By Jeff Lamfers, KRWA Consultant

The Best Solution for Meeting New, Proposed Effluent Limits? Stop Discharging!

This photo shows a tributary immediately downstream of a poorly performing discharging lagoon. Note the gray, stringy growth attached to the rock. Water in the tributary is also very cloudy; it is not clear as would be expected. Foam is also usually present. Occasionally, fish kills result due to low dissolved oxygen levels. Such observations usually indicate serious treatment problems. However if a lagoon is modified so it does not discharge, degraded stream conditions such as this are no longer an issue.

Do the following statements describe the waste stabilization pond serving your city or sewer district?

- Does not consistently meet all permit limits, especially effluent limits for BOD and ammonia;
- The tributary downstream of the discharge structure is black and looks organically overloaded;
- The first cell is often either a thick, pea soup green color or sometimes even a brown color with floating black solids on the surface;
- Offensive odors are often present and you have received several complaints from nearby homeowners about the odors;
- On a windy day, there is virtually no wave action on the surface of any of the cells of the lagoon;
- Your system has been contacted by KDHE asking why effluent quality has deteriorated recently;
- And finally, your system has recently received either a letter from KDHE or your discharging permit has been modified requiring you to retain a consulting engineer to determine why the lagoon is not meeting limits and propose options to return to compliance.

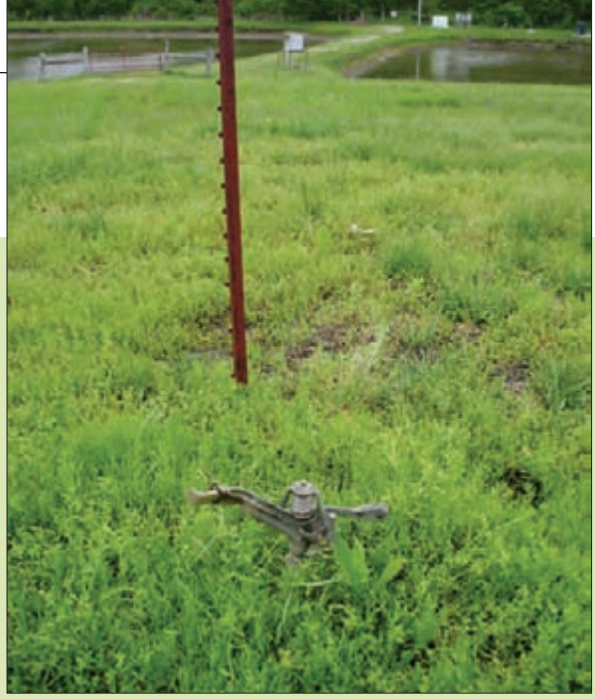
Unfortunately this scenario plays out more often than realized. Many small systems that discharge seem to be having real problems meeting permit limits recently. Many systems I deal with have had prolonged spring turnovers the last two years, presumably due to colder, harsher winters than we have had in the past. Colder temperatures for longer periods result in facultative bacteria being less effective at breaking down incoming raw sewage. Thicker ice cover stops sunlight penetration, resulting in less algae that are the primary source of oxygen for facultative bacteria. But seasonal turnovers occur with many systems from time to time and there are solutions for dealing with these. However, many systems are having a more serious problem as they are experiencing overloaded conditions and treatment problems throughout the year. These situations cannot be explained by a seasonal turnover and can be caused by many factors, including:

- Organic overloading due to either more customers connecting to the system or higher strength organic waste from commercial and industrial customers such as slaughtering operations.
- Hydraulic overloading due to excessive infiltration and inflow in the collection system
- Excessive accumulation of sludge on the bottom of individual cells over time
- Short-circuiting within individual cells that results in wastewater passing through the cell in less than required time

Move to non-discharging

The purpose of this article is to encourage wastewater systems in this predicament to consider a couple of options that have always been available, but often not pursued due to higher costs or lack of additional land. If your system has been required to retain an engineer to review options to return your wastewater lagoon to compliance, I encourage

you to explore the option of no longer producing an effluent and discharging. Of course this may be more difficult to accomplish in the eastern part of Kansas due to higher amounts of rainfall and lower rates of evaporation. But it may make sense for your system to consider constructing additional cells large enough to handle all incoming flow plus I&I and rainfall. Inflow is balanced by evaporation and controlled seepage, thereby eliminating any discharge. Yes, you will probably need to build larger cells than needed to just meet organic loading requirements. But eliminating the discharge also eliminates compliance headaches. If your system does not discharge, it cannot exceed permit limits. Non-discharging systems also save money as they have no effluent monitoring costs and have less paperwork to submit to KDHE.



This photo shows an example of a sprinkler head typically used to irrigate wastewater from a lagoon. This facility irrigates excess wastewater on pasture adjacent to the lagoon. Wastewater is drawn from the final cell by a small wet well equipped with a submersible pump. Ground cover is thick and helps slow the irrigated wastewater and prevent any discharge to nearby tributaries.

This may become even more critical in the future if EPA requires states to develop more stringent effluent limits. While BOD and TSS limits are not likely to change, there is considerable discussion ongoing about lowering effluent ammonia limits for all treatment facilities. Presently in Kansas, if your system is served by a lagoon and has no industrial customers, you do not have permit limits for ammonia. Your system simply monitors effluent ammonia. In most cases, if you have adequate detention time (120 days for three-cell lagoons), that is considered sufficient detention time for ammonia removal. However in the future, this could change and all lagoon systems will likely have effluent ammonia limits. Current proposed ammonia limits are 0.25 mg/L during warm weather and 0.52 mg/L during cool weather. I doubt any lagoon in the state will be able to consistently meet these limits if they become the actual limits. Again, another reason to seriously consider eliminating your lagoon discharge.

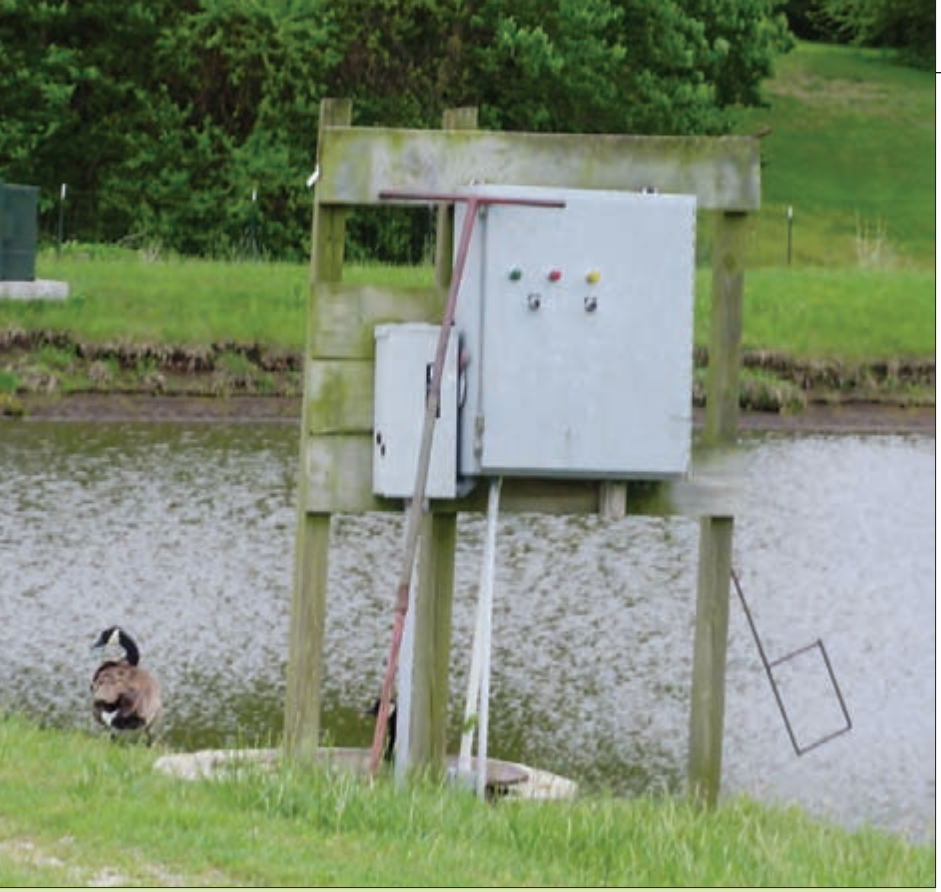
But eliminating the discharge also eliminates compliance headaches. If your system does not discharge, it cannot exceed permit limits. Non-discharging systems also save money as they have no effluent monitoring costs and have less paperwork to submit to KDHE.

Other options to discharging

If providing sufficient lagoon capacity to eliminate discharging is not possible, another option to consider is irrigating the lagoon effluent. As long as effluent is irrigated at a rate that does not allow runoff into waterways or nearby tributaries, the facility is considered a nondischarging facility. Since irrigation is only possible during warmer weather, the lagoon system would need to have sufficient hydraulic capacity to store all wastewater during the colder winter months until irrigating can resumed again in the spring/summer. When irrigating, the best solution is to apply on either pasture or cropland near the lagoon. This usually requires less pumping than to other sites and results in less regulatory oversight since the possibility of the public coming into contact with the irrigated wastewater is very remote. When irrigating on pasture or cropland, the following basic requirements apply:

- The rate of irrigation must be controlled to prevent any tailwater runoff and/or discharging
- Wastewater to be irrigated must be drawn from the final cell only
- Wastewater cannot be irrigated on crops grown for direct human consumption. Wastewater can be irrigated on fields used to grow field corn, soybeans, wheat or milo.

Wastewater can also be irrigated on public grounds such as parks, cemeteries, driving ranges and golf courses, but there are more regulatory requirements due to a higher likelihood of public contact with the irrigated wastewater. First and foremost, the wastewater to be irrigated must be disinfected, usually with chlorine. Systems that irrigate on public grounds have a unique permit that requires monitoring for both residual free chlorine and E. coli. E. coli monitoring is usually required at a sprinkler head at the end of the irrigation system for each application site. Monitoring frequency is usually either once or twice a month during the



This pump station for a typical lagoon irrigation system is located next to the final cell. A pipe from that cell connects to the pump station wet well. The wet well is equipped with a submersible pump that pumps wastewater to be irrigated to a nearby sprinkler system. Such systems are often also equipped with timers that allow running several cycles each day. This helps ensure runoff is not a problem. This pump station was also doubling as a nesting site for a pair of Canada Geese.

irrigation season. In addition to the aforementioned restrictions, the following additional requirements must also be met:

- Irrigation can only occur when public access to the irrigation site is restricted. This usually means during times the facility is closed and the public is not present.
- Irrigation must be conducted in such a manner to prevent ponding on the ground surface
- Irrigation spray must not be allowed to drift into public areas where picnic tables, drinking fountains or private residences are present
- Signs must be posted on any holding ponds containing wastewater to be irrigated, notifying the public that the ponds contain reclaimed wastewater and it is not for drinking or swimming.
- Hose bibbs on the irrigation system must be provided with signs warning the public that water from such bibbs should not be consumed as it is reclaimed wastewater
- Care must be taken to ensure there are no cross-connections between any public water supply lines and irrigated wastewater lines
- In the case of golf courses, a notice must be printed on the course scorecard indicating that reclaimed wastewater is used to irrigate the course.

Again, these are options to seriously consider in order to eliminate your lagoon discharge and potential compliance problems. If in the next three to five years your system is considering an upgrade to your lagoon. I encourage you to consider the options of constructing large enough cells to eliminate discharging or irrigation of all excess wastewater. Should you want to discuss these options in more detail, please feel free to contact me at 913-850-8822 or jeff@krwa.net.

Jeff Lamfers began work for KRWA in November 2008. Jeff has more than thirty years of regulatory experience in the oversight and operation of water and wastewater systems with the Kansas Department of Health and Environment. He is a graduate of the University of Kansas with a degree in Environmental Studies with an emphasis in aquatic biology.