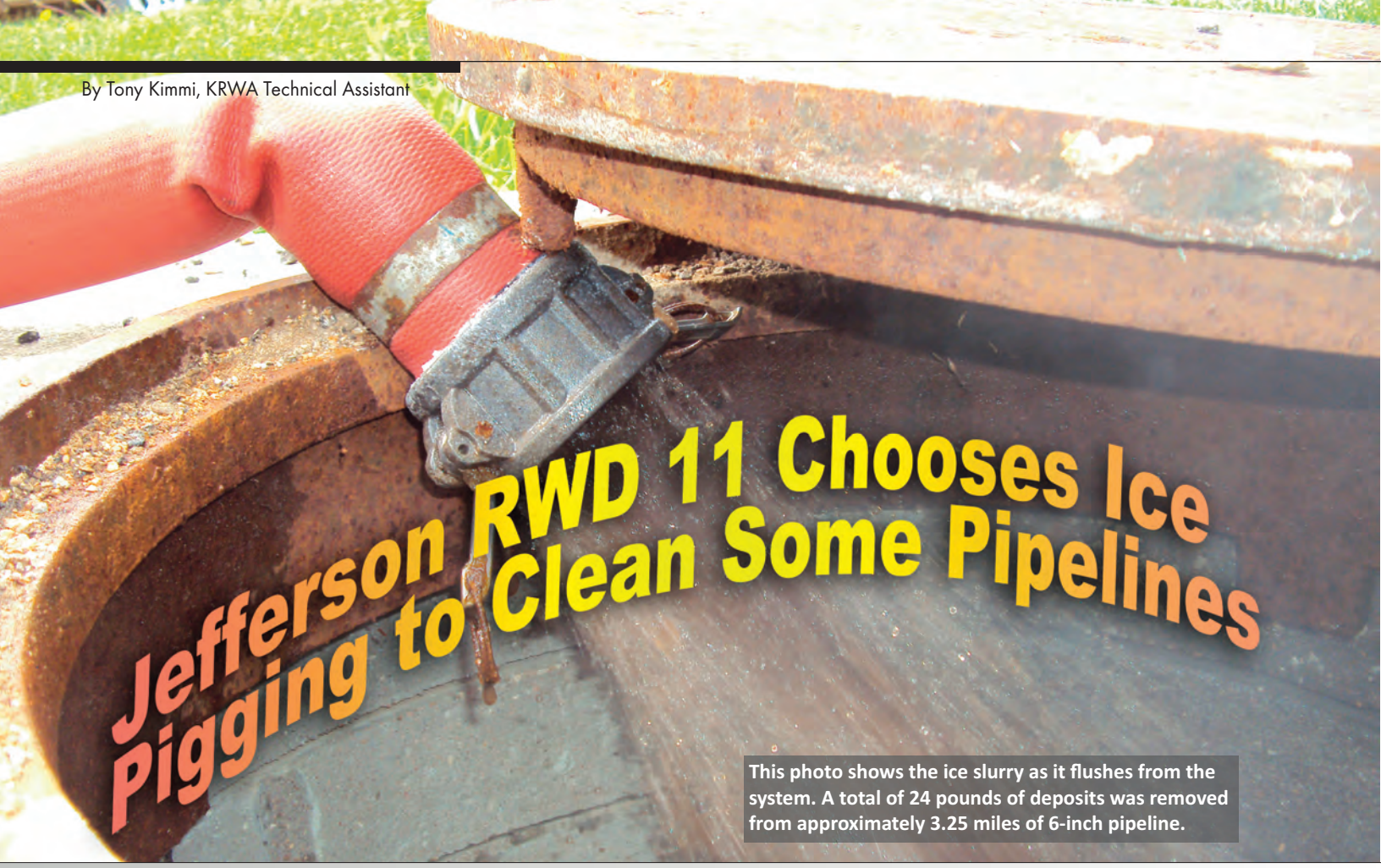
By Tony Kimmi, KRWA Technical Assistant

Jefferson RWD 11 Chooses Ice Pigging to Clean Some Pipelines



This photo shows the ice slurry as it flushes from the system. A total of 24 pounds of deposits was removed from approximately 3.25 miles of 6-inch pipeline.

Jefferson RWD 11 is a small water district located just south of Ozawkie, Kansas near Perry Reservoir. The district has approximately 150 service meters.

For some time, portions of the district have been experiencing "red" water. The red water is caused by higher concentrations of iron in the district's well water. District operator Vincent Petesch had been doing extensive flushing to try to remedy the problem, only to see the problem returning.

The board then decided to turn to a relatively new way of cleaning water lines. It's called ice pigging. The Ice Pigging Technology was developed in the United Kingdom approximately ten years ago. The district contracted with Utility Service Group, of Atlanta Georgia, for a project. This was the first ice pigging project done in the state of Kansas. The job prior to coming to Kansas, was done in Massachusetts. After the Jefferson County RWD project was completed, the crew left for the next project located in the Sequoia National Forest in California. Utility Service has two ice pigging rigs in the U.S. The company has performed demonstration projects in seven states – mostly along the east coast – and completed full scale projects in New Hampshire and North Carolina.

This was the first ice pigging project done in the state of Kansas.

Jefferson County RWD 11 chose to pig 17,500 feet of 6-inch PVC line. The contract price was $20,000.

The ice pigging rig that was at this job site had a 10-ton unit or ten tons of ice slurry. Pigging of one mile of 6-inch pipeline requires about ten tons of slurry. Along with the rig, there were four large ice makers used to produce the ice slurry. It takes, approximately 24 hours for the ice makers to produce the 10 ton of slurry.

The slurry is made up of a seven percent salt solution. The salt and the length of refrigeration determine the abrasiveness of the ice. Ground temperature also causes the ice to loose its abrasiveness. Because the pig is an ice slurry, versus a solid pig, it can't get stuck like traditional poly pigs or foam swabs. An ice pig can negotiate pipe bends, diameter changes, broken gate valves, and inline butterfly valves without affecting the cleaning process.

The ice rig also has the capabilities to chlorinate the ice slurry. Although this is not done very often, the rig can be used during the flushing process.

The method involves pumping the slurry of ice into a main through a hydrant, or a 2-inch fitting, and uses system pressure to push the ice downstream to exit through a hydrant or fitting. The ice slurry, often filling as much as 20 to 30 percent of a pipe's volume, cleans with shear forces up to 1,000 times greater than possible by water alone,

providing more effective cleaning and using significantly less water than traditional flushing methods. That's according to statements by the company.

Because the ice pig enters and exits through a hydrant, specialized launch and retrieval stations aren't required as with mechanical pigging or swabbing. Customer service isolation usually isn't necessary either.

The Utility Service Group also used a Flow Analysis system. This system monitors turbidity, alkalinity temperature, and conductivity. With this being monitored, the operator is able to determine when the ice slurry is getting close to flush out. When the slurry is close to the flush out, a series of samples are taken to determine the amount of sediment removed from the water lines. A total of 24 pounds of sediment was removed in the project at Jefferson County RWD 11.

The service crew works to set up the ice-making process.

Some history about ice pigging

Ice pigging technology was developed by Professor G.L. Quarini at the University of Bristol, United Kingdom. He was granted a worldwide patent for its unique cleaning technology, which was primarily applied in cleaning food and beverage industry piping.

Quarini approached his local water company, Bristol Water, to ask if there was a water industry application that could use ice pigging. At the time, Bristol Water flushed its smaller-diameter mains and mechanically pigged the large ones. However, strategic mid-sized pipes (12- to 24-inches) were often left uncleansed because they were too difficult to take out of service for several days for conventional pigging.

"In 2006, after seeing some convincing laboratory experiments, Bristol Water decided to take the plunge and see if they could scale up the process to suit the water industry," said Matthew Stephenson, operations director for the company that owns Bristol Water. he added that over the next few years, Bristol Water invested in equipment and testing programs in their own network to prove the process.

In 2009, Bristol Water received approval from the UK's Drinking Water Inspectorate, the agency responsible for water quality in England and Wales, according to Stephenson. By 2010, the University of Bristol and Bristol Water owners agreed to commercialize ice pigging worldwide. The technology has since been used in the United Kingdom, Holland, Germany, France, Japan, Australia, Chile, Saudi Arabia, and the United States. To date, more than 250 miles of pipe have been cleaned with ice. The longest single run was 2.67 miles of polyvinyl chloride (PVC) pipe in Wales.

Four ice-making machines work for 24 hours to produce ten tons of ice slurry. The process requires ten tons of slurry per mile of 6-inch diameter pipeline.

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.