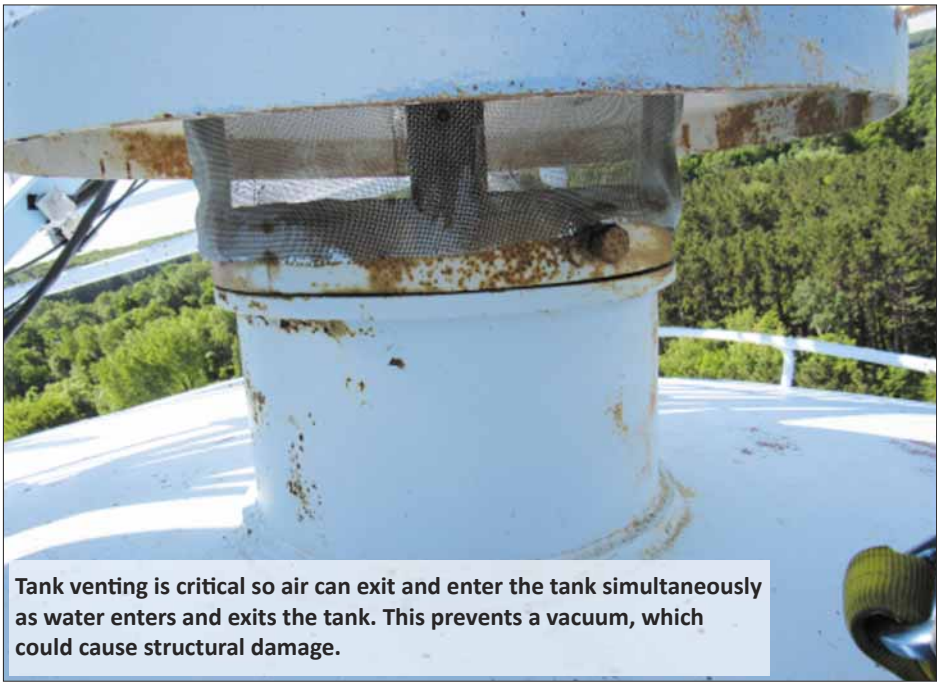
By Greg Metz, KRWA Technical Assistant

Sanitary Survey Initiates Replacement of Tank Vent – Unnecessarily

How did a sanitary survey inspection cost the city of Matfield Green more than $10,000? No wonder public water systems dread the routine sanitary survey inspections performed by the Kansas Department of Health and Environment (KDHE). The KDHE is not totally at fault in this case, but some things could and should have been done differently, in my opinion.

The KDHE does not want to cost a system money unnecessarily, but they have a job to ensure public water systems provide the best, safest water possible. The KDHE follows and enforces EPA minimum guidelines and standards for contaminant levels and regulations that are promulgated.

During a routine sanitary survey inspection by KDHE, the inspector looked at the last water tank inspection report by the tank inspection company and noticed a comment about the vent. The comment stated the vent did not meet design



Tank venting is critical so air can exit and enter the tank simultaneously as water enters and exits the tank. This prevents a vacuum, which could cause structural damage.

requirements and could allow windblown contamination or debris to enter the tank and should be replaced. On this note, the inspector wrote up a compliance issue that the situation would need to be corrected. Now understand the inspector never inspected the vent himself as KDHE does not climb water storage tanks nor perform that type of work. He just went off the report of the tank company. We would like to believe that all tank service companies are honest and reputable and would not falsify a report to make a sale or create work for themselves, and KDHE assumes that. But can a tower inspector make a mistake? No one is perfect. KDHE should in my opinion, have requested the city obtain a second opinion to verify that a problem existed since they can't look at the issue themselves. The city should have called the tank manufacturer to get a second opinion to confirm the inspection report as this tank was not that old, and the vent should and did meet compliance at that time. This is the fault by the city. The city proceeded to find a contractor to replace the vent, and Viking Industrial Painting and Tank Inspection/repair company was awarded the bid. The work was done and nothing said about the vent.

It is my fault in this for not questioning why the city was replacing the vent. Kansas Rural Water Association was asked to provide a pressure tank to bypass the tank so the work could be done. Other KRWA Staff and I assisted the mayor and operator in the bypassing of the tank and it was not until I went back to Matfield Green to pick up the pressure tank and observed the vent that was replaced laying on the ground and after inspecting the vent – only then was when I started to ask the question why the vent was replaced. Matfield Green is not a town with an excessive amount of money for any issue, much less one that is not necessary.

The tank in question was built in 2011 by Gerard Tank, Concordia, Kan. The tank met all KDHE design requirements at that time. The tank had been inspected and maintained and no problems were observed with the vent before the sanitary survey.

KRWA was asked to provide a pressure tank to bypass the tank so the work could be done

The vent is also the same style vent the company uses today. I think it is very possible during the tank inspection that the inspector looked at the tank vent and was not familiar with this style of vent, may have noticed the outer screen mesh but did not focus on the inner workings of the fine, inner screen. That was a major error in the report which ultimately cost the city. After researching the tower vent design standards and contacting Gerard Tank about their vent, the only thing I could see that might be an improvement to the vent would be a longer skirting. This could have been done for a maximum of several hundred dollars by removing the three bolts that should have been removed during the inspection and adding three to four inches of metal ring to the bottom of the dome of the vent. The KDHE tank design standards can be found at the following website: https://www.kdheks.gov/pws/engineeringpermits/minimumdesign.html, Chapter VI Water Storage Tanks.

In summary, this tank vent could have been upgraded for a few hundred dollars instead of spending $10,000 to install a new vent had the right questions asked and the right people been contacted. My opinion is there can sometimes be a glitch in the process so it's appropriate for the system to ask questions is a flaw in the process sometimes and if you have a question, ask it or call KRWA and KRWA will respond.

All about storage tanks . . .

A water storage tank is a significant component of a water system. Tanks need to be inspected regularly and maintained properly to ensure quality water. Water storage tanks provide safe drinking water, reliable pressure and fire protection.

Tank venting is critical so air can exit and enter the tank simultaneously as water enters and exits the tank. This prevents a vacuum, which could cause structural damage.

Storage tanks damaged during the Big Freeze in February 2021

Several water storage tanks froze during a severe cold snap in February. The storage tanks in Republic and Formoso, Kansas, sustained damage to the stem pipes. The repairs costs thousands of dollars. The operation of storage tanks in small towns need to be evaluated with adjustments during cold weather. Smaller cities that do not have a lot of usage or turnover in the water tank during the winter months are very susceptible to water tower freeze-up. Both of the tanks were elevated, four-legged tanks with 6- or 8-inch stem pipes. The smaller the stem or down pipe the more susceptible it is to freezing. A larger down stem like the original 24- or 30-inch pipe would not be as susceptible to freeze.

City of Republic Operator Jim Elliot, contacted KRWA early on February 16 for assistance with potential leak and frozen storage tank. The temperature was -20°. The stem pipe had frozen solid and caused an over pressure situation when the well pumps came on, resulting in a blown 4-inch main. After assisting with the main repair having to get through 24 inches of frost, pumps were operated continuously with a relief valve installed on a fire hydrant. The damage to the tank was extensive. The tank inspection/repair crew would have to either wait for the everything to thaw out or thaw it and drain it by using steam. With the weather warming over the next few days, KRWA Tech Greg Metz was able to dispatch and set up one of KRWA's portable pressure tanks, to allow some relief to the well pumps and to cycle as necessary. With the ingenuity of the operator and a local contractor, the insulations was removed at the base of the stem pipe and forced heat from a salamander style portable heater on the pipe until the stem pipe thawed. That only resulted in the water that remained in the tank to drain

KRWA provided assistance to the city of Republic by setting up one of the Association's potable pressure tanks. Insulation was added to help prevent freezing of connecting piping.

The pressure tank would be used for several weeks following until repairs could be made.

Luckily the city had great insurance and the repair costs that were over $100,000 were covered mostly by insurance. The tank repairs were made and it was returned to service. Sandblasting and painting would follow.

Ice buildup in water tanks is not uncommon and can cause damage to the interior coatings. Good operations and turnover of water in a tank can help reduce chances of such damage. It's also a testament to having a good tank inspection and maintenance program.

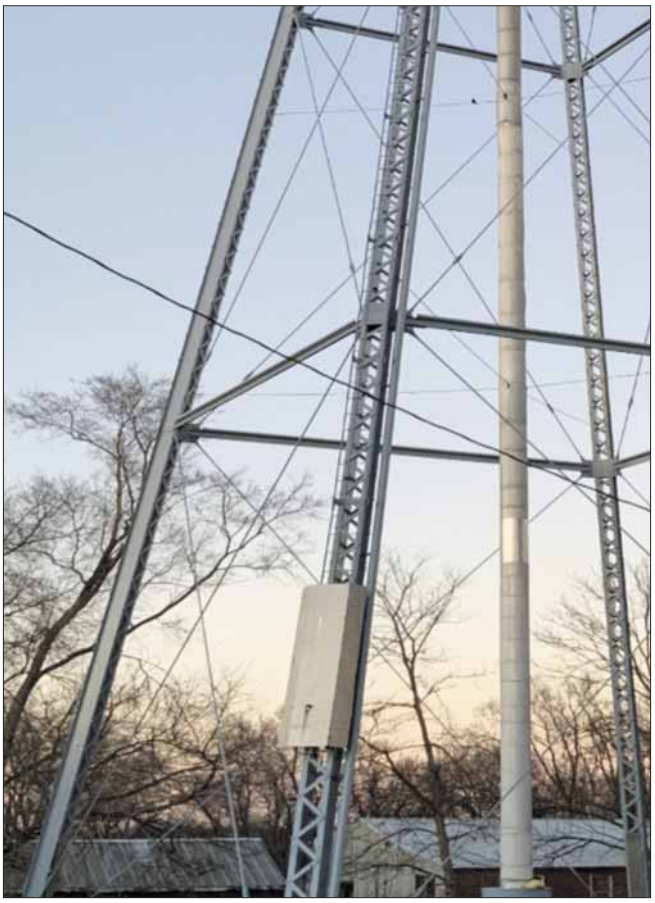
Tony Grant (on right), Maguire Iron, discusses options after inspecting the water storage tank at the city of Republic with Operator Jim Elliott and Mayor Randy Thayer.

The stem pipe at Republic broke just below the bowl of the tank. Note the four-foot chunk of ice on the pipe.

Tank venting should follow design guidelines, incorporating proper screening to prevent debris, insects, birds and other contaminants from entering the tank. The shroud, or cap, should cover the screen when viewing from the side, so wind-driven rain does not enter the tank. The screen must be fully intact and its mesh properly sized to comply with current established guidelines. Corrosion resistant material such as fiberglass should be used for screening.

Screening, if attached correctly, should be flush above and below the openings in the vent frame. Also, the interior screen should include a designed, frost-free pallet that moves freely with the flow of air.

Tank overflow pipes need to be adequately screened to prevent unwanted contaminants, including birds, from entering the tank. That means maintaining adequate relief of the overflow pipe



Since 2001, water storage facilities have been designated as federally-protected site. Access should be restricted through multiple layers of protection such as the ladder guard shown in this photo.

Tank overflow pipes need to be adequately screened and should have adequate relief of the overflow pipe within 12 to 24 inches or an air-break above the ground.

with termination at 12 to 24 inches, or an air-break above the ground. This separation is in part, so flooding the area will not result in siphoning of contaminated water into the tank. The overflow pipe should be cut off high enough above the ground to allow for the installation of an elbow to direct flow to an inlet, or splash pad to prevent erosion. The overflow pipe should not terminate below ground. During a control communication failure, the operator would not see the tank overflowing.

It is essential to know that since 2001 water storage facilities have been designated as federally protected sites. Consider restricting access to water storage tanks through multiple layers of protection. Protective methods can or should include locked fences, locked access doors with swipe cards or coded entry, locked hatches, intrusion switches or closed-circuit television monitoring. If a private company requests access to any system's storage tank, verify the individuals' identities and purpose are confirmed. Consider accompanying them also. Due to the tank's design and its location, a fabricated modification may be warranted to impede undesired intruder access. The installation of a locked aluminum cover over the access ladder and the addition of metal bars to the ladder cage is a good example as shown in the photo top left.

Greg Metz joined KRWA as a Technical Assistant in July 2009. He previously worked at the city of Washington for 13 years where he was involved in city utilities including the power plant, streets, water and wastewater. He also served as purchasing agent for those utilities.