

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

GUIDANCE FOR

DESLUDGING DOMESTIC WASTEWATER LAGOONS

BY

DRYING THE SLUDGE BEFORE REMOVAL

NOTE: Within the KDHE Northeast, Southeast, and South Central Districts, drying sludge on the lagoon floor prior to removal may not be successful without considerable effort because of the higher rainfall and more humid climatic conditions. Desludging by dredging may be more successful.

Desludging of the primary cell of a domestic wastewater treatment lagoon is generally required every 15 to 25 years to return the facility to its normal rated design capacity. Removal of sludge increases treatment effectiveness by increasing the hydraulic capacity (and therefore, retention time), removing a buildup of nutrients and reducing the potential for short circuiting within the cell.

The desludging operation will require assessing the amount of sludge to be removed, routing wastewater flow around the cell to be desludged, removing the excess water, working the sludge to promote faster drying, removing and disposing of the sludge, repairing the dikes, floor and inlet/outlet structures (if necessary), and returning the facility to normal operation. Upgrades to the normal entrance and exit piping to the lagoon cell to reduce short circuiting and placement/repair of rip-rap should be accomplished during this time, if needed.

Generally, within the eastern half of the state, owners of wastewater treatment lagoons can not expect to desludge more than one cell per summer season. Within the western half of the state, owners of wastewater treatment lagoons may be able to desludge two cells per summer season provided they actively work the sludge in the cells during the drying period. KDHE will not allow more than one cell of a two or three cell lagoon facility to be taken out of service at one time. Furthermore, KDHE will not allow a cell to remain out of service during the winter and spring seasons when treatment capacity is most needed from this type of facility.

Details of the arrangements to desludge a domestic wastewater treatment facility lagoon cell by drying the sludge before removal are discussed below.

ADVANCED PREPARATION

1. Determine the sludge accumulation profile in the lagoon cell by use of a “sludge-judge” or similar suitable equipment. From these measurements, estimate the amount of sludge to be removed. It should be noted this measurement is “wet solids,” and dry solids material to actually be removed will be significantly less than “wet solids.”

2. Notify the appropriate district office of the Kansas Department of Health and Environment of the intentions to desludge the wastewater treatment lagoon cell and receive permission to remove a portion of the facility from service. The following information must be provided:
 - A. The cell to be desludged and the estimated amount of sludge in the cell.
 - B. The wastewater flow route through the facility during the bypass operation and the expected duration of the bypass operations. (An overhead sketch or website overhead view of the lagoon treatment center is recommended.)

Normally, KDHE will require the permittee to wait until the spring rains are over before beginning the flow rerouting operations. The desludging operation shall be complete and the facility returned to normal operation as soon as possible but not later than November 1 of the same year.

- C. Determine who will have project oversight and day-to-day responsibilities (the city, county, contractor or local citizen).
- D. Check with KDHE to determine if more frequent monitoring of the effluent and additional test parameters may be required during the desludging operation.
- E. Final disposition of the sludge.

Provide a complete description of the disposal site area and method of sludge disposal. The district office will normally visit the disposal site to determine its suitability for sludge disposal. Testing of the soil at the land application site may be required depending on the amount of sludge to be disposed and the site acreage.

- F. Testing of the sludge and completing the appropriate sludge disposal/re-use forms prior to and after the desludging operation is required. The completed form is to be sent to the appropriate KDHE district office.
- G. Desludging guidance documents and the Kansas Domestic Sewage Sludge Re-use and Disposal Guidance for Desludging Lagoons form are available for downloading at www.kdheks.gov/water/tech.html

3. Check that the cell to be desludged can be isolated from the adjacent cells and the temporary flow routing to bypass the treatment cell is feasible (valves operable/control boxes accessible and planks removable, additional planks available; sandbags may be needed to completely stop flow into the cell to be desludged).

DEWATERING OPERATIONS

4. After wastewater flow has been routed around the cell to be desludged and this cell is isolated from any incoming flow, the excess water is to be removed in a controlled manner.
 - A. Allow the contents in the cell to be desludged to “age” undisturbed for one week to improve treatment quality of the wastewater.
 - B. Gradually drain or pump the water level down (faster at first and then slower as the bottom is approached to avoid dragging solids out). This should take five to ten days to avoid upsetting the receiving stream. The discharge location should be discussed with KDHE district staff.
 - C. When as much “clear” water is removed as possible, pump the remaining water from the cell to be desludged back to the cell currently receiving the raw sewage influent. The pump suction must be suspended above the lagoon floor to avoid pumping solids from the bottom of the cell to be desludged, and the discharge line is to be placed as far away as possible from the receiving cell outlet to avoid short circuiting the wastewater across the receiving cell. (This allows any sludge which gets pumped to settle in the receiving cell and not exit to the receiving stream.)

SLUDGE DRYING

5. Allow the sludge in the bottom of the cell to dry. When it gets dry enough to work, using a small tractor, disk or cultivate the dry crust to expose the wet sludge underneath. This activity must be done to expeditiously dry the sludge and return the facility to normal operation as soon as possible. The sludge should be turned at least twice a week. (Be careful not to damage the clay liner (compacted soil) in the bottom of the cell. The clay liner is natural clay or bentonite and is readily discernible from the grainy (mainly sand and dirt) bottom sludge.)

6. Any other improvements to the inlet, outlet or intercell structures should be completed during the drying period.
7. As soon as the sludge is dry enough to effectively handle, it should be removed and properly disposed.
 - A. Sludge disposal shall be in conformity with the EPA Part 503 regulations.
 - B. KDHE expects the sludge to be transported directly to the disposal site. The Department generally will not approve a plan in which the sludge is to be temporarily stored (15 days or more) without specific and substantial reasons. KDHE will not approve storage or disposal in permanent sludge lagoons.

RETURNING THE FACILITY TO NORMAL SERVICE

8. After the sludge is removed, repairs to the interior of the dikes, the area where vehicles entered or exited the cell and the lagoon floor should be completed. (If, during the removal of the sludge, the clay floor was smeared over or if the floor was allowed to dry and crack, it should be lightly disked about one to two inches deep and re-compacted to assure that the floor re-seals.) Rip-rap may be placed along the edges of the lagoon if desired.
9. When the facility is to be returned to normal service, wastewater from the current raw sewage receiving cell should be allowed to flow (or backflow) to the desludged cell. This should be done slowly to avoid drawing sludge into the desludged cell. After one to two feet of wastewater is in the desludged cell, the raw sewage influent can be switched to the desludged cell and the cell allowed to fill to its normal operating level. After this cell is at the normal operating level, the facility can be returned to normal operation.

ATTACHMENT 1

TABLE A

SOIL AND SLUDGE TESTING REQUIREMENTS

<u>SOIL TESTS</u>	<u>SLUDGE / BIOSOLIDS TESTS</u>
Use a laboratory skilled in soil testing	% Solids
Nitrate Nitrogen	
Available Phosphorus	Total Kjeldahl Nitrogen as N*
Exchangeable Potassium	Ammonium Nitrogen as N*
pH	Nitrate – Nitrogen as N*
	Total Phosphorus*
	Heavy Metals as listed in Table B

*Not required if using the 2.0 dry tons/acre default land application loading rate

TABLE B

LAND APPLICATION POLLUTANT LIMITS FOR SEWAGE SLUDGE/BIOSOLIDS

<u>POLLUTANT</u>	<u>CEILING CONCENTRATION LIMITS – mg/kg (dry wt.) *</u>	<u>POLLUTANT CONCENTRATION LIMITS – mg/kg (dry wt.)</u>	<u>CUMULATIVE POLLUTANT LOADING RATE LIMITS – lbs/acre**</u>
Arsenic	75	41	36
Cadmium	85	39	34
Copper	4,300	1,500	1,320
Lead	840	300	264
Mercury	57	17	15
Molybdenum	75	-	-
Nickel	420	420	370
Selenium	100	36	88
Zinc	7,500	2,800	2,464

* All sewage sludge samples must be equal to or less than the Ceiling Concentrations to be eligible for land application.

** Calculation need not be done if using the 2.0 dry tons/acre default land application rate.