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May 25, 2010

Dave Adams
City of Kanorado
PO Box 68
Kanorado, KS 67741

Dear Brian,

As requested, I conducted a sludge profile of your wastewater stabilization ponds on May 17, 2010. The enclosed report summarizes my findings.

We took 32 measurements in the Middle (#2) cell, the only being used. The average sludge depth in this cell was 8.88 inches. This cell was being operated at a depth of 7 feet. The loss of capacity due to sludge accumulation is 10.57 percent. The depth of heavy sludge averaged about 4 inches.

I do not believe removal is warranted given the limited amount of heavy sludge in the lagoons. Sludge removal is usually only necessary in a non-discharging system when the system has constant odor problems. The odors will usually only occur when approximately 25 percent of lagoon capacity is lost due to sludge accumulation. Other factors include system design and capacity. Also the lighter sludge will be consumed by bacteria to make the heavy sludge and this heavy sludge is what needs to be concerned with removal. Sludge removal project can be a significant expense and should be budgeted for with monies set aside for the project.

While there we reviewed how the cells are operating. It appears that the pipe between cells 2 and 1 may be plugged due to the operational depth of 7 feet without flow going to cell #1. This pipe may just have debris over the end such as when riprap was added; some rocks could have rolled and covered the end of the pipe. Most permits require that when the depth from water level to the top of dike is less than 2 feet, called "free board" that KDHE be notified.

You may also want to make Cell #1 usable by filling in the animal holes and resealing the cell with material such as bentonite clay. Riprap could be added to this cell at that time. The gate between cell 1 and cell 2 needs to be repaired to make sure you can maintain a depth of 5 to 6 feet in the primary cell used to maintain the more than 2 feet freeboard required by permit.

Your average water usage for Jan- March is 650,000 gallons. I used this to determine flow into the system. This does not take in to account rain fall or evaporation or seepage. This figures to be 7,800,000 gallons per year. Your cells at approximately 2.35 acres each, 7.06 acres total. Capacity per cell at 5 feet operating depth is 3,828,749 and net evaporation rate in your area is 44 inches, which is about 2,680,124 gallons per year. Using these figures, your system, operating at 5 feet depth in the primary used cell, may have about 2 feet of water in the second cell. If your system has seepage of only 1/16 of inch daily, allowed is 1/8 inch, your system would not have any water in the second cell. Due to the last few years being higher in rainfall events the net evaporation rate will be significantly less than normal.

To reaffirm, this letter's basic statement, I do not believe sludge needs to be removed. The pipe between cells one and two needs to be cleaned or possibly may have debris removed from in front of pipe between cells. The south cell should have the animal holes repaired and reseal the cell so it can be used, possibly adding riprap for erosion control. Repair gate between cell 1 and 2 so depth can be maintained at 5 feet to keep free board at more than the minimal 2 feet. I also recommend that you read your KDHE inspection reports that are done approximately every 4-5 years. You should also contact your KDHE district office to notify them about the free board being fewer than 2 feet and any other suggestions they may have.

I hope this helps, please call if you have any questions. KRWA appreciates the opportunity to provide assistance to your system and your support as members.

Sincerely,

Charlie Schwindamann
Wastewater Tech

Enclosure

CS:ejr

c: Susan Adams, City Clerk
Norbert Windholz, KDHE, Hays

Middle Cell

Top is North

8"	6"	6"
	8"	
8"	6"	6"
	6"	6"
8"	8"	8"
	8"	
6"	8"	6"
	8"	
8"	16"	6"
	24"	
8"	24"	8"
	8"	
8"	6"	10"
	6"	
8"	6"	18"

Average Sludge Depth: 8.88 inches

Cell Operating Depth: 7 feet