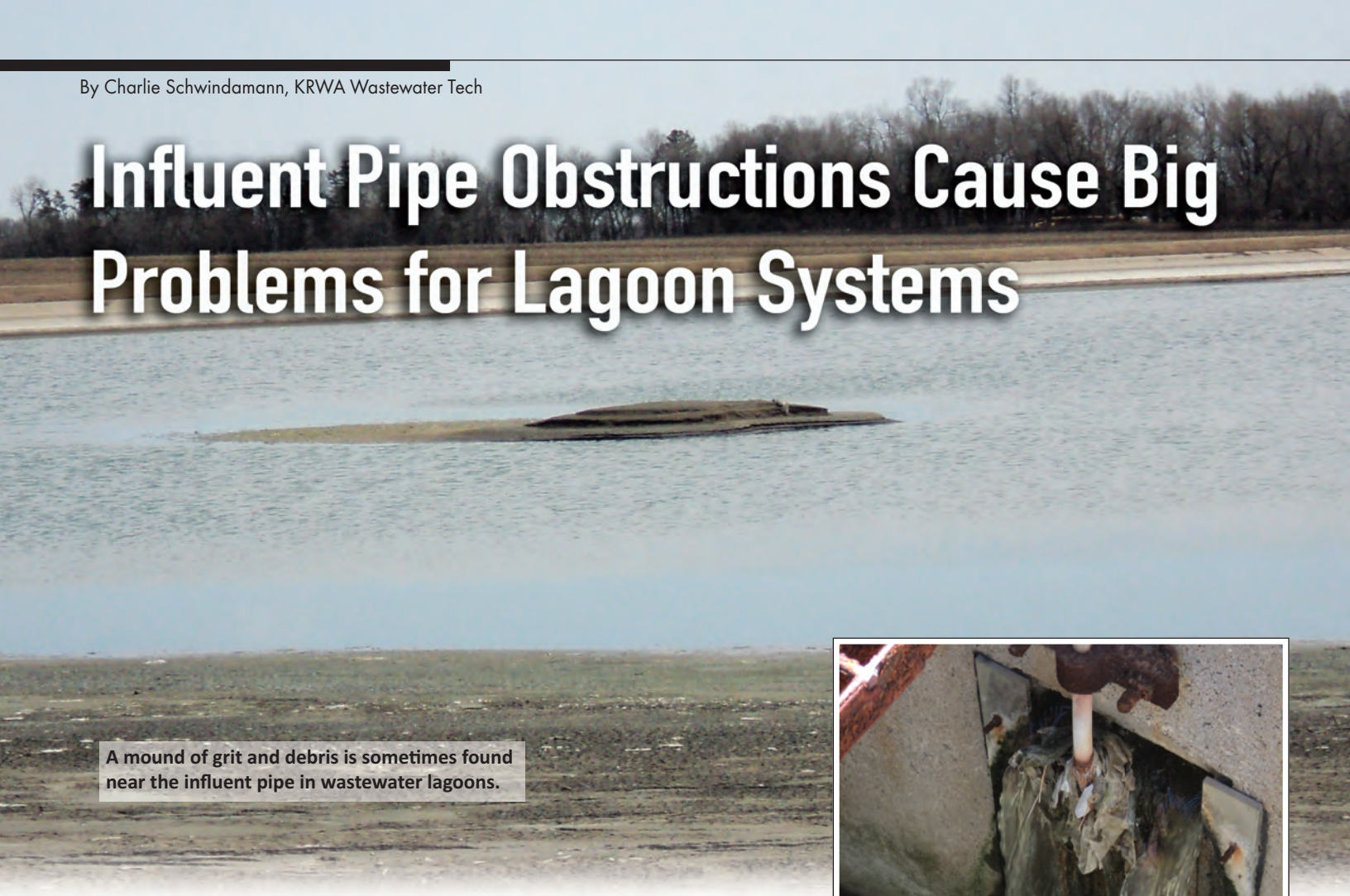
By Charlie Schwindamann, KRWA Wastewater Tech

Influent Pipe Obstructions Cause Big Problems for Lagoon Systems



A mound of grit and debris is sometimes found near the influent pipe in wastewater lagoons.

Debris on the slide gate in a structure at a lagoon can also cause bypasses.

The Kansas Rural Water Association receives numerous calls from operators of wastewater lagoon systems who have discovered a blockage at the influent pipe. Some are only partial blockages but some are complete blockages. It's important that operators visit the lagoons to check on the structures at least several times each week, or a more ideal approach would be to check them daily. It is also required to notify the Kansas Department of Health and Environment (KDHE) when complete blockages occur.

Frequently, a plugged influent line can be forced open with the use of an inflatable flow-through plug. The plugged line can generally be opened by forcing the plug through with additional pressure from a pump. Sometimes this corrective action will last for a year or two and sometimes only for a few months or weeks.

Recently, I worked with a system that obviously had not been checking its lagoon system for several months or likely even longer than that. This structure was full of grit, so much so that we could not even get the flow-through plug in place. As a result, it was necessary to call in a septic tank cleaning service. The company cleaned at least 18 inches of grit from the structure, after which wastewater was allowed to flow through the structure but only to Cell 2. The line into Cell 1 was plugged and would not allow flow through. We had to use the flow-through plug to open the line and allow flow into Cell 1, thereby allowing the facility to return to series operation. As mentioned previously, operators need to check all structures at least several times per week to ensure proper flow and treatment in the lagoons. It is also recommended that the system have the lift station

KRWA Wastewater Tech Charlie Schwindamann uses a large pry bar to remove the turtle guard and debris from the influent pipe to the primary cell.

Changes in water elevation can be detected and can indicate when a blockage has been contributing to bypasses to the other cell.

Keith Murphy, operator at McFarland, starts the pump to bypass Cell 1 to lower the water level to allow for removal of debris and the turtle guard.

cleaned to remove any grit that may be present that could cause reduced pumping or blockage of the force main due to grit accumulation.

Last February, a new city operator called requesting assistance with opening a blocked inlet pipe. In addition with assisting him in opening the pipe, I also provided training on how to utilize his equipment to open blocked lines in the future. He was successful in keeping the line open for several months but eventually an accumulation of grit required weekly cleaning. We noted when checking the plans that a turtle guard had been installed at the end of the pipe and considering how often cleaning was required. We suspected the debris was clogging the turtle guard.

After discussing the issue with the operator, he met with the city council and they all agreed to allow him to proceed to lower the cell and remove the turtle guard. A 6-inch pump was obtained to lower Cell 1. Notice of intent to bypass from Cell 1 and Cell 2 for approximately four days was provided to the KDHE as required. We then positioned the pump on the dike between the cells and used inflatable plugs to prevent backflow into Cell 1. We began bypassing Cell 1 just before noon; pumping was started later in the day. The pump was being operated at an idle speed to prevent overflowing the pond dikes. The process was closely monitored by the operator. Also, a sample of the effluent was taken during this process to determine compliance with permit limits.

Three days after pumping began the water level in the cell had lowered enough to allow entry. The plan was to remove the debris and to possibly remove the turtle guard at the end of the influent pipe to Cell 1. After entering the lagoon we found the end of the pipe was still about 28 inches below the water level. With the use of a hand shovel we were able to locate the end of the pipe and could feel the debris. The debris however, was too thick to remove. By using a steel bar we were able to pry the turtle guard open enough to allow debris to float to the surface. With continued prying, we were only able to move the turtle guard a limited

An ideal type of turtle guard allows any debris that may accumulate to drop off the end.

distance leaving an opening of about six inches. Unable to move the turtle guard any further or remove it completely, we decided to conduct a test to see if the opening would allow flow into the lagoon cell. After switching the plate at the influent structure we noticed water flowing into Cell 1. We then removed the plugs and replaced the gates to ensure series flow between all three cells. We also turned on the lift station to make sure there was no back up into the influent structure and no bypass to Cell 2. Operations were normal as all flow from the lift station went to Cell 1 as designed and no backup was noticed.

We were successful in our attempt to remove the turtle guard and debris from the end of the pipe. I recommended to the operator that he continue checking the structures at least three times per week to verify that no further debris accumulation occurs.

Turtle guards usually consist of all-thread rod installed by drilling holes at the ends of the pipes. Some are manufactured. Most do not allow for debris removal and because of this, I would rather not have turtle guards on the pipes. It would be much easier to clean the pipe of a turtle than to lower a cell and have to wade out into the cell to try to remove debris. It is also a lot safer to clean a pipe than to wade into the wastewater and sludge.

KRWA also typically finds that most of the piping is on the bottom of the cells and generally is eight inches in size for most small systems. When the sludge accumulates to more than 8 inches the result is that the pipe is covered. Sludge removal is usually only done when there is an average of 25 percent or more accumulation. Most primary cells operate at five feet of depth so the sludge accumulation of 25 percent is 15 inches. In most cases the sludge over the inlet pipe is significantly more as the solids settle out near the inlet pipe.

This raises two important issues that an operator needs to be aware of when operating a lagoon system. First, the issue of a turtle guard installed on the influent pipe can cause debris to accumulate resulting in by-passing and blockages. Second, pipes installed on the bottom of the cells can also cause by-passes due to excessive sludge accumulation near the influent pipe.

Charlie Schwindamann has been Wastewater Tech at KRWA since September 1999. Charlie holds Class II Water and Class I Wastewater Operator certification. He is a member of the Marysville, KS city council.