Chapter 14

Good and Bad Practices of Soil and Septage Waste Management

14.1 Is it Too Wet to Land Apply Septage Waste?

Determining the Moisture Content of Soils Used for Land Application of Septage Waste

During winter or early spring, one of the frequent questions asked by haulers who land apply septage wastes, “Is the soil dry enough for me to land apply septage waste?” The general response provided is “When you see the farmers start working their fields for crop production in the spring that is a good time, depending on the type of soils.”

Soils are usually very wet during the winter months and early spring. The degree of wetness will depend on the type of soil. Tillage operations such as surface application followed by incorporation and subsurface injection conducted when soils are wet will result in soil compaction and poor plant growth. It is important to determine the moisture content of soils before land applying septage waste in the winter or spring months using the plastic limit method. The plastic limit is also used as a tool to protect soils in areas for mound systems for disposal of on-site wastewater.

Plastic Limit Method

Plastic limit is the moisture content of a soil at which it starts to crumble when rolled into a thin ¼ inch rod, like the shape of a pencil.

Field Procedure [1, 2]

1. Grab a handful of soil from the plow layer (0 to 10 inches deep).
2. Roll it between the palms of the hands to form a thin uniform diameter to pass through ¼ inch or smaller wire mesh.
3. If the soil crumbles, it is at its plastic limit so it can be worked. If it does not crumble, it is below its plastic limit and it is too wet to work the soil for septage application purposes.
4. Repeat steps 1 through 3 randomly at various locations of the field.

Am I Applying Too Much Septage Waste to the Soil at a Given Time?

Hydraulic Loading Rate

In simple terms, the hydraulic loading rate of a soil is the quantity of liquid, for example, water that can be absorbed by a certain quantity of soil within a given period of time. It is usually expressed as gallons per day per square feet. In other words, how much liquid can one put into a certain area of land without creating a puddle.

For haulers who land apply septage waste, it is important to know the type of soil in the field, the area of application and how much liquid can be applied to it in one day. This concept is generally used in the installation of on-site wastewater systems.

There is a different hydraulic loading rate for different types of soils. It is important to determine the loading rate for the type of soils at your land site if you intend to apply large amounts of septage waste in a short period of time. This is especially relevant to haulers that land apply holding tank waste.

14.2 Good and Bad Practices of Soil Management at Land Application Sites - Summary

It is important to reduce the frequency of vehicular traffic over the area where septage waste is applied. Vehicular traffic and application of septage waste during inclement weather can have serious effects on the physical properties of the soil and the environment (Table 14-1).

Table 14-1. Practical Management of Soils at Land Sites.

Bad Practice	Effects
Haphazard movement of septage applicator truck all over the field under wet, sometimes saturated, or snow covered conditions in fall, winter, and spring. Frequent trips to the same field per day or week. No grasses and legumes in the rotation of crops for improved nutrient recycling, e.g., nitrogen and phosphorus. Little or no erosion control plan at land site. No uniform septage application over the field.	Soil compaction. Destruction of soil structure. Reduction of pore space. Poor or stunted crop growth. Loss of soil particles and septage attached to them. Poor growth » low crop yields » low agronomic application rate.
Good Practice	**Effects**
Plan septage applicator truck movement along defined paths in the field when the soils are not wet, saturated, or snow covered. Reduce number of trips to the same field per day or week. Introduce grasses and legumes into the rotation of crops at some point to improve nutrient recycling. e.g., nitrogen and phosphorus. Adopt erosion control plan suitable for the land site. Apply septage uniformly using splash plate or other device over the field. Use authorized septage storage facility	Reduction of soil compaction. Improvement of soil structure. More pore space with air and water. Good crop growth. Reduction of soil loss and septage from land site. Able to manage when to apply septage and when to stay off the field. Good growth » high crop yield » high agronomic application rate.

14.3 Good and Bad Practices of Septage Waste Management at Land Application Sites – Summary

Proper subsurface injection and incorporation after surface application of septage waste are practical methods of reducing septage movement away from application areas (Table 14-2). They are also efficient pathogen and vector attraction reduction methods. Subsurface injection of septage waste that bubbles to the surface shall be incorporated just like surface application.

Table 14-2. Practical Septage Waste Management at Land Sites.

Bad Practice	Effects
Septage waste still left on soil surface due to improper incorporation or injection, e.g., ponding. Ponding: Liquid on soil surface after: 1 hour - Injection 6 hours – Surface Application of septage waste to site with slope greater than 6% (surface) or 12% (injection). Application of septage waste in the same direction of the flow of water.	Septage waste is likely to be carried by storm water runoff or melted snow to adjacent properties, roads, or waters. Too much septage applied to the field can also result in runoff.
Good Practice	**Effects**
After incorporation or injection, get down from vehicle and evaluate operation before leaving site. Disc again to incorporate properly. If ponding is occurring, adjust injector to penetrate deeper into the soil. Measure slope if not sure. Apply to slope not greater than 6% (surface) or 12% (injection). Apply septage and incorporate or inject perpendicular to slope.	Septage waste is less likely to be carried away from the application site to neighboring areas if: • Properly incorporated or injected. • Applied at proper slopes. • Applied across (or perpendicular to) slopes. • Followed by seeding at the proper time.

14.4 References

1. Western Alliance for Quality Transportation Construction (WAQTC). 2003. Determining the Plastic Limit and Plasticity of Index Soils FOP for AASHTO T90.

2. Michigan Department of Environmental Quality. 2003. Pressure Mound Systems. Technical Guidance for Sire Suitability, Design, Construction and Operation and Maintenance.