distributions and in the



KRWA Tech Assistant Jon Steele prepares piping to allow injection of high chlorine solution to the well that had been contaminated with floodwater.

well overnight to insure complete disinfection of the well and distribution systems serving the offices and facilities.

The next day the chlorine solution in the well and distribution system was flushed out by pumping/flowing water to all taps until the strong smell of chlorine was no longer present and the measured chlorine residual was an acceptable level. The water taps flowed to the Department's sewage collection system.

KDWP officials took water samples for bacteriological analyses on September 12. The samples tested good. Total coliform bacteria and E.coli bacteria were absent in both samples. Also a routine monthly sample taken on September 18 was good.

Water well repair

While preparing the water well for the introduction of the strong chlorine solution, Jon noticed an extra well vent located near the ground level. The extra well vent was in addition to the primary well vent that was operable and located much higher; and ironically, the primary well vent was above the floodwater high water level. The floodwater contamination entered



A hose was inserted into the well casing to inject high chlorine solution.



This tote was used to mix chlorine in 7,000 gallons of water that was drained into the well. The water was then spread throughout the water system and allowed to disinfect overnight.

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the well from the lower, extra well vent and did not enter from the primary, higher well vent.

The extra well vent was not part of the original or intended construction. It was added at a later date for whatever reason that remains unknown. There is no reason for the second, extra vent that makes the well much more susceptible to flooding. The extra vent was plugged by installing a 2-inch pipe plug.

Takeaways

Water wells should be inspected periodically to ensure against possible contamination if and when floodwaters or surface water runoff inundates the well.

In the case of a submersible well in an open area, the well casing should be protected by a concrete slab (without cracks) on the ground, the sanitary well seal must be secure and watertight, and the well vent must be screened and above flood elevation.

In the case of a well in a well house, the well house and its roof must be kept in good condition. The well vent must be screened and above flood elevation.

Some of the clues that provide information that floodwater may have entered a water well

include turbidity in the water, inability in maintaining chlorine residual, and increase chlorine dosage. Testing the un-chlorinated well water for total coliform and E.coli will provide very good information in assessing the situation. Also, the hardness of the well water might give useful information as most floodwater is softer than most groundwater in Kansas.

Any public water system that suspects or knows that floodwater has entered a water well, the well should be taken offline immediately. If contaminated water has entered the distribution system, flushing of the distribution system with water from an un-contaminated supply should be started and a boil water advisory should be issued. Under these situations KDHE should be notified and the KDHE laboratory can perform necessary bacteriological analyses of water samples as needed.

Any public water system ever having the need for assistance in matters such as these or in assessing water wells, water rights, etc., is encouraged to give KRWA a call. KRWA staff have many decades of experience with groundwater systems in addition to having two staff members who are licensed professional geologists.

Pat McCool has worked as a consultant to KRWA since January 2004. He previously worked for KDHE for 30 years. Pat has a bachelor degree in Chemical Engineering and a masters degree in Environmental Engineering from the University of Kansas.



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