Guidelines for the Land Application of Domestic Septage at Agronomic Rates in Georgia

Introduction, Intent and Use of These Guidelines, Permitting Tiers

The Georgia Environmental Protection Division (EPD) of the Department of Natural Resources may permit the land application of domestic septage under controlled conditions. While solids from septage are nutrient-rich organic materials that will provide nitrogen and phosphorus as well as trace amounts of micronutrients, they may also contain pathogens or other contaminants that could potentially harm plants, animals, or humans if applied at an excessive rate, to an unsuitable site, or if managed improperly during and after land application. The objective of these guidelines is to safely allow for the utilization of the nutrients and other beneficial properties of septage while ensuring that public health and welfare of the population is protected. This document is commonly referred to as the "Septage Guidelines" in other EPD documents including the checklists for submitting a Septage Management Plan (SMP). Note that there are separate checklists for Tier 1 and Tier 2* facilities. The information in this guidance is applicable to all land application sites unless otherwise noted. If there are differing requirements or procedures they will be noted according to the permitting "tier" to which they apply. EPD currently permits one tier of operation (Tier 1) and will develop a general permit for Tier 2 operations. The two tiers of operations can be found in the Georgia Rules (hereinafter Rule) Chapter 391-3-6-.23.:

- Tier 1 Operations – single septic pumper applying to a site
- Tier 2 Operations – multiple septic pumpers applying to a site

Refer to the EPD document "Procedures for Obtaining an EPD Permit to Land Apply Domestic Septage in Georgia" for full details on the permitting process for domestic septage land application sites.

What is Domestic Septage?

Domestic septage is defined as any liquid or solid material removed from a septic tank, cesspool, portable toilet, type III marine sanitation device, or a similar system that receives only domestic sewage. Domestic septage does not include liquid or solid materials removed from a septic tank or similar treatment works that receives either commercial wastewater or industrial wastewater. Domestic septage does not include grease removed form a grease trap (Georgia Department of Natural Resources Rule 391-3-6-.23).

Grit and screenings, and any domestic septage that is combined with commercial, industrial or hazardous wastes, is not considered domestic septage and may not be land applied with a land application permit for domestic septage.

*Georgia EPD has not developed a General Permit for Tier 2 operations.

Disposal of Domestic Septage in Georgia

Septage removal and disposal contractors may only legally dispose of domestic septage in three approved ways in Georgia. The first option is to take the material to a county, municipal, or otherwise approved wastewater treatment facility permitted by EPD where it can be properly treated. The second option is disposal at a permitted separate septage handling facility. And the third option is via land application at sites with a low potential for public exposure that have been specifically permitted by EPD for handling septage. Land with a low potential for public exposure is land that the public uses infrequently. This includes, but is not limited to, agricultural land, forest, and a reclamation site located in an unpopulated area.

Requirements For Land Application of Septage

To protect public health and the environment, there are several requirements that must be met in order for septage to be land applied. These are discussed as follows:

- Pretreatment (Screening and stabilization)
- Vector Attraction Reduction,
- Pathogen Control,
- Agronomic application rate and crop planning
- Other site restrictions

Pretreatment (Screening and Stabilization)

At a minimum, pretreatment consisting of screening and stabilization (lime stabilization) must be provided at the land disposal site, as described below.

Screening: The septage must be screened to remove foreign or non-organic material such as trash or other non-biodegradable objects using a ¼-inch mesh maximum screen size for screening. No grinding of septage is permitted.

Lime stabilization: All septage must undergo stabilization within six hours of arrival at the facility. A minimum of 50 lbs. of lime per 1000 gallons is to be used. Adhere to lime storage and mixing procedures in the approved SMP. Stabilization does not take the place of the pathogen and vector attraction reduction requirements described in Rule 391-3-6-.23(8) and (9).

Note: Hydrated lime is calcium hydroxide that is roughly 70% calcium oxide and 25% chemically combined water. It is the preferred method for stabilization. Hydrated lime is typically preferred to condition and/or stabilize septage because of its availability, low cost, and ease of handling. Quicklime is 100% calcium oxide. It is more corrosive than hydrated lime and is reactive when mixed with water,

producing excessive heat. Quicklime should never be added to a septic tank or pumper truck for this reason. Agricultural lime (calcium carbonate) does not have the strength or potency needed to condition septage.

Vector Attraction Reduction

Vectors are organisms such as mosquitoes, flies, or rodents that can spread disease by carrying and transferring pathogens. The Vector Attraction Reduction (VAR) requirement is necessary to reduce the potential for attracting these disease-carrying vectors.

Land application of domestic septage must meet one of the following two options for meeting VAR requirements in Georgia. These are:

1. *Subsurface injection*: Domestic septage shall be injected below the surface of the land and no significant amount of septage shall be present on the land surface within one hour after septage is injected. Injection may be accomplished by any device(s) that place the septage beneath the soil in a narrow trench at a depth of no greater than 18 inches and promptly replaces the cover soil in the same action of trenching and placing septage. Excavation of a trench followed by placement of septage and later covering of the trench is not considered injection.

2. *Incorporation*: Domestic septage applied to the surface of the land shall be incorporated into the soil within **six hours** after septage application.

Pathogen Control

Pathogens are disease-causing organisms such as bacteria, viruses, and parasites that may be present in septage. The pathogen reduction requirement is necessary to ensure that any potential pathogens in the septage are reduced to a level that is safe for land application. The following management practices must be met for compliance with pathogen control requirements:

1. Food crops with harvested parts that touch the land surface or that develop above the land surface shall not be harvested for fourteen (14) months after domestic septage application.
2. Feed crops or fiber crops shall not be harvested for thirty (30) days after domestic septage application.
3. Food crops with harvested parts below the land surface shall not be harvested for thirty-eight (38) months after domestic septage application.
4. Turf grown on land where domestic septage is applied shall not be harvested for one (1) year after domestic septage application.
5. Animals shall not be allowed to graze on the land for thirty (30) days after the application of domestic septage.
6. Public access shall be restricted for thirty (30) days after the application of domestic septage.

7. Domestic septage shall not be applied to soils saturated with water or during rain events.
8. Careful records must be kept that document how the pathogen control requirements are met.

Crop planning and agronomic application rate

An annual cropping plan that clearly shows how the hauler or his designated land manager will use the land site for the application of septage during twelve consecutive months must be prepared. A comprehensive cropping plan at each site should include the following information:

- Site name/ID and location.
- Cropping year.
- Field identification.
- Acreage of the field that will be used.
- Phosphorus level (soil fertility test)
- Agronomic application rates.
- Type of crop following septage application and previous crop.
- Crop planting and harvest dates.
- Beginning and end period of septage waste application.
- Other sources of nutrients apart from septage waste that will be applied.

An example of a cropping plan format is available in the Appendices section of this document.

An annual soil fertility test is required to be conducted and the results are to be utilized to determine the agronomic application rates. The application rates must be re-evaluated each year based on the updated cropping plan and nutrient recommendations from the soil fertility test report. Realistic yield information should be provided to the laboratory at the time the soil sample is submitted for analysis. Nutrient recommendations based on inflated crop yield values are not acceptable.

The nitrogen content of 0.0026 lb N/gal used in calculations of application rates in this guidance was established by EPA, and the following equation is used to calculate annual application rates:

$$AAR = \frac{N}{0.0026}$$

where: AAR = Annual Application Rate (gal/acre·year)
N = Net Nitrogen Requirement (lbs N/acre·year)

When calculating application rates the addition of synthetic fertilizer to the site(s) should be taken into account. The following examples provide guidelines for AAR calculations without and with additional fertilizer.

Example 1: Application rate without addition of chemical fertilizer:

Crop = Wheat
Expected Yield = 65 bushel/acre (bu/ac)
Assumed Nitrogen content in septage waste = 0.0026 lb N/gal
Nitrogen requirement (recommendation from soil test report) = 50 lbs N/acre
Nitrogen in fertilizer source = 0 lbs N/ac

$$\text{AAR (gal/acre·year)} = \frac{\text{Nitrogen Requirement of Crop – Nitrogen in Fertilizer}}{\text{Nitrogen Content of Septage}}$$

$$\text{AAR} = \frac{50 \text{ lbs N/acre} - 0 \text{ lbs N/acre}}{0.0026 \text{ lb N/gal}}$$

AAR = 19,000 gal/acre·year (rounded)

Example 2: Application rate with addition of chemical fertilizer:

Crop = Corn (grain)
Expected Yield = 110 bushel/acre (bu/ac)
Assumed Nitrogen content in septage waste = 0.0026 lb N/gal
Nitrogen requirement (recommendation from soil test report) = 140 lbs N/acre
Nitrogen in fertilizer source = 50 lbs N/ac

$$\text{AAR (gal/ac/yr)} = \frac{\text{Nitrogen Requirement of Crop – Nitrogen in Fertilizer}}{\text{Nitrogen Content of Septage}}$$

$$\text{AAR} = \frac{140 \text{ lbs N/ac} - 50 \text{ lbs N/ac}}{0.0026 \text{ lb N/gal}}$$

AAR = 34,000 gal/acre·year (rounded)

Recommended management practices:

High level of Total Phosphorus in soil: Excess phosphorus in soil can potentially increase its solubility and mobility leading to its migration or movement to lakes, streams, rivers, and other bodies of surface water. Phosphorus in surface waters can contribute to eutrophication (accelerating growth of algae and aquatic weeds).

Fields with high soil phosphorus test levels (≥ 150 lbs P/acre) should be planted with high phosphorus removal crop and application of septage should be reduced to the extent possible. Fields with soil phosphorus levels greater than 300 lbs/acre should be planted with high phosphorus removal crop and should not be land applied with septage until phosphorus levels decrease to more acceptable medium levels.

Portable toilet waste (PTW): This type of septage is considered a high strength waste. It has been reported that the nitrogen content of portable toilet waste is 4 to 6 times higher than that of waste from residential septic tanks. If PTW is the primary septage waste to be land applied on a field, it is recommended to divide the AAR by 3, as described in the example below.

Example 3:

The calculated AAR for a field is 38,000 gal/acre·year. The AAR using PTW should be limited to 38,000 gallons/3 = 13,000 gal/acre·year (rounded)

Other Site Restrictions

Slope: Topography and soil types influence the amount of soil erosion and potential runoff of applied septage. No septage may be applied to slopes greater than 10%. **In no case may septage be applied in a manner that will allow it to run off-site or run into the waters of the State.**

Recharge Areas, Karst Topography and Flood Plains: Septage may not be applied to sites that contain areas with karst topography or sinkholes, or "most significant groundwater recharge areas." Refer to the Georgia Department of Natural Resource Hydrologic Atlases 18 & 20 to map groundwater recharge areas[1]. Septage may not be land applied within the 100-year flood plain, and septage facilities may not be located within a 100-year flood plain. Flood plain areas should be delineated on the maps included as part of the approved SMP.

Buffers: An undisturbed vegetative buffer strip that is at least 50 feet wide shall be maintained along all streams and drainage ditches within or adjacent to the land application site. Rule 391-3-6-.23 describes required buffer criteria. EPD may require additional buffers on a case-by-case basis. The following chart shall be used to determine the minimal buffer requirements for other features:

Public Use Land	Marsh, Wetland or Coastal Waters	Waters of the State (1)	Wells, Public/ Private (2)	Exterior Roadways	Residence or Other Facility
300 feet	300 feet	300 feet	500 feet	50 feet	300 feet

(1) Waters of the State are defined in Chapter 391-3-6-.03 as any and all rivers, streams, creeks, branches, lakes, reservoirs, ponds, drainage systems, springs, wells, wetlands, and all other bodies of surface or subsurface water, natural or artificial, lying or forming a part of the boundaries of the State which are not entirely confined and retained completely upon the property of a single individual, partnership, or corporation.

(2) All wells within 1,000 feet of the site must be identified on the maps submitted with the SMP. Additional buffer areas may be required in accordance with the Wellhead Protection Act. Deviations may be approved by EPD on a case-by-case basis.

Transportation

All vehicles that are to be used for the transportation of liquid septage (from the point of origin to the application site) must be permitted by the County Health Department in accordance with the Department of Human Resources Public Health Rules and/or guidelines. All septage must be transported and applied to a permitted site in a manner as outlined in the approved SMP and as permitted by EPD.

Site Conditions, Application, and Storage

The pH of the soil in the land application site(s) shall be maintained at a pH amenable for growing the cover crop. The pH shall be measured by annual soil tests. No person shall land apply septage to a site at a rate that exceeds the annual pollutant loading rates limit for arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc. No person shall land apply septage to a site that exceeds the cumulative pollutant loading rate limit for arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc. Refer to Table 1 in Rule 391-3-6-.23 for the Land Application Pollutant Limits for Domestic Septage for the previously mentioned pollutants.

The rate of septage application must be adjusted as necessary to prevent run-off of septage into buffer areas or waters of the State. Septage shall not be applied to a site that is frozen, flooded, snow-covered, or without an established cover crop. If rain is imminent or if the soil is saturated, then septage application must be delayed. If the septage must be stored due to weather or operational concerns, it may be stored only in accordance with the approved SMP and for a period not to exceed 15 days. Storage must not result in runoff, odor complaints, or other environmental problems.

Groundwater Monitoring (Surface Water Monitoring if required)

Per 391-3-6-.23(5), "any pollutant discharged into a land disposal system authorized by a permit shall be subject to such monitoring, recording and reporting requirements as may be reasonably required by the Director." These requirements may include the installation of monitoring wells or the monitoring of surface water. If required, ensure that any existing or unused groundwater monitoring wells are properly constructed and protected from the introduction of septage or septage runoff that could directly impact groundwater. If surface water sampling is necessary, surface water(s) samples will be collected at a maximum of 100 feet upstream and a maximum 100 feet downstream of the land treatment system and the surface water shall be monitored for the parameters and at the frequency listed in the permit.

Required Recordkeeping

Records of domestic septage disposal must be maintained that show that the domestic septage land applier is meeting all of the requirements of the Guidelines and Rules. All records must be maintained for a minimum of five (5) years for inspection by the permittee and be available for EPD inspection at the place of business and upon request.

Required records include:

- Location of the septage land application site (street address, latitude/longitude, GIS coordinates);
- Number of acres on which septage is applied at each site;
- Date, time, and quantity of each septage application;
- The type of cover crop and the nitrogen requirement of the crop or vegetation grown on each site for each calendar year;
- Rate in gallons per acre per year of septage applied to each site;
- The cumulative loading of the parameters in Table 1 of Rule 391-3-6-.23 per acre for the site(s);
- Description of pathogen and vector attraction reduction measures used; and
- Required certification statement - "I certify under penalty of law, that the pathogen control requirements and the vector reduction requirements have been met. This determination has been made under my direction and supervision and I am aware that there are significant penalties for the false certification including the possibility of fine or imprisonment."

Additional Information

The rules and regulations establishing procedures for the land application of domestic septage became effective in 2004 and were last amended in 2014. Contact Gigi Steele at the Wastewater Regulatory Program of the Watershed Protection Branch of EPD at 404-463-1511 with any questions or if you would like more information about the land application of septage.

[1]Department of Natural Resources Hydrologic Atlases 18 and 20 can be found at *http://epd.georgia.gov/sites/epd.georgia.gov/files/related_files/site_page/HA-18.pdf* and *http://epd.georgia.gov/sites/epd.georgia.gov/files/related_files/site_page/HA-20.pdf*, respectively.

APPENDICES

CROPPING PLAN

EXAMPLE ONLY

Permit holder: John Doe Septic Services, LLC.
4321 Curved Road
Town, GA 11111

Cropping year: 2016

Site name/ID: Smith Farm

Site location: 1234 Long Road
Anytown, GA 55555

Previous crop grown	January	February	March	April	May	June	July	August	September	October ** ** Soil sampling for next cropping year	November	December	Next crop
FIELD A 10 acres, Phosphorus Level: 55 lbs/acre, AAR: 27,000 gal/acre·year													
Corn	Septage application + Fertilizer: 20 lbs N/acre, 10 lbs P/acre					Soybeans							soybeans
FIELD B 25 acres, Phosphorus Level: 110 lbs/acre, AAR: 35,000 gal/acre·year													
Rye	Winter Rye				Septage application No fertilizer addition					Winter Rye			Rye
FIELD C 15 acres, Phosphorus Level: 80 lbs/acre, AAR: 40,000 gal/acre·year													
Oats	Septage application No fertilizer addition					Alfalfa-Clover Hay Crop							Legume
FIELD D 18 acres, Phosphorus Level: 70 lbs/acre, AAR: 19,000 gal/acre·year													
Rye	Winter Wheat				Septage Application No fertilizer addition								Wheat

APPENDIX A