



Land Application of Sludge from Municipal Lagoons and Compliance with the Part 503 Biosolids Rule

Equipment with either rubber tires or treads is often used to push sludge, in slurry form, to one corner of the cell to then be either pumped directly to the land application site or to tanker trucks for hauling to the site.

Fortunately, most small communities served by lagoons will never have to initiate a project to remove sludge from their lagoon. However those communities that must due to compliance issues, will find that removing sludge from a municipal lagoon is both expensive and well regulated. I am often asked what regulations must wastewater systems comply with in order to remove and land apply sludge from a lagoon system. The purpose of this article is to hopefully answer that question.

As required by the 1987 Amendments to the Clean Water Act, EPA developed new regulations to protect both public health and the environment from any adverse effects caused by pollutants found in sewage sludge (biosolids). **The Standards for the Use or Disposal of Sewage Sludge** (Title 40 of the Code of Federal

Regulations [CFR], Part 503) was published in the **Federal Register** on February 19, 1993. It became effective on May 22, 1993. The regulation is usually referred to as “Part 503” or “The Part 503 Biosolids Rule.” The purpose of the rule is to regulate and promote the beneficial use of biosolids, with one of those beneficial uses being land application. Land application of biosolids provides the benefits of both conditioning and fertilizing the soil.

EPA’s Part 503 Biosolids Rule regulates the land application of sludge from municipal sewage lagoons. This is the same rule that also regulates the routine processing and land application of sludge from mechanical plants. While lagoon sludge removal is less frequent, it must still meet some of the same requirements made of mechanical

plants. Fortunately in Kansas, KDHE and EPA Region 7 have an agreement that excludes municipal lagoons from some of the Part 503 requirements. These exclusions only apply to municipal lagoons that have not been desludged for more than fifteen years. The two exclusions involve meeting the Class B Pathogen Reduction requirement and the Vector Attraction Reduction requirement. The agreement simply confirms that sludge that has been in a lagoon for 15 years or more has gone through sufficient treatment so the concentration of pathogens such as fecal coliform has been adequately reduced. Furthermore, such treatment should also stabilize the sludge and reduce the properties that would make such sludge attractive to vectors such as insects, birds, rodents, etc.

Consequently, additional testing or treatment to reduce pathogens and/or properties that attract vectors is neither needed nor required.

However, municipal lagoon sludge must still meet the remaining requirements of the Part 503 Biosolids Rule. These include:

- ◆ Complying with required management practices and site restrictions at each application site
- ◆ Applying at the approved agronomic nitrogen rate (unless KDHE's default application rate is used)
- ◆ Meeting the Pollutant Metals Ceiling Limits

Management practices and site restrictions

To better understand what documentation must be provided, I suggest checking the KDHE website for the appropriate forms that must be submitted if land applying sludge from a municipal lagoon. They can be found under the KDHE Bureau of Water, Technical Services Section. The first part of the "Domestic Sewage Sludge Re-Use and Disposal Guidance for Desludging Lagoons" form requires site descriptions for each land application site to be used. KDHE requests the name of the property owner, acres to be used for sludge disposal, legal description and directions from town or other significant landmark. A map should also be provided showing the land application site. The management practices part of the form asks questions such as:

- ◆ Will land application of sludge cause adverse effects to threatened or endangered species of plant, fish or wildlife?
- ◆ Will sludge be applied to flooded, frozen or snow-covered ground and if so, what measures will be taken to ensure no runoff into nearby streams, creeks, etc.?
- ◆ Will sludge be applied a minimum 10 meters (33 feet) from nearby streams, creeks, etc.?



This tractor with injection system is used to "knife" the sludge under the ground surface. While surface application is allowed, injecting or disking is a better option as it reduces the possibility of runoff and odor complaints.

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- ◆ Will sludge be applied on land used to grow food crops? Such application is not allowed without KDHE approval. (Food crops are crops grown for direct human consumption, eaten either raw or with little processing such as tomatoes, potatoes and sweet corn).

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- ◆ Will animal feed crops (such as corn, milo, wheat stubble, soybeans, grasses, hay alfalfa, etc.) be grown on the site receiving sludge? If so, harvesting is prohibited for 30 days after application.
- ◆ Will animals be allowed to graze on the site receiving sludge? If so, grazing is prohibited for 30 days after application.
- ◆ Is turf grown on the site receiving sludge? If so, turf cannot be harvested for one year after application.
- ◆ Does the land application site present a high or low potential for public access? If high potential (public parks, ball fields, cemeteries, school grounds, etc.), public access must be restricted for one year after application. If low potential (private or public lands where access is discouraged by physical barriers, trespassing laws or remoteness), public access must be restricted for 30 days after application.

It should be noted that in most cases, sludge is land applied during the

summer in rural areas near the lagoon, on either cropland or pasture that is privately-owned. So most of the aforementioned restrictions are not major concerns. Runoff concerns become even less if the sludge is either injected or disked in after surface application. Regardless, KDHE's form requires a response to these questions.

Determining agronomic loading rate

The purpose of determining the agronomic loading rate is to ensure that the amount of nitrogen provided by land applying sludge, does not exceed that needed by the next crop planted and to minimize the amount of nitrogen that passes below the plant root zone and onto groundwater. KDHE allows two options when deciding how to comply with the agronomic loading rate. The easiest is to use KDHE's

default loading rate which is a maximum 2.0 dry tons of sludge per acre. I would encourage using this loading rate if at all possible. Those systems that have a considerable amount of land available in relation to the amount of sludge to be applied, usually use the default loading rate. Less testing of sludge and soil are required. The system also does not have to perform any calculations for determining the maximum application rate allowed.

Pollutant Metal	Ceiling Concentration (mg/kg dry basis)
Arsenic	75
Cadmium	85
Copper	4300
Lead	840
Mercury	57
Molybdenum	75
Nickel	420
Selenium	100
Zinc	7500

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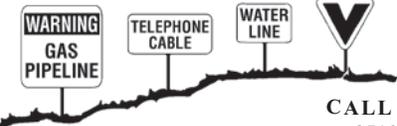
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If the land application site is several miles from the lagoon, an interim pumping station may be necessary. Pumping directly to the site is the best option if at all possible. It is faster and less expensive and also eliminates the possibility of spilling sludge on area roads.

However, if an abundance of land is not available and the system wishes to apply more gallons of sludge per acre, then the KDHE form allows for calculating the maximum amount of sludge allowed per acre without over applying nitrogen. The advantage of calculating the agronomic rate is that the property owner receives the maximum benefit in terms of nutrients. Most lagoon systems do not calculate the agronomic rate, but instead use the default rate of 2.0 dry tons/acre. This is because there is usually more than enough acres to apply the sludge and not exceed the default loading rate.

Meeting Pollutant Metals Ceiling Limits

Lastly, all sludge that is land applied from municipal lagoons must be tested by a KDHE-certified laboratory for nine heavy metals. Each of the metals has a ceiling limit that cannot be exceeded if the sludge is to be land applied. See Table 1 on the previous page for those limits. The purpose of such testing is to ensure that metals do not enter the food chain and cause adverse health effects. Mechanical plants that land apply sludge routinely must also calculate a cumulative

Most small systems have no problems meeting the metals ceiling limits. In fact, the highest metals' result is usually copper, likely from household plumbing systems – but again, never over the ceiling limit for copper.

pollutant metals loading rate. But this calculation is not required for land application sites used only for a one-time desludging of a lagoon.

Most small systems have no problems meeting the metals ceiling limits. In fact, the highest metals' result is usually copper, likely from household plumbing systems – but again, never over the ceiling limit for copper. Those systems that usually have problems meeting one of the metals limits are communities that either have or have had in the past, some kind of metal plating operation that discharged to the city's collection system. I can only recall two systems that have had

problems meeting the metals limits and both of them had a privately-owned metal plating operation at one time. If any of the metals limits are exceeded, the sludge cannot be land applied. Other options include dewatering and hauling to an approved landfill for disposal. Obviously, not being able to land apply the lagoon sludge results in a much more costly project for the system.

Should your community be faced with a lagoon sludge removal project in the future, please feel free to contact me. I can be reached at 913-850-8822 or jeff@krwa.net. You can also contact KDHE for assistance. The KDHE contact concerning the Part 503 Biosolids Rule is Arthur Fink. Arthur can be reached at either 785-296-5528 or afink@kdheks.gov.

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.



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