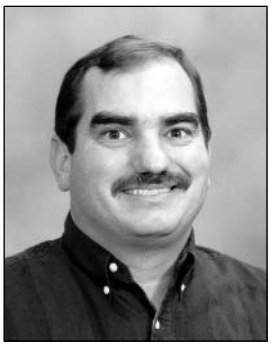
by Charlie Schwindamann

Operational review identifies wastewater system problems

An operational review of a wastewater treatment facility is often needed when the system begins to fail to meet the permit discharge limits. Depending on the location in the state, most permit limits are set to 30 mg/L BOD (biochemical oxygen demand) and 80 mg/L TSS (total suspended solids) on lagoons and treatment facilities. An operational review will help determine if there are problems with the treatment plant, or process, of if there is just too much waste for the facility to treat. There are several things the system can do to be prepared for an operational review. First and foremost, having a set of plans of the system and the permit are essential. The population served as well as Water Use Reports or flow measurements to the wastewater treatment are also necessary. Every operator should be familiar with the system's permit BOD and TSS limits and the design capacity. It's good to have a copy of the permit for review. The flow measurements will assist with making sure the system does not have excess I & I (inflow & infiltration) or exceed the capacity of the treatment system. A sludge profile (measurement) is helpful in the review of wastewater stabilization ponds.



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Early this year, I was asked to help to perform an "operational review" of a small wastewater stabilization pond (lagoon) system in northeast Kansas. The review required three visits and several phone calls to complete. This review was required by the Kansas Department of Health & Environment (KDHE) because the facility was failing its permit discharge limits on several occasions in recent years.

During the first visit, the operator and I reviewed the design plans for the system. We went to the facility and physically looked at the operation, particularly how the gates were placed to direct flow in the cells. Our visit to the cells was to make sure that the system was being operated as designed. I requested flow measurements from the city. The collection system and lagoons have no lift stations; all flow is by gravity. We used the Water Use Reports to determine an average use. Several years ago KRWA smoke tested the town; that study found no significant I&I. The city clerk separated the water use because it has two separate lagoon systems – one for the east and another for the western part of the city. There was some question as to which sewer connections

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This wintertime photo showing thawed ice leaves no question as to the location of the inlet in this wastewater lagoon cell. The primary cell is approx 575 feet in length. The inlet, located on the north end of the cell, is within 150 feet of the discharge pipe to the second cell, thus not utilizing 425 feet of the primary cell for treatment of the waste. The proper placement of the inlet pipe to the primary cell should be on the opposite end so that the entire length of the cell could be utilized for treatment.

actually flowed to the east or west lagoon. I also reviewed the sampling technique with the operator to determine that he was sampling from the proper locations.

Review your permit

After our review of the permit and the plans and using data from the city's Water Use Reports, we determined that the system had only approximately 90 days of detention time in their wastewater lagoons. This is less than the 120 days required by KDHE. The primary cell is approx 575 feet in length. The inlet, located on the north end of the cell, is within 150 feet of the discharge pipe to the second cell, thus not utilizing 425 feet of the primary cell for treatment of the waste.The inlet pipe should be on the opposite end of the cell so that the entire length of the cell is utilized for treatment. (See photo on previous page). This system was designed in the late 1960's, obviously before short-circuiting in lagoon systems was really understood.

The system also had a structure that could allow the second cell to be bypassed to the third cell. This was occurring because there was a plugged pipe between cell 1 and cell 2. We cleaned the pipe. This correction added a significant amount of detention time as the flow could go to the primary cell. Most of the waste had been treated in the final cell instead of the primary cell. It is a requirement to notify KDHE any time there is a bypass of wastewater. A written report is to be provided to KDHE outlining the bypass and how it was addressed.

Sludge had been removed from the lagoons in the mid 1990s; we performed another sludge profile to determine the build up of sludge. The average depth of the sludge in the cells was less than nine inches; it was not the heavy thick sludge that typically needs to be removed but more a light "floc" of particles.

By using the average water use for winter months, cleaning the pipe between the cells and the correction of the influent pipe in the primary cell, this system will have capacity for approximately 320 days of detention time. That's nearly a year! This system may not discharge except in early spring and late fall when rain events are common.

Changing the influent pipe will require an engineer to design. KDHE requires that a licensed engineer design any changes other than repairs. The system should be able to advise the engineer what they want and how they want it done, although the engineer may have a better way.

This city is fortunate to have several qualified contractors who have built many lagoon systems close by. This should help reduce costs. I estimated this project without engineering fees to be less than $20,000 and more likely, should be the $10,000 range. This project should only take two structures and about 200 feet of pipe at a digging depth of less than four feet deep.

I think this is a good example of how an operational review of a wastewater system may be helpful. Frequently, we hear that a city needs to do this or that to come into compliance with their wastewater permit. In the case of this city, the time we spent checking the system on-site provided invaluable information that helped this small town avoid constructing another cell to their system.

If your wastewater utility has compliance issues or if you have any questions regarding utility operation or maintenance, I am available to come to your community to review your project and help you analyze the original design to what may be going on today. Give KRWA at call at 785/336-3760 or email to me at charlie@krwa.net.