By Greg Metz, Technical Assistant

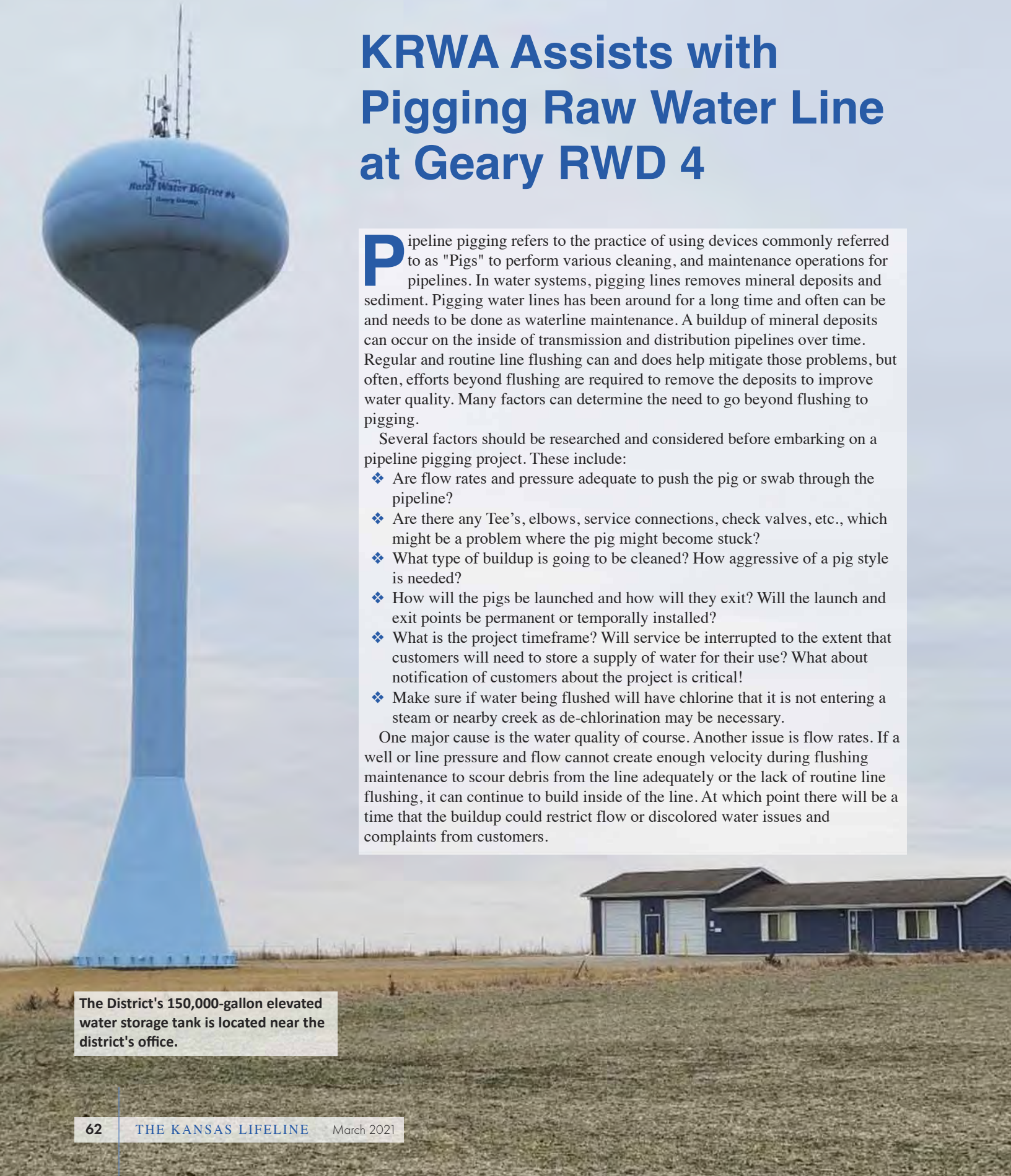
KRWA Assists with Pigging Raw Water Line at Geary RWD 4

Pipeline pigging refers to the practice of using devices commonly referred to as "Pigs" to perform various cleaning, and maintenance operations for pipelines. In water systems, pigging lines removes mineral deposits and sediment. Pigging water lines has been around for a long time and often can be and needs to be done as waterline maintenance. A buildup of mineral deposits can occur on the inside of transmission and distribution pipelines over time. Regular and routine line flushing can and does help mitigate those problems, but often, efforts beyond flushing are required to remove the deposits to improve water quality. Many factors can determine the need to go beyond flushing to pigging.

Several factors should be researched and considered before embarking on a pipeline pigging project. These include:

- Are flow rates and pressure adequate to push the pig or swab through the pipeline?
- Are there any Tee's, elbows, service connections, check valves, etc., which might be a problem where the pig might become stuck?
- What type of buildup is going to be cleaned? How aggressive of a pig style is needed?
- How will the pigs be launched and how will they exit? Will the launch and exit points be permanent or temporally installed?
- What is the project timeframe? Will service be interrupted to the extent that customers will need to store a supply of water for their use? What about notification of customers about the project is critical!
- Make sure if water being flushed will have chlorine that it is not entering a steam or nearby creek as de-chlorination may be necessary.

One major cause is the water quality of course. Another issue is flow rates. If a well or line pressure and flow cannot create enough velocity during flushing maintenance to scour debris from the line adequately or the lack of routine line flushing, it can continue to build inside of the line. At which point there will be a time that the buildup could restrict flow or discolored water issues and complaints from customers.



The District's 150,000-gallon elevated water storage tank is located near the district's office.

When Marion County RWD No. 1 realized it was not possible to keep their standpipe supplied with all three of their wells operating, it was concluded an obstruction in the pipeline was the cause. Here's an example where a water utility, their Engineer and the KRWA worked together to solve the problem– and at a savings of more than $50,000 for the District.

Pigging lines benefits central Kansas rwd

By C. Michael Butler

KRWA conducted a pigging project in July 1991 at Marion RWD 1. That project was well-documented to demonstrate the improvement in flow and resulting energy reduction. The article by C. Michael Butler of Schwab – Eaton, P.A., Manhattan, Kan., summarized that project in an article in the July 1991 issue of *The Kansas Lifeline*. By removing excess mineral deposits, the production of water increased by 35 percent. The head pressure was reduced by 24 percent on the 4.5 miles of transmission line from the wells to the chlorination building. I encourage readers to check the article "Pigging Pipelines" at this link: https://tinyurl.com/y5jj6v2z.

This photo shows the start of "dirty water" (high content manganese and iron deposits) during pigging of a pipeline on another project KRWA conducted.

This photo shows the buildup from iron deposits in a 3-inch PVC line. This pipe is from a smaller city in northeast Kansas where KRWA staff assisted with pigging.

The reason for pigging a raw water line as in Geary RWD 4, was to improve water quality, maintain flow and improve media life and filter performance and function. By regularly flushing and then as needed, pigging the raw waterline, the district hopes to improve and prolong the life of the plant media and reduce treatment costs. Customers are also sure to appreciate improved water quality. The district's well water is high in iron and manganese. The district's main well produces approximately 500 gpm. An 8-inch pipeline of about 5,300 feet transports water from the well to the

About the district . . . .

Rural Water District No. 4, Geary County, began providing water service to about 50 customers in 1976. Additional land was incorporated into the district in 1981. The district's south boundary is the Republican River. The north boundary is the Geary/Riley county line. Fort Riley borders the district to the east and Milford Lake is on the western border. In 2021, the District has 400 patrons and also sells water to two locations for the Corp of Engineers, Milford State Park, Acorn Resort and also to the city of Milford.

The water supply is provided from three wells. Two lower producing wells are on standby. The district's newer well can produce up to 500 gpm. The source is an alluvial aquifer located below the dam at Milford Lake. The water has high amounts of iron and manganese. Untreated water is pumped to the filter plant where treatment is through the use of an oxidation (chlorine) filter that helps to remove most of the iron and manganese.

District Manager/Operator Clifford White first became involved with the project as a board member in 1987. With changes within the district, White says that the board saw a need for to employ someone vs. contracting service for operations. Clifford was hired as Manager/Operator since 2000. He attained a Class VI water operator certification in 2002.

The district recently completed construction of an addition to the filter plant. The expansion includes a shop, equipment room and a restroom. The district has moved all equipment including management out of the main filter room so as to protect from the corrosiveness. White says that the district has had to continuously replace and repair equipment because of being in close proximity to the chlorination.

Also part of the current project was to replace the media in the filters due to fouling from the iron and manganese. Another aspect was the pigging of the 8-inch transmission line from the wells to the filter plant to remove mineral deposits from the pipe.

The district's plant site also has a 50,000-gallon storage tank that holds water until resupply is called for the by district's 150,000-gallon elevated tank. The system operations are controlled by a SCADA system.

Inside RWD 4 water treatment plant,

Anxiety reigns supreme! It can be stressful waiting for a pig to make it to the exit point.

treatment plant. The plant is about 200 feet in elevation above the wellhead.

Geary RWD 4 Operator/Manager Cliff White contacted KRWA for assistance with the project. I met with Cliff and discussed planning for the project. The district wanted to install permanent launching and receiving ports so that pigging of the line could become regular maintenance to improve filter media life and efficiency.

After meeting with Cliff and reviewing the proposed project, we wanted to be sure to cover any issues for the path the swab would take. We tried to confirm any services, Tee's or any changes in route that could create a problem in disrupting the pig's path and causing it to get stuck. We installed the pits and ports to allow for the launching and exiting of the pigs.

On the day we worked on the project, we first connected the riser and pipe at the exit pit to direct water away from the area and to ensure no damage would be caused because water flowing from the discharge point. Given the length of the pipeline to be pigged and knowing the flow rate and pipe size, we calculated the time required for the foam pig to travel the distance from the well to the treatment plant. We estimated it would take about 27 minutes to reach the plant exit point.

Almost exactly 27 minutes from the start of the pumping, a lot of discolored water began to arrive. But there was a problem. There was no foam pig! We continued to flush water for another hour. Still, there was no pig coming from the exit port. There was no loss of pumping capacity. So, where could that swab be?

There were only a couple of possibilities. I learned later that the district had installed a check valve at the midway point of the line at the top of a small hill. Usually, a soft swab type pig would have passed such a swing check. This valve, however, had a center pivot with two halves. The

Preparing for a pigging project requires having a port to launch and an exit point. KRWA staff member Greg Metz is shown here tightening MJ connections to hold the piping together. Straps were added as an extra measure.

district excavated the valve and opened the pipeline at that location. Sure enough, the swab was stuck in the one side of the check valve.

Pigging waterlines can be a very rewarding project. KRWA has seen all sorts of methods and manners how projects have been approached. In extreme cases, one city connected a fire truck to the waterline to force the pigs through cast pipelines that were very clogged with mineral deposits. In another town, the city mayor decided that using a high capacity air compressor would help propel the pigs better. Yes, it did – including launching one nearly over the top of a two-story home. In another case, a system did not close side valves and swabs went through pipes of lower integrity and ended up with plugged kitchen faucets and washing machines. The message on that is to know the system and shut off the sideline valves.

The photo shows the foam swab (pig) after it was retrieved from a check valve. It was caught in the system for several weeks.

I know several systems have installed permanent launch and exit ports on pipelines so that pigging can be readily accomplished. That's a good idea if the water quality has treatable amounts of iron and manganese.

KRWA staff are prepared to help any community or RWD that may be interested in reviewing the need for or options to clean sections of pipeline. For those systems that have known water quality issues that contribute to excessive mineral buildup, the acceptance that regular pigging of some lines may need to happen is a first step to ensuring better water quality and more satisfied customers.

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.