

Chapter XI

SEPTAGE MANAGEMENT

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INTRODUCTION

The information in this domestic septage guidance is provided to help the handlers, recyclers, and disposers of septage understand and follow a Federal rule called "Standards for the Use or Disposal of Sewage Sludge", which are commonly called 503 rules. In addition, portions of this chapter are important to owners of land where septage is applied.

Outlined in this chapter are the requirements for persons who apply domestic septage to non-public contact sites (sites not frequently visited by the public).

To meet federal requirements for application of domestic septage to non-public contact sites, the land applier must first assure he/she has only domestic septage according to the 503 rules. Domestic septage is described in the Federal Part 503 Regulation as the liquid or solid material removed from a septic tank, cesspool, portable toilet, type II marine sanitation device, or a similar system that receives only household, non-commercial, non-industrial sewage. Domestic septage may be applied only to sites not frequently visited by the public, called non-public contact sites in the Federal rule. Non-public contact sites include agricultural land, forests, and reclamation sites. The land applier must manage the domestic septage so that pathogens (disease-causing organisms) are reduced. The land applier must manage the domestic septage so that its attractiveness to vectors is reduced. Vectors are insects and rodents that can carry pathogens in or on their bodies and therefore transmit disease. The owner of the land where domestic septage has been applied must adhere to crop-harvesting, animal-grazing, and site-access restrictions. The land applier must certify that pathogen- and vector-attraction reduction requirements have been met, including crop-harvesting, animal-grazing, and site-access restrictions. The number of gallons of domestic septage applied per acre of land may not be more than needed to supply the nitrogen required by the crop being grown.

The person who applies domestic septage has choices about how to meet the pathogen- and vector-attraction-reduction requirements.

SEPTAGE MANAGEMENT

Goal: Septage must be treated and disposed of in a manner that reduces the potential for contamination and human disease caused by contaminants in the septage.

What Is Domestic Sewage?

Domestic Sewage is the liquid and solid material pumped from septic tanks or other devices during cleaning. It does not include commercial or industrial septage or grease-trap wastes.

Characteristics

- 1) About 40 to 50 percent of the solids found in domestic wastewater are retained in the septic tank.
- 2) There is approximately nine times more nitrogen and phosphorus in septage than in domestic wastewater.
- 3) Large numbers of disease-causing microorganisms including bacteria, viruses, and pathogenic human parasites are present in septage.

Septage Disposal Options

- 1) **Disposal at a municipal wastewater plant** is preferred and highly recommended for the following reasons:
 - a) EPA 503 defined requirements for the septage hauler for a specific load ends once the septage is properly discharged and accepted by the municipal plant. The municipal plant then assumes responsibility for the septage.
 - b) Best option to insure pathogens are destroyed as well as providing significantly better protection of surface and groundwater from excessive loading of nutrients and other contaminants.
 - c) Significantly reduces paperwork requirements for the septage hauler.

Recommendations: Septage hauler should contact municipal wastewater plant(s) in his or her service area to determine if they accept domestic septage and to acquire knowledge of the various dumping requirements and fees set forth by that plant.

Kansas Department of Health and Environment recommends that septage not be disposed of at a public or private wastewater treatment lagoon or sludge lagoon.

- 2) Land application is the spraying or spreading of domestic septage onto the land surface or the incorporation or injection of domestic septage into the soil so that the sewage sludge can condition the soil and fertilize the vegetation grown in that soil.

To legally land apply septage the following requirements must be met and documented:

- a) Determine the annual application rate for nitrogen for the planned crop. This amount shall be calculated and the nitrogen amount provided by septage shall not exceed that crop requirement.
- b) Provisions implemented for pathogen reduction.
- c) Provisions implemented for vector-attraction reduction.
- d) Records for all EPA 503 land application requirements shall be retained by the applier for at least five years.

LAND APPLICATION: STEP-BY-STEP INSTRUCTIONS ON HOW TO COMPLY

Determine the Allowed Annual Rate for Land Application

- 1) The maximum volume of domestic septage that may be applied to any site depends on the pounds of nitrogen required per acre by the planned crop for a specific projected yield.
 - a) This information is listed for all Kansas-grown crops in KSU Bulletin MF-2586, *SOIL TEST INTERPRETATIONS AND FERTILIZER RECOMMENDATIONS*.

- b) Secure this bulletin from your county extension office. The agent will gladly assist you in using it. Some information from page 4 of the bulletin is presented Table XI-1

Table XI-1. Nitrogen Recommendations

Crop	Area of State	Medium and Fine Textured Soils (Fallowed)	Medium and Fine Textured Soils (Continuous Cropped)	Coarse Textured (Sandy) Soils	Irrigated
-----Nitrogen Application Per Acre, Pounds-----					
Corn, Wheat	Entire		100-200	100-200	160-220
	Eastern		40-70	40-70	50-80
	Central	20-40	30-60	40-60	50-80
	Western	0-40		25-50	50-80

The maximum volume of septage is calculated by the following formula:

$$\text{Annual Application Rate (gallons/acre/year)} = \frac{\text{Annual Pounds of Nitrogen Required for the Crop and Yield}}{\div (\text{divided by}) 0.0026 (\text{conversion factor})}$$

Example: If 74 pounds of nitrogen per acre is required to grow a 60 bushel per acre crop of wheat, then the annual application rate of domestic septage would be 28,461 gallons per acre.

$$\text{Annual Application Rate} = 74 \div 0.0026 = 28,461 \text{ gallons/acre/year}$$

The primary reason for this annual-rate calculation is to prevent the application of nitrogen in excess of crop needs and its potential movement through soil to groundwater, resulting in nitrate contamination of groundwater.

Pathogen-Reduction/Crop- and Site-Restriction Requirements

Domestic septage must be managed so that pathogens are appropriately reduced. The Part 503 Regulation offers two alternatives that will meet this requirement. The first alternative, (no treatment) and its restrictions are presented in Table XI-2; requirements of the second option (pH 12 for a minimum of 30 minutes, i.e., mixing 50 pounds of hydrated lime/1,000 gallons of septage) are listed in Table XI-3.

Please note that both of the pathogen-reduction alternatives impose crop harvesting restrictions. However, site-access controls are only required when the soil incorporation alternative for pathogen reduction has been used. Remember that the owner/operator of the land where the domestic septage has been applied is required to be informed about the crop-harvesting and site access restriction requirements. This notification is required because the applicator of the domestic septage must certify that these conditions are met.

NOTE: Part 503 Regulations *do not* restrict access to the site by the persons working the land. These regulations assume these persons, as well as the applicator, are aware of appropriate practices to limit exposure and to minimize risk of infectious disease, and will follow 503 Regulations to minimize any problems with domestic septage.

Table XI-2. Pathogen-Reduction Alternative One for Domestic Septage Applies to Non-Public Contact Sites

Domestic septage is pumped from the septic tank or holding tank and land applied without treatment, i.e., septage is injected OR spread on soil and incorporated within six hours.	
Crop Restrictions:	<p>A. Food crops with harvested parts that touch the septage/soil mixture and are totally above ground shall not be harvested for 14 months after application of domestic septage. Examples — melons and strawberries.</p> <p>B. Food crops with harvested parts below the surface of the land shall not be harvested for 38 months after application of domestic septage. Examples — potatoes, onions, and radishes.</p> <p>C. Animal feed, fiber, and those food crops that do not touch the soil surface shall not be harvested for 30 days after application of the domestic septage. Examples — wheat, corn, peaches, cotton, and hay.</p> <p>D. Turf grown on land where domestic septage is applied shall not be harvested for one year after application of the domestic septage when the harvested turf is placed on either a lawn or land with a high potential for public exposure, unless otherwise specified by the permitting authority.</p>
Grazing Restriction:	A. Animals shall not be allowed to graze on the land for 30 days after application of domestic septage.
Site Access Restrictions:	A. Public access to land with a low potential for public exposure shall be restricted for 30 days after application of domestic septage. Examples of restricted access include remoteness, posting with no trespassing signs, and/or simple (3½- to 4-foot-tall agricultural type) fencing

Table XI-3. Pathogen Reduction Alternative Two, for Domestic Septage with pH Treatment Applied to Non-Public Contact Sites

<p>The domestic septage pumped from the septic tank or holding tank has had its pH raised to 12 or higher by the addition of alkali such as hydrated lime and, without adding more alkali, it will remain at a pH of 12 or higher for at least 30 minutes prior to being land applied. To accomplish this goal, 50 lbs of hydrated lime shall be mixed and thoroughly agitated in each 1,000 gallons of septage.</p>	
<p>Crop Restrictions:</p>	<p>A. Food crops with harvested parts that touch the septage/soil mixture and are totally above ground shall not be harvested for 14 months after application of domestic septage. Examples — melons and strawberries.</p> <p>B. Food crops with harvested parts below the surface of the land shall not be harvested for 20 months after application of domestic septage when the domestic septage remains on the land surface for four months or longer prior to incorporation into the soil. Examples — potatoes, onions, and radishes.</p> <p>C. Food crops with harvested parts below the surface of the land shall not be harvested for 38 months after application of domestic septage when the domestic septage remains on the land surface for four months or longer prior to incorporation into the soil. Examples — potatoes, onions, and radishes.</p> <p>D. Animal feed, fiber, and those food crops whose harvested parts do not touch the soil surface shall not be harvested for 30 days after application of the domestic septage. Examples — wheat, corn, peaches, cotton, and hay.</p> <p>E. Turf grown on land where domestic septage is applied shall not be harvested for one year after application of the domestic septage when the harvested turf is placed on either a lawn or land with high potential for public exposure, unless otherwise specified by the permitting authority.</p>
<p>Grazing Restriction:</p>	<p>None</p>
<p>Site Access Restrictions:</p>	<p>None</p>

Vector Reduction Alternatives

Choose one of the following methods for reducing vector attraction:

1. Inject septage immediately below the soil surface.

OR

2. Apply septage to the land surface, and incorporate it into the soil surface plow layer within six hours.

OR

3. Raise the pH of the septage to 12 or above, and hold at or above 12 for 30 minutes. The suggested procedure is to use a 50-pound bag of hydrated lime per 1,000 gallons of septage (see procedure below).

Procedure for Raising pH with Hydrated Lime

- 1) Agitate septic tank contents with truck vacuum hose.
- 2) Withdraw 200-400 gallons of septage from septic tank.
- 3) Add 50 pounds of hydrated lime to the septage through the vacuum hose. The dry lime (available at hardware stores and lumber yards) can be emptied into five-gallon buckets or can be vacuumed directly from the original paper bag.
- 4) The balance of the 1,000 gallons of septage should then be vacuumed into the truck.
- 5) Agitate septage/lime mixture for 15 minutes by frequent opening and closing of the main hose vacuum valve. The air bubbling through the mixture as well as the sloshing of the material inside the truck tank during transport to the field disposal site will accomplish adequate mixing.
- 6) Thirty minutes after the lime was mixed with the contents, the mixture can be surface-spread onto the soil.
- 7) This example illustrates a 1,000-gallon mix. If you have a 500-gallon truck, use 25 pounds of lime. Similarly a 1,500-gallon tank will require 75 pounds of hydrated lime to do the job.
- 8) Follow all label safety instructions printed on the lime package, i.e., wear rubber boots, gloves, and eye protection.

Certification of Application Site

- 1) The applicator must complete and sign for each application-site certification listed in Table XI-5 about meeting pathogen- and vector-attraction-reduction requirements.

EPA 503 RECORD KEEPING REQUIREMENTS

You must retain records for at least five years after any application of domestic septage to a site, but you *are not* required to report this information under the 503 Regulations. However, local authorities may require reporting certain information to them. These required records may be requested for review at any time by the permitting or enforcement authority. The retained records must include the information shown in Table XI-4 and a written certification (see Table XI-5). Forms 1 and 2 contains samples of forms which can be used to organize your record keeping. You are not required to use these forms, but they may be helpful.

Table XI-4. Record Keeping Requirements

1) The location of the site where domestic septage is applied: Provide the legal description, the street address if applicable, and the longitude and latitude coordinates of the site (available from U.S. Geological Survey maps, a GPS unit, or online services such as Google maps).
2) The number of acres to which domestic septage is applied at each site.
3) The date and time of each domestic septage application.
4) The nitrogen requirement for the crop or vegetation grown during the year on each site. Indicate the expected crop yield used to help establish the nitrogen requirement on the form.
5) The gallons of septage that were applied to the site during the specified annual (365-day) period.
6) The certification shown in Table XI-5.
7) A description of how the pathogen requirements are met for each load of domestic septage that is land applied
8) A description of how the vector-attraction-reduction requirement is met for each load of domestic septage that is land applied.

Table XI-5. Certification Statement To Be Incorporated into Record Forms

I certify, under penalty of law, that the pathogen-reduction requirement shown on this form for each site (*specify restrictions on harvesting and public access or pH treatment*) and the vector attraction reduction requirements shown on this form for each site (*specify injection, incorporation, or pH treatment*) have been met. This determination has been made under my direction and supervision in accordance with the system designed to assure that qualified personnel properly gather and evaluate the information used to determine that the pathogen requirements and vector-attraction-reduction requirements have been met. I am aware there are significant penalties for false certification including the possibility of fine and imprisonment.

SIGNATURE _____

PRINTED NAME _____

TITLE* _____

*e.g., owner or employee of company or individual name

ADDITIONAL REQUIREMENTS FOR SEPTAGE LAND APPLICATION

- 1) Consult with county environmental health officials about local land application requirements and follow those requirements.
- 2) If county does not have more restrictive limits, the requirements noted below apply.
 - a) Septage shall not be applied within 100 feet of a public or private water supply well.
 - b) Septage shall not be applied within 50 feet of any surface water.

Definition of Terms**pH**

a numerical measure of the acidity or alkalinity of a liquid (example - septage) or a solid substance such as soil.

2 ← 7 → 14
 (very acid) neutral (very alkaline)

Pathogen Reduction

the number of disease-causing organisms commonly found in septage when that septage is land applied.

Vector Attraction Reduction

EPA 503 requires that the land applicator manage domestic septage so that its attractiveness to vectors is reduced. Vectors are insects and rodents that carry pathogens in or on their bodies and, therefore, transmit disease.

Annual Application Rate

The maximum volume of domestic septage that may be applied to any site during a 365-day period. This is determined by the amount of nitrogen required by the planned crop and the targeted yield.

Forms 1 and 2

At the end of this chapter are two forms that may be helpful to septage pumpers and haulers for record keeping. The first of these forms (Form 1) has information about the business, the land to be used for application, and a sheet to record the annual plan by field. Here the user would describe the field name and location, crop to be grown, expected yield, and calculations of the amount of septage that can be applied per acre annually for each field. The second form (Form 2) is an example of a daily log that might be kept in the truck as domestic septage is pumped and land applied.

Following the blank forms are samples of both of these forms which have been filled in as an example of the type of information you might actually record.

REFERENCES AND READING MATERIALS

- Chisam, Don. *Land Application of Septage: Domestic Septage*, Kansas Department of Health and Environment, Not dated but likely about 1995-1996.
- Eberle, W.M., D.A. Whitney, and G.M. Powell. *Sewage Sludge Use on Agricultural Land*, MF- 1168, Kansas State University, Cooperative Extension Service, September 1994.
- Mancl, Karen, Jay Johnson, and Michael Veenhuizen. *Septage Management in Ohio*, Bulletin 854, The Ohio State University, September 1995.
- Morse, Ken. *Urban Septic Legends*, Environmental Health, December 1999.
- Petrik, Bruce and Lyle Christensen. *Program Promotes Waste Minimization*, Water Environment & Technology, December 1994.
- Solomon, Clement, Peter Casey, Colleen Mackne, and Andrew Lake. *Septate Management: A General Overview*, Fact Sheet WWFSGN109, National Small Flows Clearinghouse, 1998.
- Solomon, Clement, Peter Casey, Colleen Mackne, and Andrew Lake. *Septate Management: A Technical Overview*, Fact Sheet WWFSOM31, National Small Flows Clearinghouse, 1998.
- Starkis, Ken. Evaluating Land Application Effects: Results of Philadelphia sludge application program on corn and soybean fields, BioCycle, January 1987.
- Ungvarsky, John and Karen Mancl. *Septage Use and Disposal*, Special Circular 317, The Pennsylvania State University, Extension Service, U.Ed. 85-1100 IVBIIC 3M885.
- Ungvarsky, John and Karen Mancl. *Septage Management in Pennsylvania*, Special Circular 316, The Pennsylvania State University, Extension Service, U.Ed. IVBIIC 85-1101.
- US EPA. *Domestic Septage Regulatory Guidance: A Guide to the EPA 503 Rule*, Office of Water, EPA 832-B-92-005, September 1993.
- US EPA. *Guide to Septage Treatment and Disposal*, Office of Research and Development, EPA/625/R-94/002, September 1994.
- Wooding, N.H. and R.F. Shipp. *Agricultural Use and Disposal of Septic Tank Sludge in Pennsylvania*, Special Circular 257, The Pennsylvania State University, Cooperative Extension Service, IVBIIC R5M579 U.Ed. 9-350.

**EPA NPS SECTION 503 RECORD KEEPING FORM 1
LAND APPLICATION OF DOMESTIC SEPTAGE AT NON-PUBLIC CONTACT
SITES**

PART 1: BUSINESS AND LAND APPLICATION SITE INFORMATION

REPORT YEAR _____ DATE _____

SEPTAGE HAULER

NAME _____

ADDRESS _____

COUNTY LICENSE OR PERMIT NUMBER _____

LAND APPLICATION SITE

OWNER _____

LOCATION _____

(legal location, street address, and/or GPS coordinates)

SITE NUMBER OR NAME _____

TOTAL ACRES AT SITE _____

SITE OWNER'S SIGNATURE _____

Note: All records must be maintained by the septage hauler for five (5) years

PART 2: ANNUAL APPLICATION RATE AND PUBLIC CONTACT INFORMATION

PUBLIC ACCESS CONTROL (check all that apply)

- (1) Site remotely located _____
- (2) Signs are posted _____
- (3) Property is fenced _____

ANNUAL APPLICATION RATE (AAR) AAR = $\frac{\text{Nitrogen requirement of crop}}{0.0026}$

CROP	EXPECTED YIELD (bushels/acre)	NITROGEN REQUIREMENT (pounds N/year)	AAR (gal/acre/year)
CROP 1 _____	_____	_____	_____
CROP 2 _____	_____	_____	_____
CROP 3 _____	_____	_____	_____

PLANTING/HARVESTING SCHEDULE

	PLANTING DATE	HARVEST DATE
CROP 1 _____	_____	_____
CROP 2 _____	_____	_____
CROP 3 _____	_____	_____

Note: All records must be maintained by the septage hauler for five (5) years.

EXAMPLE

EPA NPS SEC 503 FORM 1

**EPA NPS SECTION 503 RECORD KEEPING FORM 1
LAND APPLICATION OF DOMESTIC SEPTAGE AT NON-PUBLIC CONTACT
SITES**

PART 1: BUSINESS AND LAND APPLICATION SITE INFORMATION

REPORT YEAR 2020 DATE 03/25/20

SEPTAGE HAULER

NAME Joe's Septic Pumping Service

ADDRESS 1591 E. Highway 21, Hays, KS 67601

COUNTY LICENSE OR PERMIT NUMBER #981

LAND APPLICATION SITE

OWNER Jones Farms

LOCATION SE/4 - 6 - Township 7 N - Range 3 West
(legal location, street address, and/or GPS coordinates)

SITE NUMBER OR NAME Jones Farms

TOTAL ACRES AT SITE 60

SITE OWNER'S SIGNATURE _____

Note: All records must be maintained by the septage hauler for five (5) years

EPA NPS SECTION 503 RECORD FORM 2 LAND APPLICATION OF DOMESTIC SEPTAGE AT NON-PUBLIC CONTACT SITES

LAND APPLICATION SITE: _____						RECORD YEAR: _____						
NAME & ADDRESS WHERE SEPTAGE WAS PUMPED	DATE OF APPLIC. TO SITE	GALLONS APPLIED TO SITE	TOTAL GALS APPLIED Y.T.D.	WAS SEPTAGE INCORPORATED?#		WAS SEPTAGE INJECTED?		IF SEPTAGE WAS pH TREATED, INDICATE**				
				Yes	No	Yes	No	Type	Amount	How mixed	pH 12 held	for 30 min
				Yes	No	Yes	No				Yes	No
				hours*								
				Yes	No	Yes	No				Yes	No
				hours*								
				Yes	No	Yes	No				Yes	No
				hours*								
				Yes	No	Yes	No				Yes	No
				hours*								

* If septage was incorporated, how many hours after it was applied to the site?

** Type means what kind of alkaline material was used, e.g., lime.

Amount means how many pounds were added.

How mixed means how did you mix the alkaline material into the septage.

EPA NPS SECTION 503 RECORD FORM 2 LAND APPLICATION OF DOMESTIC SEPTAGE AT NON-PUBLIC CONTACT SITES COMPLETION EXAMPLE

LAND APPLICATION SITE: _____						RECORD YEAR: _____						
NAME & ADDRESS WHERE SEPTAGE WAS PUMPED	DATE OF APPLIC. TO SITE	GALLONS APPLIED TO SITE	TOTAL GALS APPLIED Y.T.D.	WAS SEPTAGE INCORPORATED?#		WAS SEPTAGE INJECTED?		IF SEPTAGE WAS pH TREATED, INDICATE**				
				Yes	No	Yes	No	Type	Amount	How mixed	pH 12 held for 30 min	
Willis Brown 231 Wilson Hays, KS	3/25/20	1000	5000	Yes	<u>No</u>	Yes	<u>No</u>	Hydrated lime	50 lbs	Agitated with vacuum valve	<u>Yes</u>	No
				Yes	No	Yes	No				Yes	No
				Yes	No	Yes	No				Yes	No
				Yes	No	Yes	No				Yes	No