

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

GUIDANCE FOR

DESLUDGING DOMESTIC WASTEWATER LAGOONS BY DREDGING THE SLUDGE FROM THE CELL

Desludging of the cells 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.

Desludging by dredging will require determining the amount of sludge to be removed, selecting a suitable land application site, determining the method of disposal, procuring the services of a dredging company, placing the dredging equipment in the cell, re-routing flow away from the cell to be desludged, proper disposal of the sludge-wastewater mixture, removing the dredging equipment, repairing damage to the dikes and returning the facility to normal operation.

Since desludging by dredging is a reasonably quick operation and the cost of moving the dredging equipment on/off-site is high, KDHE expects the permittee to complete all desludging operations for the treatment facility as one continuous project.

Details of desludging a domestic wastewater treatment facility by dredging the sludge are discussed below.

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 wet sludge to be removed.
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

Provide the following information:

- A. The treatment plant layout, the cell to be desludged and the estimated amount of sludge in the cell.
- B. The wastewater route through the facility during the desludging process and the expected duration of the desludging operation. (A sketch or drawing is recommended.) Depending on the intended disposition of the sludge, KDHE may require the permittee to wait until the spring rains are over before beginning the flow re-routing operation. The desludging operation shall be complete and the facility returned to normal operation as soon as possible.
- 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 land application area and method of sludge application/disposal. The district office or a KDHE contractor may visit the land application site to determine its suitability for sludge application. Testing at the land application site may be required depending on the loading rate (dry tons/acre) of sludge to be land applied/disposed and the site characteristics.
 - F. Testing of the sludge and completing the appropriate sludge land application/disposal forms prior to and after the desludging operation is required. See Attachment 1 for test requirements for wastewater treatment lagoon sludge disposed by land application.
3. Generally acceptable options for desludging a domestic wastewater treatment lagoon cell by dredging are:
- A. Isolating the cell from the other cells, dredging the sludge/water mixture out directly to the land application area while allowing the water level in the cell to drop. This method requires the operator of the dredge to frequently adjust the depth of the dredge head to assure that the bottom of the lagoon cell is not damaged and assumes that adequate water level will be available at all times to operate and maneuver the barge.
 - B. Isolating the cell from the other cells, dredging the sludge/water mixture out to a thickening device and allowing the excess water to return to the isolated cell. This method maintains a relatively constant level in the isolated cell making the dredging easier but may return some of the “light sludge” back to the cell being desludged depending on the efficiency of the thickening device.
 - C. Rerouting the flow through the facility such that the treated wastewater from the final cell is allowed to backflow (or is pumped) into the cell being desludged. This method maintains an essentially constant water level in the cell being desludged and can be used in conjunction with methods A and B above. (Depending on the size of the lagoon cells and placement of the influent and effluent structures, KDHE may approve the use of partially treated wastewater from the primary cell to maintain water level in the cell being desludged. However, additional site management and access restrictions may be required.)

Routing raw untreated sewage directly to the cell to be desludged is an unacceptable practice and will not be approved by KDHE.

- D. KDHE will review other methods of sludge removal by dredging and approve/disapprove them on a case-by-case basis.
 - E. KDHE currently does not approve removal of sludge by use of a “clam shell” unless the wastewater is drawn down to expose the sludge and the permittee is prepared to repair the gouges and re-work the lagoon floor as necessary to assure the floor re-seals properly and bottom-contour-created channeling does not occur when the cell is returned to service.
4. After the method of removal has been determined and approved by KDHE, check that the cell to be desludged can be isolated (if isolation is required) and the temporary bypass and/or backflow routing is feasible (valves operable/control boxes accessible and planks removable, additional planks available).
5. The most important item to successfully implement this method of sludge removal is the selection of the proper land application site. The land application site should be selected based upon the requirements listed below.
- A. Sludge disposal by land application shall be in conformity with EPA Part 503 regulations as provided in the guidance document Domestic Sewage Sludge Re-use and Disposal Guidance for Desludging Lagoons.
 - B. KDHE expects the sludge to be transported directly to the land application site. The Department generally will not approve a plan in which the sludge is to be temporarily stored without specific and substantial reasons. KDHE will not approve storage in permanent or semi-permanent sludge lagoons.
 - C. Since this method results in the transportation of a significant amount of water, the problem of water retention at the land application site (or collection and removal to another land application site) is of major importance.

If the land application area is sufficiently large and flat such that the excess water does not significantly pond nor runoff the land application area, no collection or monitoring of the wastewater will be required.

If the land application area is too small to handle the excess wastewater without significant ponding or runoff, a containment and testing program may be necessary. If methods 3A or 3B are used, it is quite likely that the excess water can be released to a receiving stream provided it is sufficiently filtered (as through a grassy pasture) or settled (as in a settling basin) to reduce the Total Suspended Solids level. If method 3C is used, the partially treated wastewater may not undergo sufficient treatment during the sludge removal process to be suitable for release to a receiving stream without further treatment. In this case, the wastewater may need to be collected and pumped back to the head of the treatment facility.

6. Care must be taken to assure that the clay liner on the dikes and bottom of the cell will not be damaged by the dredge head. (The clay liner is natural clay or bentonite and is readily discernible from the grainy (mainly sand and dirt) sludge on the bottom of the lagoon cell.)
7. After the sludge is removed and the dredging equipment is recovered, repairs to the dikes caused by the dredging operation must be completed.
8. The facility must be returned to normal operation as soon as possible.

ATTACHMENT 1TABLE ASOIL 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 BLAND 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.