

# A Unique Solution for Dealing with Commercial and Industrial Discharges and Lagoon Compliance Issues



Note excessive amount of grease balls in corner of Cell 1 of Moundridge's lagoon. Grease balls are likely due to discharge from industrial and commercial customers.

The city of Moundridge's lagoon has a long history of compliance problems. Effluent from the city's 4-cell discharging lagoon was of such poor quality that at one point, KDHE required the city to monitor their influent and effluent weekly. From January 2016 through November 2017, the city monitored 48 times. During the period, the effluent Biochemical Oxygen Demand (BOD) limit of 30 mg/L was exceeded 29 times. The Total Suspended Solids (TSS) limit of 80 mg/L was exceeded 22 times. That's not a great record. In 2013 the city found there was an excessive amount of sludge in Cell 1 which required removal. Removal improved effluent quality somewhat, but only temporarily. In 2015 EPA conducted an inspection of one of the businesses in town that was discharging high-strength wastewater to the city's system. Due to the city's compliance issues, EPA also conducted an inspection of the city's lagoon. And during a recent renewal of the city's permit, KDHE was going to require Moundridge's lagoon to meet effluent ammonia limits. While lagoons may be able to meet ammonia limits during

summer months, almost all have problems meeting such limits during colder, winter months.

It was well documented that most of the cause for the city's compliance problems was the discharge of high-strength BOD wastewater from a food processing plant in town. This plant also discharged wastewater with a high TSS and oil/grease concentration. It was also suspected that the need to remove sludge from Cell 1 was caused by years of such discharges from that plant. The city needed to take steps to return its wastewater system to compliance with both KDHE and EPA. As a long-term solution, Moundridge is planning to replace the lagoon with an activated sludge plant. This will also allow the city to pursue residential and commercial/industrial customer growth. An activated sludge plant will be better able to handle high-strength influent wastewater. But even with such a plant, there will be limits to what such a plant can accept and effectively treat. Consequently, the city came up with a new, unique approach to solving this problem of

overloading and non-compliance due to high-strength commercial and industrial discharges to their system.

## Customer Education

In a situation like this, there are several options a city can take to solve the problem. The first step usually is to educate commercial/industrial customers on why high-BOD discharges are difficult to treat and the problems they can cause. In the case of lagoons, problems include offensive odors, prolonged seasonal turnovers and failing to meet effluent limits. Frequently such facility owners are not aware of the problems their discharges can cause. With education of

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customers, it is hoped that by recycling wastes, improving housekeeping and minimizing spills that the discharges will be lower strength and more easily treated.

### Providing Pre-Treatment Prior to Discharge to the City

Another option is to either encourage or even require commercial/industrial customers to pre-treat their wastewater before discharging to the municipal system. This is usually an effective remedy but obviously requires expenditures by the customers to lower the BOD and TSS in their discharge. I know of several cities with locker plants that discharge whole blood from slaughtering operations. If the whole blood can be collected in barrels and then recycled, a lower BOD wastewater results. Other cities have chosen to accept the high-strength wastewater and construct a pre-aeration basin prior to their lagoon to provide an environment with an abundance of dissolved oxygen and food that allows aerobic bacteria to lower the BOD to acceptable levels before entering the lagoon.

In the case of Moundridge, the problem food processing plant chose to install a pre-treatment system in 2012 to lower BOD and remove solids, oil and grease. The pre-treatment system consists of a dissolved air flotation (DAF) system plus an aerated attached-media basin. DAF systems are effective at removing suspended matter such as oils, grease and other solids by adding dissolved air to the wastewater. The air is released in a tank or basin to form tiny bubbles that attach to the suspended matter causing it to float to the surface where it can be removed by skimming. A coagulant is sometimes added to get heavier particles to settle so they can also be removed. Such systems can be effective, but obviously require a trained operator to oversee operation of the system. Unfortunately, the food processing plant did not always produce an acceptable effluent as the pre-treatment plant was not always operated satisfactorily. Prior to

construction of the pre-treatment plant, wastewater discharges with BODs exceeding 3,000 mg/L were common. Once the pre-treatment system was up and running, BODs were usually 500 to 700 mg/L and at times, even much lower. But there was no consistency in the remove of BOD and TSS.

### Enforcing Sewer Use Ordinance

Another option for ensuring commercial/industrial customers do not overload treatment facilities is to enforce the system's Sewer Use Ordinance. I have written past articles on this subject which were published in *The Kansas Lifeline*. What is a Sewer Use Ordinance (SUO)? A SUO establishes requirements for any customer wanting to use the city's sewage collection and treatment systems. It is a valuable tool for both

elected officials and operating staff. Nearly all cities and sewer districts in Kansas have a SUO, but occasionally staff members are not aware such an ordinance exists. If the system has ever applied for a grant or loan through KDHE to upgrade or build new collection or treatment systems, then that system likely has a SUO as it was a condition of funding. I encourage all operators to find a copy of their facility's SUO and read it, as it gives the system a considerable amount of responsibility and authority regarding operation of the sewer system.

A SUO regulates many aspects of the system's sewage system. But for this



One industry in Moundridge has an aerated attached-media basin, pre-treatment system for treating wastewater from a food processing customer prior to discharge to city.



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## Moundridge's Charges for Exceeding Limits Explained . . .

How does Moundridge calculate a customer's monthly sewer bill if they exceed limits for BOD, TSS or oil/grease? The limits are 300 mg/L for BOD, 350 mg/L for TSS and 100 mg/L for oil and grease. First, the city's Sewer Use Ordinance establishes the following "Extra Strength Unit Charges" if limits are exceed:

Type/Location of Customer	Charges Per Pounds
Inside City Limits	
BOD	\$0.11
TSS	\$0.08
Oil & Grease	\$1.69
Outside City Limits	
BOD	\$0.22
TSS	\$0.17
Oil & Grease	\$3.34

Then, the city uses the following formula to calculate the customer's Extra Strength Charge. The Extra Strength Charge is then added to the customer's monthly base charge, which in the case of commercial and industrial customers, is based on actual water used that month.

$$S = V(0.00834) [X (BOD - 300) + Y (TSS - 350) + Z (O\&G - 100)]$$

### Where:

- S = Extra strength sewer charge in dollars
- V = Sewage volume (based on water used during month)
- X = Applicable BOD unit charge in dollars/pound
- BOD = BOD concentration in mg/L based on sampling
- 300 = Allowable BOD concentration in mg/L
- Y = Applicable TSS unit charge in dollars/pound
- TSS = TSS concentration in mg/L based on sampling
- 350 = Allowable TSS concentration in mg/L
- Z = Applicable Oil & Grease unit charge in dollars/pound
- O&G = Oil and grease concentration based on sampling
- 100 = Allowable O&G concentration in mg/L

### Example Calculation of Extra Strength Charge:

Let's assume Customer A is within city limits and has a monthly flow of 20,000 gallons. Based on composite samples collected by city staff, Customer A has a discharge with a BOD concentration of 400 mg/L, a TSS concentration of 380 mg/L and an oil & grease concentration of 105 mg/L. Their Extra Strength Charge would be calculated as follows:

$$\begin{aligned} S &= V(0.00834) [X (BOD - 300) + Y (TSS - 350) + Z (O\&G - 100)] \\ S &= 20,000 (0.00834) [\$0.11(400-300) + \$0.08(380-350) + \$1.69(105-100)] \\ S &= 20,000 (0.00834) [\$11.00 + \$2.40 + \$8.45] \\ S &= 20,000 (0.00834) (\$21.85) \\ S &= \$3644.58 \end{aligned}$$

Assuming Customer A has a monthly base charge of \$1750.00, their monthly sewer charge (including Extra Strength Charge) would be:

$$\text{Total Monthly Bill: } \$1750.00 + \$3644.58 = \$5394.58$$

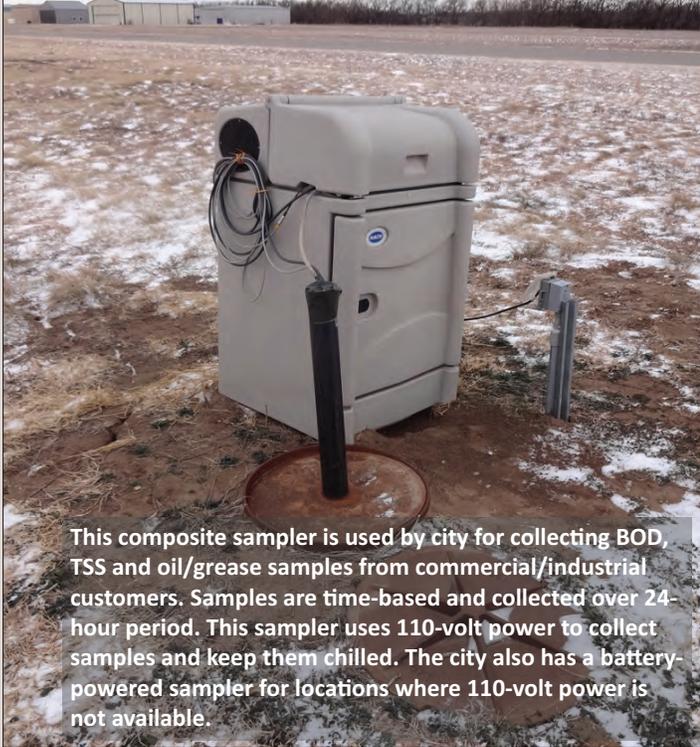
article I am specifically concerned about that section that addresses what can and cannot be discharged to the collection system. And more importantly, the maximum BOD, TSS and oil/grease concentrations that can be discharged by any customer, but especially commercial/industrial customers. SUOs set limits on the maximum BOD, TSS and oil/grease that can be discharged. That is rarely a problem with discharges from residences. But that may not be the case with commercial or industrial customers. In Moundridge's case, their SUO sets a maximum BOD discharge concentration of 300 mg/L, a maximum TSS concentration of 350 mg/L and a maximum oil and grease concentration of 100 mg/L.

If any discharges to the city's collection system exceed such limits, the city has four options:

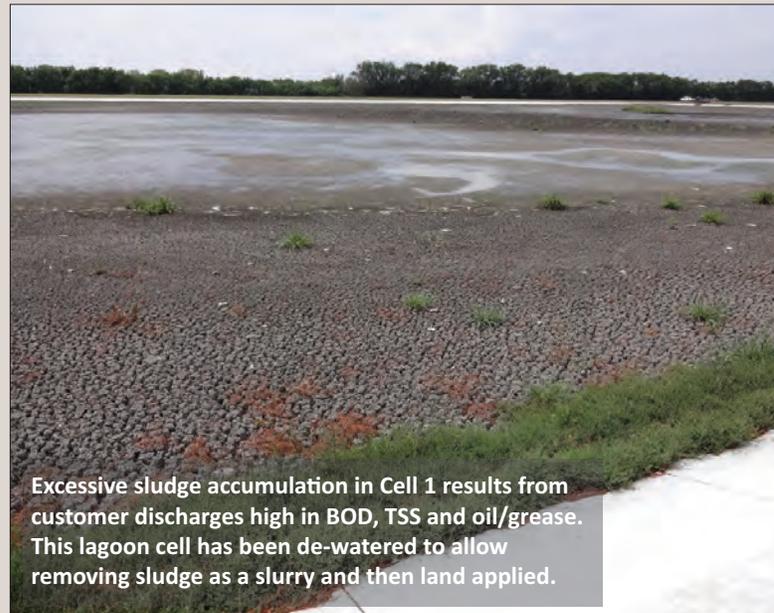
- ❖ Reject the waste, requiring the owner to find other means of proper disposal (usually not very practical)
- ❖ Require pretreatment to acceptable levels before discharge to the city.
- ❖ Require control over the quantities and rate of discharge
- ❖ Require payment to cover the added costs of handling and treating high-strength wastewater not covered by the city's existing sewer service charge.

### Adopting Extra Strength Charge

Since Moundridge had tried the first three options without the desired results, the city decided in September 2017 to pursue the last option: implementing an "Extra Strength Charge" on discharges that exceeded the aforementioned limits. And to date, the results have been very favorable for the city. When faced with a monthly sewer charge that could be twice or even three times their bill in the past, the food processing customer's pre-treatment system is now operated optimally in order to meet limits in the city's SUO. The city has also found other customers, primarily kitchens at nursing homes and other similar



This composite sampler is used by city for collecting BOD, TSS and oil/grease samples from commercial/industrial customers. Samples are time-based and collected over 24-hour period. This sampler uses 110-volt power to collect samples and keep them chilled. The city also has a battery-powered sampler for locations where 110-volt power is not available.



Excessive sludge accumulation in Cell 1 results from customer discharges high in BOD, TSS and oil/grease. This lagoon cell has been de-watered to allow removing sludge as a slurry and then land applied.

facilities, with high-strength discharges. Again, when faced with much higher sewer bills, such customers have found ways to reduce the strength of their discharges. In the case of kitchens, uneaten food is no longer flushed down the garbage disposal and kitchen sink. Instead, plates and trays are scraped clean so excess food is disposed of as solid waste that ends up at a landfill and not the city's sewer plant. Amazingly, it has made a huge difference in the quality of customer's discharges. It's clear that the customers will pay attention when their bottom line is affected.

In Moundridge's case, the goal was never to collect more revenue by increasing the monthly bills of commercial and industrial customers. The goal has always been to lower the BOD, TSS and oil/grease concentrations so that the city's treatment system could produce a good quality effluent and return to compliance with effluent limits. As Mike Stausz, supervisor of Moundridge's Street & Sewer Department, comments: "If you do the violating, then you will do the paying." So far, the Extra Strength Charge has worked well. And the city also likes to point out that such a system is fairer to all customers, especially residential

customers who contribute much lower strength discharges. Also, the city has seen lagoon influent BOD and TSS levels drop significantly. It is hoped the lagoon effluent will also improve eventually.

In closing, please contact me if your system needs help modifying sewer rates to better control high-strength discharges. I can be reached 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.*



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