By Charlie Schwindamann, KRWA Wastewater Tech

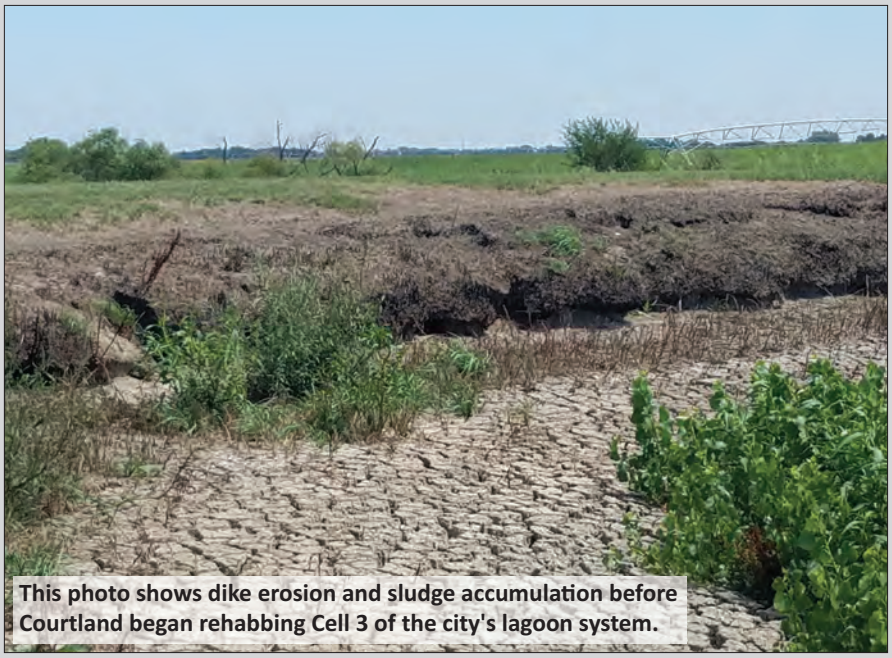
City of Courtland Makes Lagoon Improvements

This photo shows placement of the riprap from near the bottom of the cell to the top of the dikes.

Approximately 80 percent of Kansas wastewater is treated using lagoon systems. Concerning wastewater treatment systems, according to KDHE, Kansas has 329 discharging lagoon systems, 264 non-discharging lagoon systems and 193 mechanical or other type of treatment facilities.

Many of the lagoon systems were constructed in the 60's and 70's and have had no maintenance conducted on them. I'd like to showcase the recent repairs made by the city of Courtland on their lagoons, not only to show the improvements but to provide details how the city made these repairs at nominal costs.

Bryan VanMeter, who has been operator at the city of Courtland, Kan.



This photo shows dike erosion and sludge accumulation before Courtland began rehabbing Cell 3 of the city's lagoon system.

since early 2015, requested assistance from Kansas Rural Water Association to review the operations of the city's wastewater treatment system. Bryan had attended a training session on lagoon operation in June 2015 and was concerned that the city needed to address issues based on the material presented at the KRWA training session. I responded to Bryan's request and met with him and Mayor Tim Garman and Council Member David Douglas the following week to review the system and to discuss maintenance of the lagoon system.

We went to the lagoons and viewed the cells. I recommended the city review the city's prior inspection reports issued by the Kansas Department of Health and Environment (KDHE) for any corrections the agency may have suggested. Reviewing prior inspection reports is a recommended practice. If an operator cannot locate the inspection report, then I suggest contacting the KDHE district office for a copy of prior inspection reports. It is also highly advisable to review the system's permit as well and to ensure that the system owner has the most recent permit.

Erosion issues; sludge removal

It was very apparent that the dikes on Courtland's three cells all had suffered severe erosion. We discussed reshaping the dikes to the proper slope and then to add rock or crushed concrete riprap to control erosion. Riprap should be two- to five-inch diameter material. This is a minimum design standard. That size of riprap is large enough to prevent the riprap from washing into the cells, but small enough to prevent animals from burrowing into dikes where rip rap has been placed. My suggestion is if a wastewater system in your area has done a similar project, contact them for information as to cost, who their contractor was and where to locate the riprap.

KRWA conducted a sludge profile several weeks later. We found ten to twelve inches in the first two cells. Sludge removal was not believed to be needed because of the system only having random failure of its discharge permit limits. The sludge in the final cell was not measured as it began to rain and because of lightning, we opted to play it safe. We packed up and got away from the water. A report was provided to the city.

Bryan VanMeter, city of Courtland Operator (far right) explains the improvements at Courtland's lagoon system to some of those attending a training session on May 7, 2017.

The city council took up the recommendations made in the report. The council voted to repair the cells and remove the sludge at the same time. The city contacted a local contractor for cost estimates. It was decided to repair one cell per year, starting in 2016. The city provided the supplies such as the riprap and valves. The contractor was to remove the sludge and reshape the dike walls, and repair or replace valves.

The sludge was stockpiled on site; it is being applied to local farm ground in compliance with 503 sludge

The contractor is using a small hoe to shape the dikes and remove the sludge.

The sludge has been stockpiled for a year and now is ready to be loaded onto the spreader and hauled to field for proper land application process.

application rules. Information concerning land application of the sludge was provided to the city. The landowner, who had his own agronomist, calculated the agronomic rate for the crop to which the sludge was to be applied. The landowner applied the sludge with his equipment and the city monitored the application to ensure proper rates were followed.

Courtland's project began in late April 2016. Operator VanMeter contacted KDHE to inform the agency that Cell 3 was going to be out of service and the city would be operating on only two cells. Cell 3 was slowly drained over the next month; the final water was pumped out. It took several months for the sludge to dry enough for the contractor to get into the cell to remove the sludge, reshape the dikes, add the needed valves and riprap the dikes for erosion protection. This process took about a month to complete starting in August 2016. Once completed, the cell was put back in service and the system was again operated in series.

Holding costs down

The cost for sludge removal, reshaping of the dikes and riprap for this cell at Courtland was approximately $34,000. That includes materials, such as valves, riprap, pipe and machine and labor costs on the dikes. An engineer was not needed because the project was considered to be repair and maintenance type work with no changes from the original plans. It is estimated the cost for Cell 2 to be slightly higher at $40,000 as it is a larger cell. The advantage is to have the same contractor and everyone now knows the process so the time frame for the actual work may be less.

The final cell was filling up and the city had not discharged in nine months. The city then began to drain the Cell 2

KRWA operates two programs to provide assistance to wastewater utilities. One is funded through USDA Rural Development and administered by the National Rural Water Association. The other is funded through KDHE.

This photo shows the dikes after the sludge has been removed and dikes were repaired.

into Cell 3. When water would not flow to Cell 3, they discontinued the flow and are in hopes that adequate evaporation will dry the cell. It may be necessary to pump the final water to Cell 3. When the water level was lowered, a large mound of sludge was seen near the inlet pipe to Cell 2. This is typical for the first two cells to have a mound of sludge or grit near the inlet as this is where the flow from the collection system is discharged.

KRWA and the city of Courtland co-hosted a Wastewater Lagoon Operation and Maintenance training session on May 9, 2017. A tour of the lagoons provided attendees with first-hand experience of the repair and maintenance process. This session was attended by 18 operators from 14 systems. The training allowed for great discussion with many questions about the project.

The improvements are quite impressive when compared to before and after. I hope that more systems will follow the city of Courtland's example and be progressive in making improvements and repairs when needed. I believe that when all the cells are repaired the system may not discharge for quite some time and may even be able to control when they discharge to one or two quarters per year.

KRWA operates two programs to provide assistance to wastewater utilities. One is funded through USDA Rural Development and administered by the National Rural Water Association. The other is funded through KDHE. If your community has issues concerning wastewater treatment, operations or maintenance, I hope you will give a call to me at 785.799.6105 or email me at charlie@krwa.net or call the KRWA office at 785.336.3760.

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.