

WATER LOSS ISSUES IMPACTED BY CONDITIONS AND PIPE MATERIALS

Water loss is an ever-continuing problem for many cities and rural water districts in Kansas and across the country. Revenue lost due to leaks is almost always a contributing factor to the profit/loss margin. High unaccounted for water hits smaller systems especially hard. Some cities and districts estimate that water loss can be up to 60 percent. If water is being purchased, the financial impact can be severe.

This article will review different types of pipe used on water systems in Kansas and some of the issues concerning water loss on each of the types.

Today most new water pipelines and fittings are constructed with PVC material. PVC is the most popular type of pipe being used. Other variations are cast iron piping, ductile iron with flex joints, asbestos cement, and reinforced concrete. The most common issue of my personal experience causing water loss is with the old grey, solvent weld (glued) plastic pipelines. Some rural water districts have this material; it was used in the earlier days of rural water district development in Kansas.

With every joint being glued, there is no flexibility for expansion because of drought conditions where the ground contracts. That can cause many leaks on the glued pipeline. Most repairs I have personally dealt with occur at the bell where the joints are glued together.

Gasketed PVC pipe is much more forgiving to shifting soils. Generally, gasketed pipe either leaks or it doesn't. In cases of extreme settlement, pipe may move far enough to have the pipe come apart and create a leak. In my work with leak detection, we sometimes find gaskets that are "rolled".



The Yelomine pipe incorporates a locking self-restraining joint which has grooves that allow a spline to be inserted to create a restrained joint that locks the pipe and coupling together.

This occurs when proper assembly processes were not followed, including lack of lubrication or forcing of the joint into the gasketed end.

Cast iron piping is typically found in older parts of municipal systems. I have experienced several different types of leaks on cast iron piping. The most common I have experienced with cast iron piping is called a circle break. This is where the pipe break in almost a complete circle



These repair clamp bolts were very corroded after being in the ground for only three years in a small city in northeast Kansas.

around the pipe. This type of leak can frequently be repaired with a band clamp installed on the pipe and torqued to high degree to seal the leak. Cast iron piping is also known to rust, resulting in small pieces of iron to flake off the piping. That in turn causes a weakening of the wall and leads to holes in the piping, and eventually leaks. I have also experienced different soil types that cause different wear and corrosion types on cast iron piping. When that situation exists, it is often needed to cut out portions of the pipe that has been corroded and install new piping. Generally, repairs are made using PVC.

I have rarely come across asbestos cement waterlines. I am aware that it does exist however have not had to repair any damaged asbestos piping as of late. People who have experience with it know how fragile it can be.

Reinforced concrete is typically used in larger cities. I have had one experience with this type of pipeline. A 24-inch gasket came loose and ended up in an 8-inch meter of a water district that the city was selling to. This caused the district's water meter to over-register significantly which in turn showed that the water district had a large amount of water loss. In order to fix the issue, we removed the meter chamber and dismantled it to remove the gasket. We were unable to determine where the gasket came from. After gasket removal the chamber was re-installed and the meter was re-tested. It showed an accurate reading per the AWWA standards.

Ductile iron with flex joints is stronger than cast iron. It is also found in older parts of water distribution systems. To



This section of steel service line is very corroded due to soil conditions. It is from a small municipal water system in northeast Kansas.

minimize rust and corrosion the interior wall of the ductile iron pipe is coated with a protective material such as cement mortar. I have only experienced ductile iron in a water plant and well houses.

Another type of pipe is called yelomine. This style of pipe has a restraining pipe system along with gaskets and an O-ring coupling which provides a hydraulic pressure seal. A spline is inserted at the coupling which locks the pipe and bell/coupling together. Yelomine is commonly used when installing road and creek crossings by boring. Once the bore is complete the pipe can be pulled back through the bored opening. This type of pipe can also be dismantled by removing the flexible splines.

Every style of pipe through history has had its place to supply water to customers. As technology advances no one knows what the future will hold for new piping, but presently, PVC is by far the most used pipe. Leak detection methods and tools to help find leaks continue to improve. Tackling a chronic water loss problem can require dedication and resolve to finding the problems. In some instances, the problem might be something that has been overlooked. In others, it involves many days (and nights) of work, using sonic leak detection equipment to try to detect water that is moving through valves or pipes.

Kansas Rural Water Association can provide no cost leak detection and meter testing as a benefit of contracts funded through USDA Rural Development and National Rural Water Association and a significant contract administered by the Kansas Water Office with funding as a benefit of the Clean Drinking Water Fee. I encourage any water district or city operator or other representative to contact KRWA if any water system has high water loss and would like help. KRWA is ready, willing and able to try to help resolve the issues.

Tony Kimmi has worked as a Tech Assistance for KRWA since October 2009. He has extensive experience in the operation of construction equipment. He has assisted in the construction of several rechlorination stations and ongoing monitoring of water quality issues. Tony enjoys providing assistance to public water systems.

