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July 6, 2010

Mayor Delores Dalke and City Council
c/o Larry Paine, City Administrator
City Hall, PO Box 125
Hillsboro, Kansas 67063

Re: Wastewater Lagoon Odor Problems

Dear Larry:

On July 1, I received a call from Mike Duerksen that the city had received two more complaints about odors from your new, three-cell lagoon. Since I wasn't too far away, I headed toward Hillsboro and met Joe Alvarez at the lagoon around noon. Primary Cell 1 (north) was definitely experiencing problems. Wastewater in this cell had a neon-green color with floating black solids and a slight septic odor. Wastewater in Cell 1 also appeared to have minor amounts of blue-green algae which are often present in low oxygen environments. Dissolved oxygen (DO) levels were checked at a couple locations around the edge of this cell and ranged from 0.5 – 1.5 mg/L. These are very low DO levels for any lagoon in the middle of summer on a hot, sunny afternoon. Cell 2 (southeast) had DO levels around 9.7 mg/L which would be expected in such a situation. Finally, Cell 3 (southwest) had DO levels of 5.7 mg/L which are likely lower than Cell 2 due to less algae present. Fortunately, the lagoon effluent looked very good and appeared to be within range of permit limits. However due to the conditions in Cell 1, the following recommendations were offered to help improve the situation and prevent odor problems becoming even worse:

- The lagoon is presently operated in series. Divert some of the raw, influent flow from Cell 1 to Cell 2, thus placing less loading on Cell 1 and allowing it to recover. While on-site, Joe changed stop plates in the influent box to divert 40% of incoming flow to Cell 2. Cell 2 now needs to be watched very closely to ensure it does not also become organically overloaded and start producing offensive odors. I suggest checking all three cells daily for now, especially noting the color and odor of wastewater in Cell 2. Joe also mentioned the city has a YSI DO meter. It should be used daily to check oxygen levels in all three cells. Readings should be logged in, including the time of day DO was measured and whether it was sunny or cloudy.

- Add sodium nitrate at the rate of 100 pounds/acre to Cell 1 to help provide more oxygen for the bacteria in this cell to decompose incoming sewage. Since Cell 1 has about 16 surface acres, at least 1600 pounds should be added. Fortunately, the city had 2000 pounds stored at the old sewage treatment plant. According to Joe, all 2000 pounds were added that afternoon and the next day, DO readings were higher and a more sparkling, green color was present. I suggest adding

more sodium nitrate (50 pounds/acre) later this week if the situation demands it. Sodium nitrate is best added in the wake of a small motorboat; however, be carefully to not use a boat with too many horsepower as this can stir up solids on the bottom of the cell and actually make the situation worse. I also suggest that more sodium nitrate be ordered, as it likely will be needed in the future.

- Begin pumping wastewater from the northwest corner of Cell 2 over into Cell 1. Since wastewater in Cell 2 is high in dissolved oxygen and the type green algae needed to provide sufficient oxygen, transfer to Cell 1 should help in the recovery. I would not pump from Cell 3 as wastewater in this cell is very clear and does not have the type algae needed.

- Finally, the city needs to determine why the lagoon is experiencing problems with either organic overloading or introduction of a toxic substance. A brand new lagoon designed with excess capacity should not be having such problems in the middle of summer. This is the time of year when most lagoons operate best. Consequently, I recommend you begin sampling the decant from the city's pre-treatment plant that treats wastewater from the honey plant. Honey wastewater is hauled during the week to the pre-treatment plant. On the weekends, the aerator is turned off and solids allowed to settle before decanting and discharging to the influent lift station. The city needs to begin sampling flow from the pre-treatment plant when decanting and have analyzed for BOD and COD to determine if adequate pre-treatment is being provided. The city also needs to keep track of gallons discharged from the pre-treatment plant so that the organic loading from this process can be calculated. I also suggest staff begin setting up the composite sampler more often on the line from the honey plant. While past sampling indicates that this line carries primarily domestic waste from the honey plant, it also is tied into floor drains. Should the plant experience a spill, concentrated honey could be discharged directly into the city's collection system. Treatment of wastes such as honey is very difficult as it is a high oxygen-demanding waste, similar to treating blood from locker plants or milk/cheese wastes. It is possible that all excess capacity in the new lagoon (and possibly more) is being used to treat wastewater from the honey plant and the city needs to make that determination.

I will try to stop by again in the near future to see how the lagoon is progressing. If you have any comments or questions concerning this letter, please feel free to contact me at 913-850-8822 or jeff@krwa.net.

Sincerely,

Jeff Lamfers
Consultant

c: Mike Duerksen, Superintendent
Karl Mueldener, KDHE, Topeka
Marsha Carpenter, KDHE, Salina
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