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A Guide to the Federal EPA Rule For Land Application of Domestic Septage to Non-Public Contact Sites

(Agricultural Land, Forests, and Reclamation Sites)

Discussed in Relationship to Existing State Rules and Other Federal Regulations of Septage

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ACKNOWLEDGEMENT

The authors [John Walker, Municipal Technology Branch, U.S. EPA Office of Wastewater Enforcement and Compliance, and Penny Mascaro, Engineering-Science, Inc.] gratefully acknowledge all those persons who have reviewed and made comments to improve this guidance. These reviewers include septage haulers who land apply, consultants, treatment plant operators, and regulators.

EVERY EFFORT HAS BEEN MADE TO PROVIDE ACCURATE AND COMPLETE INFORMATION IN THIS GUIDANCE DOCUMENT. HOWEVER, IT IS NOT INTENDED TO SUBSTITUTE FOR THE ACTUAL RULE.

IF YOU ARE NOT SURE ABOUT ANYTHING DISCUSSED IN THIS GUIDANCE, YOU SHOULD CHECK THE TEXT OF THE COMPLETE RULE IN 40 CFR PART 503 ENTITLED "STANDARDS FOR THE USE OR DISPOSAL OF SEWAGE SLUDGE."

THE REGIONAL AND STATE SEPTAGE COORDINATORS, WHOSE NAMES ARE LISTED IN APPENDIX A, ARE AVAILABLE TO ANSWER YOUR QUESTIONS ON THE REGULATION.

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A GUIDE TO THE FEDERAL EPA RULE FOR LAND APPLICATION OF DOMESTIC SEPTAGE TO NON-PUBLIC CONTACT SITES

Discussed in Relationship to State Rules and Other Federal Regulations of Septage

PURPOSE

The information in this domestic septage guidance is provided to help the users and disposers of septage understand and follow a new governing Federal rule called "Standards for the Use or Disposal of Sewage Sludge" (40 CFR Part 503).

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

FIRST REQUIREMENT FOR LAND-APPLYING DOMESTIC SEPTAGE

To meet the Federal requirements for application of domestic septage to non-public contact sites, the land applier must assure that he/she has only domestic septage.

DOMESTIC SEPTAGE AS DESCRIBED IN THE FEDERAL PART 503 REGULATION IS THE 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 SEPTAGE (HOUSEHOLD, NON-COMMERCIAL, NON-INDUSTRIAL SEWAGE).

SECOND REQUIREMENT

Unless domestic septage is applied only to sites that are not frequently visited by the public, called non-public contact sites in this document, its use or disposal is regulated under 40 CFR Part 503 as sewage sludge.

NON-PUBLIC CONTACT SITES INCLUDE AGRICULTURAL LAND, FORESTS, AND RECLAMATION SITES.

THIRD REQUIREMENT

The land applier must manage the domestic septage so that pathogens (disease-causing organisms) are reduced.

PATHOGEN AND VECTOR ATTRACTION REDUCTION CHOICES

[1] Not treat the pumped domestic septage before land applying. Instead the applier must either directly inject this domestic septage into the soil or incorporate it into the soil surface by plowing or disking within six hours after application.

The applier must also assure that the land owner follows crop harvesting, animal grazing, and site access restrictions.

OR

[2] Adjust the pH of the domestic septage so that it remains at pH 12 or greater for at least 30 minutes before land applying.

The applier must also assure that the land owner follows crop harvesting restrictions.

FOURTH REQUIREMENT

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.

ADDITIONAL REQUIREMENTS

Fifth, the owner of the land where domestic septage has been applied must adhere to crop harvesting, animal grazing, and site access restrictions.

Sixth, the land applier must certify that pathogen and vector attraction reduction requirements have been met, including crop harvesting, animal grazing, and site access restrictions.

Seventh, 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.

Eighth, the person who applies domestic septage to land must also follow the applicable rules of the State involved.

OTHER SEPTAGE USE AND DISPOSAL

This document also provides guidance on regulations that govern the application of domestic septage to public contact sites as well as its discharge into facilities for treatment prior to use or disposal. Guidance is also given on regulations that govern the use or disposal of commercial and industrial septage.

USE DISPOSAL OPTIONS FOR DOMESTIC AND NON-DOMESTIC SEPTAGE ON OTHER THAN NON-PUBLIC CONTACT SITES

[1] Septage can be discharged into treatment works for treatment as follows: Domestic septage to septage-only treatment works, or both domestic and non-domestic septage to municipal facilities that normally treat domestic sewage. This discharge is permissible provided that a treatment facility is available which will accept septage of the nature that you have and provided that all applicable State and Federal rules are followed.

OR

[2] Septage can be placed in a landfill or other surface disposal site. Again, the rules of the landfill operator and applicable State and Federal rules must be followed.

OR

[3] Septage can be incinerated. In this case, the rules of the incinerator operator and the applicable State and Federal rules must be followed.

STATE REQUIREMENTS

Finally, State requirements for the land application of domestic septage are discussed generally in the last part of this guidance document.

REQUEST FOR COMMENTS ON IMPROVEMENT OF GUIDANCE

The guidance provided was up-to-date at the time of printing and has been reviewed by a wide spectrum of individuals from regulatory to septage pumpers. Please let us know what you think about this document. Please offer any suggestions you might have for future improvement using the comment sheet inside the back cover of this document, or by directly contacting us at U.S. EPA, Office of Wastewater Enforcement and Compliance, Municipal Technology Branch, WH-547, Washington, DC 20460.

INTRODUCTION

WHY IS THERE NEW FEDERAL REGULATION OF DOMESTIC SEPTAGE?

The new Federal regulation for managing domestic septage was written in response to the Clean Water Act Amendments of 1987. This Act required that the U.S. Environmental Protection Agency (EPA) develop new rules to govern the use or disposal of sewage sludge.

"Sewage sludge" is defined in the Part 503 regulation to include "domestic septage". The new regulation is called "Standards for the Use or Disposal of Sewage Sludge". It contains standards which are designed to protect public health and the environment from reasonably anticipated adverse effects of pollutants in sewage sludge (and domestic septage). This regulation was published in the Federal Register on February 19, 1993, Volume 58, pages 9248 to 9404. It will also appear in the Code of Federal Regulations as 40 CFR Part 503. (For short we will call it the Part 503 Regulation.)

DOMESTIC SEPTAGE IS DEFINED IN THE PART 503 REGULATION AS THE 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 SEPTAGE (HOUSEHOLD, NON-COMMERCIAL, NON-INDUSTRIAL SEWAGE).

WHAT IS IN DOMESTIC SEPTAGE?

Domestic septage contains many different substances depending on the type of waste being treated in the septic system. Domestic septage contains mostly water, sewage, inorganic materials like grit, and organic fecal matter. Small amounts of polluting substances, normal to household activity, can also be present. When analyzed in a laboratory, domestic septage is usually shown to contain low levels of heavy metals and other pollutants.

Pumpings from portable chemical toilets and type III marine sanitation devices are defined as domestic septage in the Part 503 Regulation. A type III marine sanitation device is the name given to a holding tank for receiving sanitation wastes on a boat or other water-going vessel. The nitrogen content of such pumpings may be higher than in other domestic septage. This is discussed further in Section 3 of this guidance.

The most common fertilizer nutrients contained in domestic septage are nitrogen and phosphorus. These nutrients, along with certain trace fertilizer elements and organic matter, make domestic septage valuable for use on agricultural lands, forests, and reclamation sites.

Typical physical and chemical properties of domestic septage are shown in Appendix B. For comparison, typical pollutant contents of sewage sludge are also provided in Appendix B.

Photographs provided by Ted Lyon,
North Carolina Septage Coordinator

The primary purpose of this document is to provide guidance to septic tank pumpers and haulers and others who apply only domestic septage to non-public contact sites.

PURPOSE OF THIS GUIDANCE DOCUMENT

This guidance to the Part 503 Regulation calls land application sites that are not frequently visited or used by the public, non-public contact sites. These non-public contact sites include agricultural land, forests, and reclamation sites.

The requirements governing land application of domestic septage to non-public contact sites are less burdensome but not less protective than the other requirements for land application of sewage sludge in the Part 503 Regulation. These less burdensome requirements are described in detail in Section 3 of this guidance document.

Land application is the spreading of domestic septage on land at controlled rates to fertilize crops and improve the tilth of soils. This domestic septage can either be sprayed or spread on the soil surface, or plowed, disked, or injected into the soil. The EPA has a policy that encourages the beneficial use of sewage sludge, including domestic septage.

A second purpose of this document is to provide reference to Federal rules that govern other alternatives for the use or disposal of septage.

The characteristics of domestic and non-domestic septage along with other alternatives for the use or disposal of these septage materials as well as the associated governing Federal regulations are briefly described in Section 2.

TWO IMPORTANT CONSIDERATIONS REGARDING SEPTAGE REGULATION:

[1] The Federal Part 503 Regulation does not replace any existing State regulations.

[2] The septage pumper and applier should check with State and local regulatory authorities concerning their septage ordinances.

A third purpose of this guidance is to discuss the relationship of the Federal domestic septage regulation to State requirements.

EPA's upcoming "Field Guide for Septage Treatment and Disposal" (4) will provide useful information about many non-regulatory aspects of septage management. The booklet should be available for distribution late in 1993 from EPA's Center For Environmental Research Information, 26 West Martin Luther King Drive, Cincinnati, OH 45268, Phone 513-569-7562.

Photograph provided by Ted Lyon, North Carolina Septage Coordinator

REGULATION OF DOMESTIC SEPTAGE DISCHARGED INTO TREATMENT FACILITIES, APPLIED TO PUBLIC CONTACT SITES, ORDISPOSED

(1) If domestic septage is discharged into a treatment facility that receives only domestic septage, the appropriately treated domestic septage could be applied to either public or non-public contact sites. If applied to non-public contact sites, the less burdensome rules listed in Section 3 of this guidance would apply unless otherwise directed by a permitting authority. If used on public contact sites or disposed, the applicable provisions of the Part 503 Regulation or other applicable rules, which are described below, would apply.

(2) If domestic septage is applied to public contact sites, its use is covered by the more detailed provisions of the Part 503 Regulation for sewage sludge. Public contact sites are defined as lands with a high potential for contact by the public such as public parks, ball fields, cemeteries, plant nurseries, turf farms, and golf courses.

(3) If domestic septage is discharged into a sanitary sewer or directly into a publicly owned treatment works that also receives municipal wastewater, the person discharging the domestic septage must first of all follow the rules of that treatment works. Then the residual solids from the treatment of the sewage sludge and domestic septage would be covered by the specific provisions of the Part 503 Regulation that apply to the sewage sludge use or disposal practice being followed or by the other applicable Federal law and State rules described below.

(4) If domestic septage is placed in a sewage sludge-only landfill (called surface disposal in the Part 503 Regulation), or incinerated in a sewage sludge incinerator, its disposal is covered by the requirements in the Part 503 Regulation for those

disposal practices.

(5) If domestic septage is placed in a municipal solid waste landfill, its disposal is covered by the rules of the disposal facility which in turn must comply with the requirements of 40 CFR Part 258 for the disposal of non-hazardous wastes.

NOTE: The septage user or disposer must keep records of septage volumes put into any of these facilities.

A separate EPA guidance document has been prepared to explain the requirements of the total Part 503 Regulation. Its title is "A Guide to EPA's Part 503 Federal Standards for the Use or Disposal of Sewage Sludge". The rules governing the application of domestic septage to public contact sites is the same as for the land application of sewage sludge. Detailed information on septage applied to public contact sites can be found in that guidance.

DIFFERENTIATING DOMESTIC FROM COMMERCIAL AND INDUSTRIAL SEPTAGE

The term "septage" has been used to refer to many materials pumped out of various types of waste receiving tanks. It normally contains large amounts of grit and grease and can have an offensive odor.

The specific definition of domestic septage in the Part 503 Regulation does not include many of the other materials that are often called septage by the industry. For instance, grease trap wastes are not classified as domestic septage. Grease traps are used at restaurants to prevent large amounts of grease from entering the public sewer system. If you pick up restaurant grease trap wastes along with domestic septage in the same truck, then the whole truckload is not covered by the Part 503 sewage sludge standards.

Commercial and industrial septage are not considered domestic septage. The factor that differentiates commercial and industrial septage from domestic septage is not the type of establishment generating the waste, rather it is the type of waste being produced. As described above, grease trap wastes from a restaurant are not domestic septage, but the sanitation waste residues and residues from food and normal dish cleaning from a restaurant are considered domestic septage. Likewise, only sanitation waste residues from a gasoline station are domestic septage, while wastes containing petroleum are classified as non-domestic septage.

Still another example is septage from a motel or nursing home which is considered domestic septage, provided it does not include any grease trap wastes. Dry cleaning waste residues are commercial septage, while sanitation-only waste from such an establishment would be considered domestic septage.

REGULATION OF NON-DOMESTIC SEPTAGE

It is important to emphasize again that any mixture of domestic and non-domestic septage, for example in a pumper truck or holding tank, causes the entire batch of septage to be considered non-domestic septage and not covered by the Part 503 Regulation. It is up to the individual septage pumper to determine whether to mix domestic with non-domestic septage. If not mixed, domestic-only septage would be regulated under the provisions of the Part 503 Regulation. If mixed, the septage mixture would be regulated as outlined below.

Hazardous wastes are also excluded from the definition of domestic septage.

Septage that does not meet the Federal definition of domestic septage, must be managed and disposed in accordance with:

(1) EPA's 40 CFR Part 503 if the non-domestic septage (commercial septage, industrial septage, grease trap pumpings, or mixtures of domestic and non-domestic septage) is discharged for treatment into a treatment works that also receives domestic sewage.

(2) EPA's 40 CFR Part 257 if non-domestic septage is directly used or disposed in all but a municipal solid waste [MSW] landfill.

(3) EPA's 40 CFR Part 258 if non-domestic septage is disposed in a MSW landfill.

(4) EPA's 40 CFR Part 261 if the septage is classified as a hazardous waste.

(5) Other applicable Federal, State, and local rules.

SECTION 3

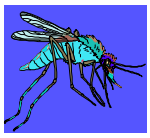
FEDERAL STANDARDS FOR THE APPLICATION OF DOMESTIC SEPTAGE

INTRODUCTION

The following Federal requirements have been established to ensure safe land application practices. These requirements pertain only to persons who apply domestic septage to non-public contact sites (agricultural land, forests, and reclamation sites.) The requirements include:

1) Provisions for control of disease-causing organisms called pathogens and the reduction of the attractiveness of the domestic septage to vectors like flies, rodents, and other potential disease carrying organisms. Note that the processes that reduce the attractiveness to vectors also reduce the potential for objectionable odors being generated and released.

EXAMPLES OF VECTORS



2) Limits on application rates and restrictions on crop harvesting, animal grazing, and site access. Limited application rates minimize the addition of pollutants and the potential for over application of the fertilizer element nitrogen, hence protecting ground and surface water from contamination with excess nitrogen. Restrictions on crop harvesting, animal grazing, and site access protect from contact with pathogens while still potentially viable.

3) The information you must collect, records that you must keep, and the certification you must make to assure that the pathogen and vector attraction reduction requirements have been met.

4) Provisions for you to notify the owner or lease holder of the land onto which the domestic septage is applied about the crop and site restrictions that the land owner must obey.

   While not required by the rule, it is important that the septic tank pumper inform the owner or lease holder of how much of the crop's nitrogen requirement was added by the applied domestic septage.

By knowing how much of the crop's nitrogen requirement was fulfilled through use of the domestic septage, the land owner can determine how much additional nitrogen in the form of chemical fertilizer, if any, will need to be applied.

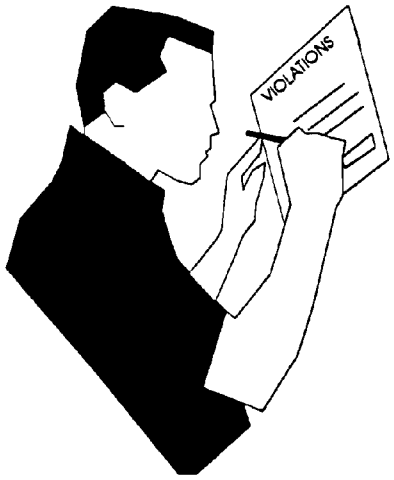
Where the pH adjustment is utilized, Federal requirements apply on a truckload by truckload basis unless pH adjustment was done in a separate treatment device (e.g., lagoon or tank). Domestic septage application rate requirements apply to each field site, adjusted to the nitrogen requirement for the crop being grown.

PERMITS AND COMPLIANCE

In general, Federal permits are not required for persons who apply domestic septage to non-public contact sites.

Even though Federal permits may not be required, governmental authorities have the right to inspect your land application operations along with all other Federally

required records at any time. You can be fined and other penalties can be imposed if you are not in compliance (correctly following the requirements) with all applicable Part 503 requirements.



If the domestic septage is treated in a central facility, the treatment facility may need to apply for a permit. If you operate such a treatment facility, you should ask about the possible need for a permit at the applicable State or EPA Regional office listed in Appendix A.

WHEN MUST I COMPLY WITH THE PART 503 REGULATION?

The Part 503 Federal rule requires that you begin to monitor and keep records by July 20, 1993.

You have until February 19, 1994, before you have to meet all the other requirements of the rule along with the certification that you are meeting the pathogen and vector attraction reduction requirements of the rule.

NOTE

The Part 503 Regulation allows an extra year until February 19, 1995, to be in compliance if construction of new pollution control facilities is required. Appliers of domestic septage to non-public contact sites will not have this extra year because EPA does not believe that new pollution control facilities are needed to be in compliance with this less burdensome Federal rule.]

RECORD KEEPING AND REPORTING FOR LAND APPLIERS

You must keep records for five years after any application of domestic septage to a site, but you are not required to report this information. As previously stated, 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 Figure 1 and a written certification (see Figure 7). Appendix C contains samples of ways to organize your record keeping. You are not required to use such sheets, but they may be helpful.

Figure 1:
RECORD KEEPING REQUIREMENTS

1] The location of the site where domestic septage is applied, either the street address, or the longitude and latitude of the site (available from the U.S. Geological Survey 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 on each site during the year. Also, while not required, indicating the expected crop yield would help establish the nitrogen requirement.

5] The gallons of septage which are applied to the site during the specified 365-day period.

6] The certification shown in Figure 7.

7] A description of how the pathogen requirements are met for each batch of domestic septage that is land applied.

8] A description of how the vector attraction reduction requirement is met for each batch of domestic septage that is land applied.

DETERMINING THE ALLOWED ANNUAL RATE FOR APPLYING DOMESTIC SEPTAGE TO NON-PUBLIC CONTACT SITES

The maximum volume of domestic septage that may be applied to any site during a 365-day period depends on the amount of nitrogen required by the planned crop and the yield. This maximum volume is calculated by the following formula, where Annual Application Rate is represented by *AAR*:

$$AAR(gallons/acre/year) = \frac{Pounds\ Nitrogen\ Required\ for\ Crop\ Yield}{0.0026}$$

As an example, if 100 pounds of nitrogen per acre is required to grow a 100 bushel per acre crop of corn, then the annual application rate of domestic septage is 38,500 gallons per acre.

$$AAR = \frac{100}{0.0026} = 38{,}500\ gallons/acre/year$$

The primary reason for this annual rate calculation is to prevent the over application of nitrogen in excess of crop needs and its potential movement through soil to groundwater. The annual application rate formula was derived using assumptions to make land application very workable for domestic septage haulers. For example, fractional availability of nitrogen from land-applied domestic septage was assumed over a 3-year period to obtain the "0.0026" factor in the annual application rate formula. Also, in deriving the formula, domestic septage was assumed to contain about 350 mg/kg total nitrogen and 2.5% solids (about 1.4% total nitrogen on a dry weight basis).

For additional guidance on avoiding nitrogen contamination of groundwater when land applying domestic septage with a high nitrogen content or dewatered domestic septage, see the examples below.

AVOIDING NITROGEN CONTAMINATION OF GROUNDWATER WHEN LAND APPLYING DOMESTIC SEPTAGE

CASE EXAMPLE 1: DOMESTIC SEPTAGE WITH HIGH NITROGEN CONTENT OPTIONS

Portable chemical toilet and type III marine sanitation device domestic septage wastes can contain 4 to 6 times more total nitrogen than was assumed to derive the annual application rate formula.

While not required by the Part 503 Regulation, good practice argues that you consider reducing the volume applied per acre of such high nitrogen-containing domestic septage. For example, if the land owner is expecting to grow a 100-bushel per acre corn crop, and the domestic septage contains 6 times more total nitrogen, the gallons applied should be reduced 6-fold (from 38,500 to about 6,400 gallons).

CASE EXAMPLE 2: DEWATERED DOMESTIC SEPTAGE OPTIONS

Some domestic septage servicing companies dewater or otherwise cause solids to settle out before land application. This is often done by treating the domestic septage with lime and temporarily storing it in a tank or lagoon during periods when the climate or soil conditions are not favorable for land application.

A firm that has dewatered septage in this manner, prior to land application, has several options to consider:

REMIX LIQUIDS AND SOLIDS) MANAGE MIXTURE AS DOMESTIC SEPTAGE

A) Remix the solids with the overlying liquid and apply the mixture according to the annual application rate formula.

[This option is simple and easy to implement.]

[A major drawback of this option is that much of the nitrogen is lost during lime treatment in an open tank or lagoon and the amount of available nitrogen in the domestic septage applied to the farmer's field will likely supply less nitrogen than is assumed using the annual application rate formula.]

MANAGE SEPARATED SOLIDS AS SEWAGE SLUDGE

B) Separate the liquid from the solids and manage the separated solids as sewage sludge, following the Part 503 Regulation for sewage sludge. The liquid effluent could either go into a sanitary sewer, be irrigated onto land, or be discharged to surface water, after obtaining the appropriate approvals and permits.

[A major advantage of this option for the farmer is that the application of the dewatered domestic septage is based upon its analysis for nitrogen, and can therefore supply the agronomic rate (crop requirement) of nitrogen. With this assurance, the farmer does not have to guess how much nitrogen was supplied by the septage and would not be tempted to apply chemical nitrogen to make sure that enough nitrogen had been supplied for his crop.]

[A major disadvantage of this option for the septage service company is the extra cost associated with additional requirements for nitrogen and metal

testing, pathogen and vector attraction reduction, management practices, record keeping, etc.]

Scott Harris of the Interstate Septic Systems in Maine says that their firm dewaters and manages the solids separated from domestic septage as sewage sludge. Their analytical costs run about $200.00 per sample for a complete metal and nutrient analysis. They feel that the extra cost seems to be reasonable for the yearly 2 million gallons of domestic septage which they process.

MANAGE SEPARATED SOLIDS AS DOMESTIC SEPTAGE

C) Separate the liquid from the solids and manage the separated solids as domestic septage. If the separated solids are managed as domestic septage, they can be land applied at an annual application rate based upon the gallons of septage from which they were separated during treatment.

For example, suppose that each 10,000 gallons of domestic septage resulted in 500 pounds of residue after dewatering (consisting of septage solids, tightly held water and added lime). For a 100 bushel per acre corn crop, the annual application rate formula indicates that 38,500 gallons of undewatered domestic septage per acre is the maximum amount that can be applied. The pounds of dewatered septage that can be applied annually can be determined as follows:

$$\text{Pounds of dewatered septage that can be applied} = \frac{\text{Gallons of un-dewatered septage for crop nitrogen requirement}}{10{,}000} \times \text{Pounds of cake solids from 10,000 gallons of septage}$$

$$= \frac{38{,}500}{10{,}000} \times 500 = 1925 \text{ pounds}$$

In this example, a maximum of 1925 pounds of dewatered domestic septage could be applied each year to an acre of land for a 100 bushel per acre corn crop.

The effluent could either go into a sanitary sewer, be irrigated onto a separate area of land, or be discharged to surface water after obtaining appropriate approval and permits as required. Theoretically, one could apply the separated liquid effluent back to the same land to which the separated solids were applied - in this example the 38,500 gallons (less solids) of domestic septage effluent could be applied to the same acre that the 1925 pounds of solids had been applied.

[A major drawback to this option is that only a relatively small quantity of dewatered solids could be applied per acre. These solids would likely not supply the needed crop nitrogen requirement due to losses of nitrogen during lime treatment and dewatering.]

[As a result, nitrogen management on the application site would be difficult. Not knowing the actual nitrogen supplied by the dewatered domestic septage, the farmer might add the full amount of nitrogen required by the crop using chemical fertilizers. As a result, over time the groundwater might become contaminated with excess nitrogen.]

CAUTION

You may not apply a greater volume of domestic septage to land than is calculated by the annual application rate formula (e.g., in Options A and C), even if the applied remixed liquid domestic septage or its separated solids contain less than the required amount of nitrogen for the crop being grown. This is because the EPA Part 503 domestic septage application rate formula limits more than the amount of nitrogen added to the land (e.g., pollutants like heavy metals are also indirectly limited by the formula). The exception to this caution is if domestic septage is treated as sewage sludge in Option C.

Example domestic septage application rates are given in Figure 2 (corresponding to nitrogen requirements for various crops and expected yields). These are only guidance; more exact information on the amount of nitrogen required for the expected crop yield under local soil and climatic conditions should be obtained from a qualified, knowledgeable person, such as your local agricultural extension agent. This crop nitrogen requirement is then used in the annual application rate formula to calculate the gallons per acre of domestic septage that can be applied.

Figure 2: TYPICAL CROP NITROGEN REQUIREMENTS AND CORRESPONDING DOMESTIC SEPTAGE APPLICATION RATES

	Expected Yield (bushel/acre/ year)	Nitrogen Requirement (lb N/acre/year)[1]	Annual Application Rate (gallons/acre/ year)
Corn	100	100	38,500
Oats	90	60	23,000
Barley	70	60	23,000
Grass & Hay	4 tons/acre	200	77,000
Sorghum	60	60	23,000
Peanuts	40	30	11,500
Wheat	70	105	40,400
Wheat	150	250	96,100
Soybeans	40	30	11,500
Cotton	1 bale/acre	50	19,200
Cotton	1.5 bales/acre	90	35,000

[1] These figures are very general and are provided for illustration purposes. They should not be used to determine your actual application rate. Crop fertilization requirements vary greatly with soil type, expected yields, and climatic conditions are also important factors in determining the appropriate volume of domestic septage to apply to a particular field. Different amounts of nutrients can be required by the same crop grown in different parts of the country. To get more specific information on crop fertilization needs specific to your location, contact local agricultural extension agents.

PATHOGEN REDUCTION REQUIREMENTS CROP AND SITE RESTRICTIONS

Domestic septage must be managed so that pathogens (disease-causing organisms) are appropriately reduced. The Part 503 Regulation offers two alternatives from which you can pick to meet this requirement. The first alternative (no treatment) and its restrictions are presented in Figure 3; the requirements of the second option (pH of 12 for a minimum of 30 minutes) are listed in Figure 4.

Please note that both of the pathogen reduction alternatives impose crop harvesting restrictions. However, site access controls are required unless the pH pathogen treatment alternative is used. Remember that you are required to inform the owner/operator of the land where the domestic septage has been applied about these crop harvesting and site access restriction requirements. This notification is required because you, the applier of the domestic septage, must certify that these conditions are met.

Figure 3: **PATHOGEN REDUCTION ALTERNATIVE 1**[1] for Domestic Septage (Without Additional Treatment) Applied to Non-Public Contact Sites

Domestic septage is pumped from the septic tank or holding tank and land applied without treatment, and

Crop Restrictions:

i) 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.

ii) Food crops with harvested parts below the surface of the land shall not be harvested for 38 months after application of domestic septage.

iii) 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.

iv) 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.

Grazing Restrictions:

i) Animals shall not be allowed to graze on the land for 30 days after application of domestic septage.

Site Restrictions:

i) 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 of site, posting with no tresspassing signs, and/or simple fencing.

[1] You must meet either of the two pathogen reduction alternatives discussed in Figure 3 or 4 (not both).

Figure 4: **PATHOGEN REDUCTION ALTERNATIVE 2**[1] for Domestic Septage (With pH Treatment) Applied to Non-Public Contact Sites

The domestic septage pumped from the septic tank or holding tank has had its pH raised to 12 or higher by the addition of material such as hydrated lime or quicklime and, without adding more alkaline material, the domestic septage remains at a pH of 12 or higher for at least 30 minutes prior to being land applied, and

Crop Restrictions:

i) 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.

ii) 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.

iii) 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 less than four months prior to incorporation into the soil.

iv) 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.

v) 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.

Grazing Restrictions: None

Site Restrictions: None

[1] You must meet either of the two pathogen reduction alternatives in Figure 3 or 4 (not both). Note, if you meet this pH 12 pathogen reduction alternative, you also meet vector attraction reduction alternative number 3 listed in Figure 5.

VECTOR ATTRACTION REDUCTION ALTERNATIVES

If you choose pathogen reduction alternative 1 (see Figure 3), land application of the domestic septage without additional treatment, you also will be required to meet one of two vector attraction reduction alternatives. One of these alternatives is subsurface injection of the septage, the other is incorporation into the surface of the soil within 6 hours. The requirements of these two vector attraction reduction alternatives are discussed in Figure 5.

On the other hand, if you choose pathogen reduction alternative 2 (pH treatment as described in Figure 4) you also meet the requirements of vector attraction reduction alternative 3, also shown in Figure 5.

Figure 5: **VECTOR ATTRACTION REDUCTION ALTERNATIVES**[1] for Domestic Septage applied to Non-Public Contact Land

VECTOR ATTRACTION REDUCTION ALTERNATIVE 1: Injection

Domestic septage shall be injected below the surface of the land, AND no significant amount of the domestic septage shall be present on the land surface within one hour after the domestic septage is injected;

OR

VECTOR ATTRACTION REDUCTION ALTERNATIVE 2: Incorporation

Domestic septage applied to the land surface shall be incorporated into the soil surface plow layer within six (6) hours after application;

OR

VECTOR ATTRACTION REDUCTION ALTERNATIVE 3: pH Adjustment

The pH of domestic septage shall be raised to 12 or higher by addition of alkaline material and, without the addition of more alkaline material, shall remain at 12 or higher for 30 minutes.

[1] You must meet vector attraction reduction alternatives 1, 2 or 3 - only one.

CASE EXAMPLES

The following are case examples of septage management options:

CASE EXAMPLE) Management of Untreated Domestic Septage	
1)	The untreated domestic septage is pumped directly into the truck's tank and hauled to a non-public contact site.
2a)	The domestic septage is injected below the land surface with no significant amount of domestic septage remaining on the land surface within one hour after the domestic septage is injected (vector attraction reduction alternative 1).
	OR
2b)	The domestic septage is incorporated into the soil surface within six hours after application to the land (vector attraction reduction alternative 2).
3a)	If an animal feed crop like hay, a food crop like corn (which does usually not touch the surface of the soil), or a fiber crop like cotton is grown, a minimum wait of 30 days after application of the domestic septage is required before the crop may be harvested.
	OR
3b)	A minimum wait of 30 days after application of the domestic septage is required before letting animals graze the pasture.
	OR
3c)	If a food crop, like melons or cucumbers that touch the surface of the soil, is grown, a wait of 14 months after application of the domestic septage is required before that food crop.
	OR
3d)	If you raise a food crop, like potatoes or onions which grow below the surface of the soil, a minimum wait of 38 months after application of the domestic septage is required before that food crop may be harvested. Additional examples of the different kinds of crops described in 3a to 3c are listed in Figure 6.
4)	Public access to this non-public contact site (site with a low potential for public exposure) must be restricted for 30 days after application of untreated domestic septage. Examples of restricted access includes remoteness of site, posting with "no trespassing" signs, and simple fencing.
5)	You must complete and sign the certification listed in Figure 7 about meeting the pathogen and vector attraction reduction requirements.

Figure 6: EXAMPLES OF CROPS IMPACTED BY DOMESTIC SEPTAGE PATHOGEN REQUIREMENTS

With Harvested Parts Which...		
Usually Do Not Touch the Ground	Usually Touch the Ground	Are Below the Ground
Peaches Apples Corn Wheat Oats Barley Oranges Grapefruit Cotton Soybeans	Melons Eggplant Squash Tomatoes Cucumbers Celery Strawberries Cabbage Lettuce Hay	Potatoes Yams Sweet Potatoes Rutabaga Peanuts Onions Leaks Radishes Turnips Beets

CASE EXAMPLE: Management by pH Adjustment	
1)	The pH of domestic septage is raised to 12 by treatment with an alkaline material such as hydrated or quicklime. Each batch of domestic septage that is applied to land must have its pH at 12 for a minimum of 30 minutes. By this treatment you have met the pH part of the pathogen reduction alternative 2 and vector attraction reduction alternative 3.
2a)	If animal feed, a food crop like corn (that does not usually touch the surface of the soil), or a fiber crop like cotton is grown, a minimum wait of 30 days after application of the domestic septage is required before the corn may be harvested.
	OR
2b)	If a feed crop, like hay is grown, a minimum of 30 days after application of the domestic septage is required before the hay may be harvested. However, animals can be grazed immediately after application of the pH-treated domestic septage to the pasture.
	OR
2c)	If a food crop, like melons or cucumbers that touch the surface of the soil is grown, a wait of 14 months after application of the domestic septage is required before that food crop may be harvested.
	OR
2d)	If a food crop, like potatoes or onions which grow below the surface of the soil, is produced, a minimum wait of 20 or 38 months after application of the domestic septage is required before that food crop may be harvested -- the shorter period of time is permitted only if the lime-treated domestic septage remained on the surface of the soil for greater than four months before being incorporated.
3)	There are no animal grazing or public access restrictions in Case 2 where the pH of the domestic septage was raised to 12 for a minimum of 30 minutes.
4)	You must complete and sign the certification listed in Figure 7 about meeting pathogen and vector attraction reduction requirements.

HOW TO RAISE THE pH OF DOMESTIC SEPTAGE

The alkaline materials most commonly used by septage haulers to raise the pH of domestic septage are hydrated lime and quicklime. There are several methods by which hydrated lime or quicklime can be added to the septage for treatment in the pumper truck tank. Methods that septage servicing professionals have recommended are presented below, along with cautions they have passed on. Any one of these methods may work well for you. However, whatever method you choose, you must test two separate, representative samples of the batch of lime-treated domestic septage taken a minimum of 30 minutes apart to verify that the pH remains at 12 or greater for that minimum 30-minute time period. Each method involves adding 20 to 40 pounds of lime per 1000 gallons of domestic septage.

THE pH OF THE DOMESTIC SEPTAGE MUST REMAIN AT 12 OR HIGHER FOR AT LEAST 30 MINUTES AFTER THE ALKALINE MATERIAL IS ADDED.

Using Hydrated Lime

One approach was described by David Pickar, whose septage servicing business is in Oregon. His procedure involves slurrying hydrated lime in water and subsequently bleeding the lime slurry into the vacuum draw line at the same time domestic septage is being pumped into the truck.

He places hydrated lime (calcium hydroxide) in a plastic tank partly filled with water (e.g., 55-gallon open plastic drum or a 100-gallon plastic tank). He adds about 13

gallons of water to 50 pounds of lime and mixes it with an electric paddle mixer to form a slurry. The slurried lime mixture is drawn off through a stop-cock valve at the base of the mixing tank into 5-gallon buckets (for example, plastic paint buckets). Each bucket contains a water-lime slurry with between 20 to 30 pounds of lime (dry weight basis) in the mix. The consistency of this mixture would be somewhat thinner than drywall spackling compound (mud). The 5-gallon buckets are hauled on the septage pumper truck.

Reference: Register of American Manufacturers
JWI, Inc.

A "T" fixture has previously been fitted into the pumper truck's septage draw line. This "T" fitting attaches in a small-diameter, valved polyethylene line (one-half inch in diameter). The line is used at the proper time to bleed slurried lime into the truck as the septage is being drawn in.

David draws a portion of the septage from a septic tank into the truck without bleeding in the lime slurry. He then blows back the partially pumped load of septage into the septic tank to break up any layers of hardened septage solids and grease.

Now, at the same time the septage is pumped back into the truck for hauling and land application, he bleeds the slurry into the truck from a 5-gallon bucket at the rate of one bucket per each 1000 gallons of septage pumped.

The pH of the pumped, lime-treated septage will have to be tested by the pumper to see that enough lime has been added to cause it to remain at a minimum of 12 for 30 minutes. Suggested procedures for sampling and testing the pH are described in the next subsection of this guidance.

Using Quicklime

Tom Ferrero, whose septage servicing business is in Pennsylvania, uses quicklime (calcium oxide) instead of hydrated lime for raising the pH. He reports using a more dilute mixture of water and lime in his slurry than David Pickar (about 80 pounds of lime to 50 gallons of water).

CAUTION: Quicklime is more reactive than hydrated lime and it releases a lot of heat. **IF QUICKLIME IS USED, SAFETY PRECAUTIONS MUST BE TAKEN.** Quicklime can cause bad burns if it gets onto moist skin or into your eyes. Appropriate safety precautions include the use of rubberized gloves, a respirator to exclude dust, and protective eyewear and clothing to keep moist skin from contacting the quicklime. In addition, a fire could start if a bag of quicklime gets wet and sits around. Any fire involving quicklime must be put out using a carbon dioxide [CO_2] extinguisher, not water. Water sprayed onto such a fire would only react with the quicklime and release more heat. (See Appendix D for additional cautions.)

When Tom intends to land apply the septage within an hour or so after pumping, he draws the slurried lime into his truck at the rate of about 20 pounds per 1000 gallons of septage pumped. He has tried drawing the lime slurry into his trucks both before and after pumping the septage, but prefers to draw the slurry in before pumping.

When Tom intends to hold the septage for some period of time before he land applies, he places it in a large tank at his business location. He draws lime slurry into the tank and uses an electric mixer to uniformly raise the pH.

Note: Pumpers have indicated their reluctance to raise the pH in the septic tank either indirectly (as just described) or directly by placing lime in the septic tank before pumping. This is caused by unfounded concern that the raised pH within the septic tank could possibly disrupt the biological treatment that occurs there. The fact is that only very minimal temporary disruptions of the biological treatment occur.

Tom reports that the exact amount of lime solids required per 1000 gallons of septage (generally between 20 and 30 pounds) depends upon the solids content of the septage: thicker septage requires more lime to reach the required pH of 12.

Using Dry Alkaline Material

Hydrated lime or quicklime can also be added in a dry form directly into the pumper truck at the same rate of approximately 20 to 30 pounds per 1000 gallons of domestic septage about to be pumped. The dry lime can be added from the top of the truck via ports or by sucking dry lime into the truck using the vacuum line. However, when sucking the dry lime in through the vacuum line, some of the lime may make its way through to the pump and could ultimately cause undue wear. In addition, the lime may clump in the bottom of the truck and not mix well. Finally, if dry quicklime powder were used, it could react with any moisture in your plastic draw line and release enough heat to damage the line.

Other Alkaline Material

Other alkaline materials may be available for raising the pH of the domestic septage. These materials are often manufacturing byproducts. Some of these byproducts contain significant levels of pollutants such as heavy metals. You should test these materials to determine that you are not adding pollutants in excess of the pollutant concentration levels shown in Appendix B.

General

Any of these pH adjustment alternatives may work for you. The key is that enough lime or other suitable alkaline material be thoroughly mixed with the septage so that the pH remains at 12 for a minimum of 30 minutes before being applied to non-public contact sites.

SAMPLING AND TESTING TO DETERMINE THE pH OF DOMESTIC SEPTAGE

You should not automatically assume that the lime or other alkaline material you have added and the method of mixing chosen will adequately increase the pH of the domestic septage. The pH must be tested. A representative sample should be taken from the body of the truckload or tank of domestic septage for testing. For example, a sampling container could be attached to a rod or board and dipped into the septage through the hatch on top of the truck or tank or through a sampling port. Alternatively, a sample could be taken from the rear discharge valve at the bottom of the truck's tank. However, if the lime has settled to the bottom of the tank and has not been properly mixed with the septage, the sample will not be representative. Two separate samples should be taken 30 minutes apart, and both of the samples must test at pH 12 or greater. If the pH is not at 12 or greater for a full 30 minutes, additional lime can be added and mixed with the septage. However, after mixing in the additional lime, the septage must be at 12 or greater for a full 30 minutes in order to meet the pH requirement of the Part 503 Regulation.

The pH of the domestic septage sample can be tested using either a pH meter or pH-sensitive colored paper. There are several brands of suitable pH-sensitive paper. See Appendix D for additional information about these materials.

CERTIFICATION

The land applier of domestic septage must sign the certification that the pathogen and vector attraction reduction requirements of the Part 503 Regulation have been met and retain this certification in his files for 5 years. The required certification is given in Figure 7. Note that a land applier with employees must assure that his/her employees are qualified. These employees must be capable of gathering the needed information and performing the necessary tasks so that the required pathogen and vector attraction reduction requirements are met.

Figure 7: CERTIFICATION

"I certify under penalty of law, that the pathogen requirements in [*insert either alternative 1 or 2*] and the vector attraction reduction requirements in [*insert either vector reduction alternative 1, 2 or 3*] have/have not [*circle one*] 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 the vector attraction reduction requirements have been met. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment."

Signed: "Im Anna Plier"

(to be signed by the person designated as responsible in the firm that applies domestic septage

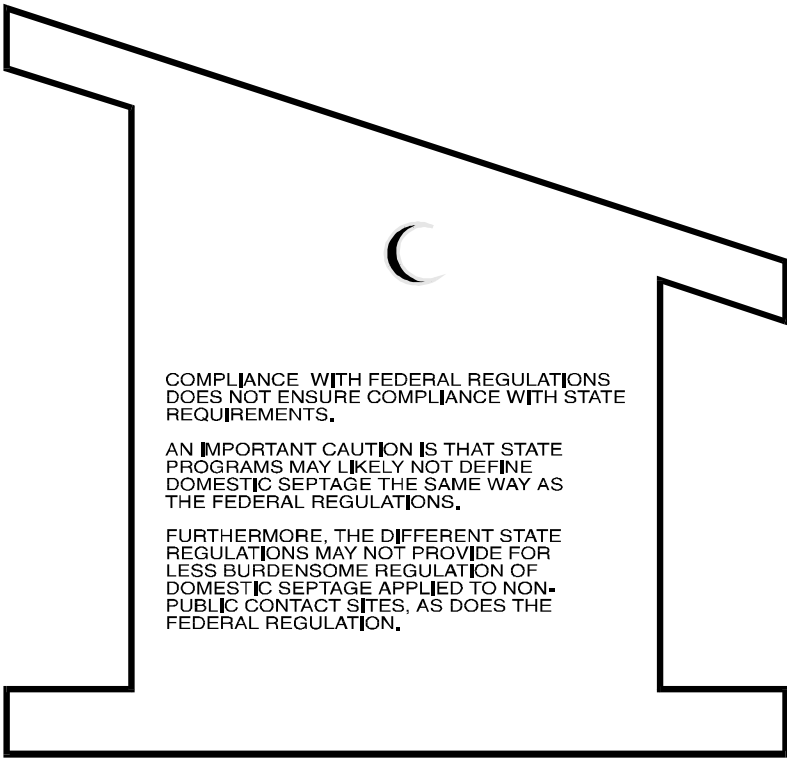
A person is qualified if he or she has been sufficiently trained to do their job correctly. The critical test of this qualification is passing an inspection of field performance and records by authorized State or Federal inspectors.

MANAGEMENT PRACTICES

There are no specific Federal management practice requirements for appliers of domestic septage to non-public contact sites in the Part 503 Regulation. On the other hand, many states have specific management practice requirements that you must follow. Such required practices may include minimum distances between sites where domestic septage has been applied and drinking water wells and surface water streams. Good practice would also suggest a caution against applying domestic septage to flooded, frozen, or snow-covered land such that it will run-off into a wetland or surface water stream. Even if the domestic septage did not reach surface water, it should not be allowed to concentrate and overload a portion of the field with nutrients or be allowed to collect in low areas and road ditches and create a nuisance condition.

STATE RULES ALSO APPLY FOR LAND APPLICATION OF DOMESTIC SEPTAGE

Although the Federal Part 503 Standards for the Use or Disposal of Sewage Sludge, including domestic septage, were signed in 1992 and published on February 19, 1993, many states have had septage management programs for years. The Federal regulation only sets a minimum national standard which must be met by all domestic septage appliers.



In some cases the State requirements may be more restrictive or may be administered in a different manner than the Federal regulation. State programs may likely not define domestic septage in the same manner as the Federal regulation. Furthermore, the different state

regulations may not provide less burdensome regulatory requirements when domestic septage is applied to non-public contact sites, as does the Federal regulation. In any case, appliers of domestic septage to non-public contact sites must meet all requirements of both State and Federal septage regulations until a State obtains approval from EPA for administering the Federal sewage sludge regulatory program. States can change their regulations to meet the minimum Federal standards and obtain a Federally approved program at any time, but they are under no obligation to do so.

DECIDING HOW TO MEET BOTH FEDERAL AND STATE RULES

- Knowing exactly which rules to follow can be somewhat complicated. The following situations should help you to determine what you are required to do:

- In all cases, appliers of domestic septage to non-public contact sites have to follow the new Part 503 Regulation for domestic septage management, as explained in this document.

- If your State has its own rules governing the use or disposal of domestic septage and has not yet adopted the Federal rule, you will have to first assure that you are complying with the Federal rule and then do whatever else is required by the State.

If your State has gained approval from EPA to administer the Federal rule, then you will only have to follow your State's rule to meet the requirements of both rules. This is because your State, as a condition of gaining EPA's approval, has incorporated the Federal requirements into its rule.

Each State has a different approach to regulating the

land application of domestic septage. The current septage management programs of Florida and Minnesota are described in Appendix E. The septage program requirements of these two States are presented as an example of how State and Federal rules may differ. Differences between these two States and the Federal regulatory requirements are summarized in Figure 8. Regulatory requirements of several other states are discussed in the USEPA Region 5 publication (5).

YOU ARE STRONGLY ENCOURAGED TO CHECK WITH THE APPROPRIATE STATE SEPTAGE COORDINATOR (PROVIDED IN APPENDIX A) REGARDING SPECIFIC REQUIREMENTS FOR YOUR STATE.

STATE RULES ALSO APPLY FOR LAND APPLICATION OF DOMESTIC SEPTAGE

FIGURE 8: COMPARISON OF FEDERAL AND SELECTED STATE REQUIREMENTS FOR THE LAND APPLICATION OF DOMESTIC SEPTAGE TO NON-PUBLIC CONTACT SITES

	Federal	Minnesota [1]	Florida
PERMITS REQUIRED	No	No	Yes
Issued By			County
APPLICATION RATE			
Based on:	Crop Nitrogen Requirement	Crop Nitrogen Requirement and Other Nitrogen Impacts	Crop Nitrogen Requirement Max. 500 lbN/acre/yr or 30,000 gal/acre/year
Typical Rate (gallons/acre/year)	38,500	66,700 surface applied or 50,000 injected	
Hydraulic Loading Limits	No	Yes	Yes
Daily Application Rate Max.	No	15,000 gal/acre [2] 10,000 gal/acre [3]	
RECORD KEEPING	Yes	Yes	Yes
Reporting Required	None	None	Quarterly
Years to Be Retained	Five	Not Specified	
Required Information:			
Site Location	Yes	Yes	Yes
Date of Application	Yes	Yes	Yes
Time of Application	Yes	No	No
Number of Acres	Yes	No	Yes
Amount of Septage Applied	Yes	Yes	Yes
Crop Grown	Yes	Yes	Yes
Weather Conditions	No	No	Yes
Certification	Yes	No	No
Depth to Water Table	No	Yes	Yes
Percent Vegetative Cover	No	No	Yes
PATHOGEN REDUCTION	pH 12/2 hours and harvesting restrictions OR Site and harvesting restrictions	Optional	Optional
VECTOR ATTRACTION REDUCTION	pH 12/30 minutes OR Injection Or Incorporation	Optional	pH 12/2 hours

FIGURE 8 Con't **COMPARISON OF FEDERAL AND SELECTED STATE REQUIREMENTS FOR THE LAND APPLICATION OF DOMESTIC SEPTAGE TO NON-PUBLIC CONTACT SITES**

	Federal	Minnesota [1]	Florida
CROP HARVESTING RESTRICTIONS			
Human Food Crops With Harvestable Portions That Touch the Soil Surface But Are Totally Above Ground	14 Months	12 Months [4]	60 Days [5]
Root Crops	20 Months [6] 38 Months [7]	2 Years [4]	Not allowed
Other Food, Fibers or Feed	30 Days	30 Days [4]	30 Days
Grazing	30 Days [4]	1 Year [4]	30 Days
Turf	1 Year [4]		
ACCESS RESTRICTION (Fencing, posting, remoteness, etc.)	Required for Non-Stablized	Required	Case Specific
SET BACK REQUIREMENTS			
Surface Waters	None	Varies with site slope [8]	3000 ft-Class I and 200 ft-other
Public Water Supply Well	None	1000 ft [8]	500 ft
Private Drinking Water Well	None	200 ft [8]	300 ft
Residence	None	200 ft [8]	300 ft
Property Boundary	None	10 ft [8]	75 ft
Recreational Area	None	600 ft (200 ft trails) [8]	None
Intermittent Streams	None	100 ft [8]	None
Road Right-of-Ways	None	10 ft [8]	None
Holes and Channels	None	Varies with site slope [8]	200 ft
SOIL REQUIREMENTS			
Slope	None	0-6% (if surface spread) 0-12% (injected)	8%
Minimum Soil Depth	None	3 ft	2 ft-permeable
Minimum Depth to Water Table	None	3 ft	None
Available Water Holding Capacity	None	6 inches to bedrock or watertable	None
Permeability	None	> .2/hr (if surface spread) inches < 6/hr in at least 1 horizon inches	None
Flooding	None	Free from flooding hazard	None

Notes:
1 = Minnesota's entered information is guidelines, not regulation.
2 = Medium-textured soils.
3 = Fine-textured soils.
4 = Non-treated septage.
5 = Use of septage not allowed on leafy vegetables or tobacco.
6 = If septage remains on the soil surface for four months or longer.
7 = If septage remains on the soil surface for less than four months.
8 = Non-stabilized, surface spread septage.

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APPENDIX A

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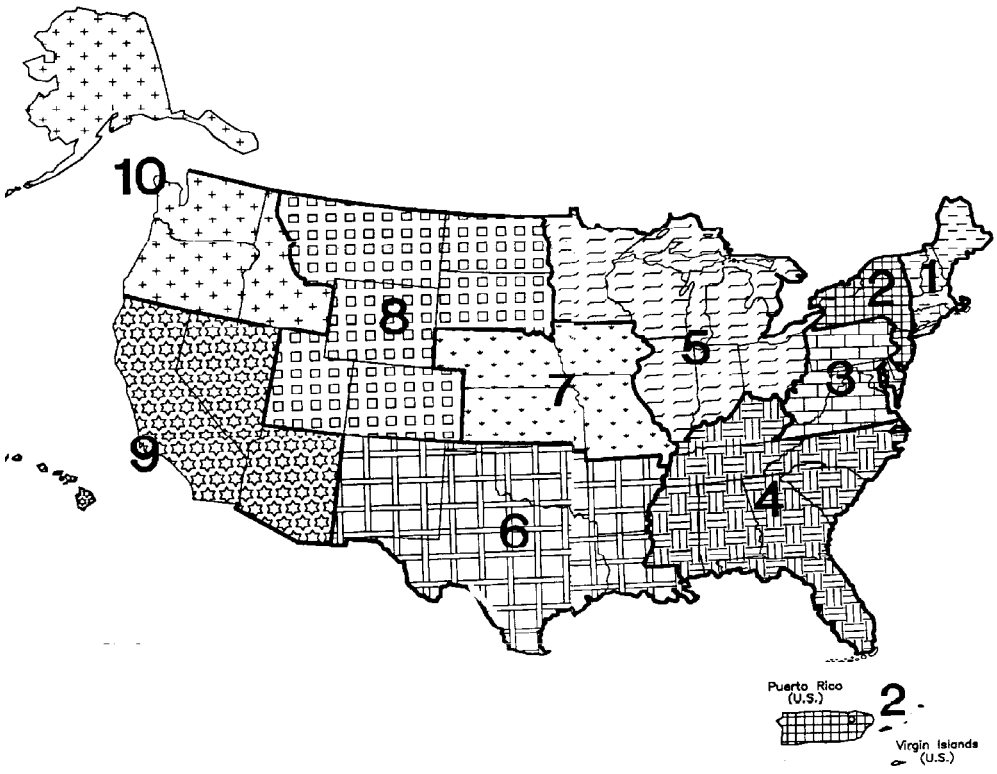
U.S. EPA REGIONS



ALPHABETICAL LISTING OF STATES

Region - State	Region - State	Region - State	Region - State
4 - Alabama	5 - Indiana	9 - Nevada	4 - Tennessee
10 - Alaska	7 - Iowa	1 - New Hampshire	6 - Texas
9 - Arizona	7 - Kansas	2 - New Jersey	8 - Utah
6 - Arkansas	4 - Kentucky	6 - New Mexico	1 - Vermont
9 - California	6 - Louisiana	2 - New York	3 - Virginia
8 - Colorado	1 - Maine	4 - North Carolina	10 - Washington
1 - Connecticut	3 - Maryland	8 - North Dakota	3 - West Virginia
3 - Delaware	1 - Massachusetts	5 - Ohio	5 - Wisconsin
3 - District of Columbia	5 - Michigan	6 - Oklahoma	8 - Wyoming
4 - Florida	5 - Minnesota	10 - Oregon	9 - American Samoa
4 - Georgia	4 - Mississippi	3 - Pennsylvania	9 - Guam
9 - Hawaii	7 - Missouri	1 - Rhode Island	2 - Puerto Rico
10 - Idaho	8 - Montana	4 - South Carolina	2 - Virgin Islands
5 - Illinois	7 - Nebraska	8 - South Dakota	

APPENDIX B

CHEMICAL AND PHYSICAL CHARACTERISTICS OF DOMESTIC SEPTAGE VS. SEWAGE SLUDGE

Parameter	Concentration mg/kg (dry weight basis)		
	Domestic Septage[1]	Sewage Sludge[2]	Pollutant Concentration Limit (PCL)[3]
Arsenic	4	10	41
Cadmium	3	7	39
Chromium	14	120	1200
Copper	140	740	1500
Lead	35	130	300
Mercury	0.15	5	17
Molybdenum	)	4	18
Nickel	15	43	420
Selenium	2	5	100
Zinc	290	1200	2800
Nitrogen as N	2%	2 - 7%	)
Phosphorus as P	< 1%	1 - 3%	)
pH	6 - 7	5 - 8	)
Grease	6 - 12%	5 - 10%	)
Biochemical Oxygen Demand ($B0D_5$)	6,480 mg/l	2000mg/l[4]	)
Total Solids (as normally spread)	3.4%	3 - 35%	)

Notes:

1: Domestic septage characteristics are from Field Guide to Septage Treatment and Disposal.

2: Sewage sludge characteristics are from the National Sewage Sludge Survey, and Wastewater Engineering: Treatment/Disposal/Reuse.

3: Pollutant Concentration Limits are from Table 3 of the Standards for the Use or Disposal of Sewage Sludge (40 CFR Part 503). These regulatory limits apply to sewage sludge, not domestic septage, but is used for comparison purposes here. Sewage sludges meeting these limits can be used without tracking the cumulative amount of metals applied to the land.

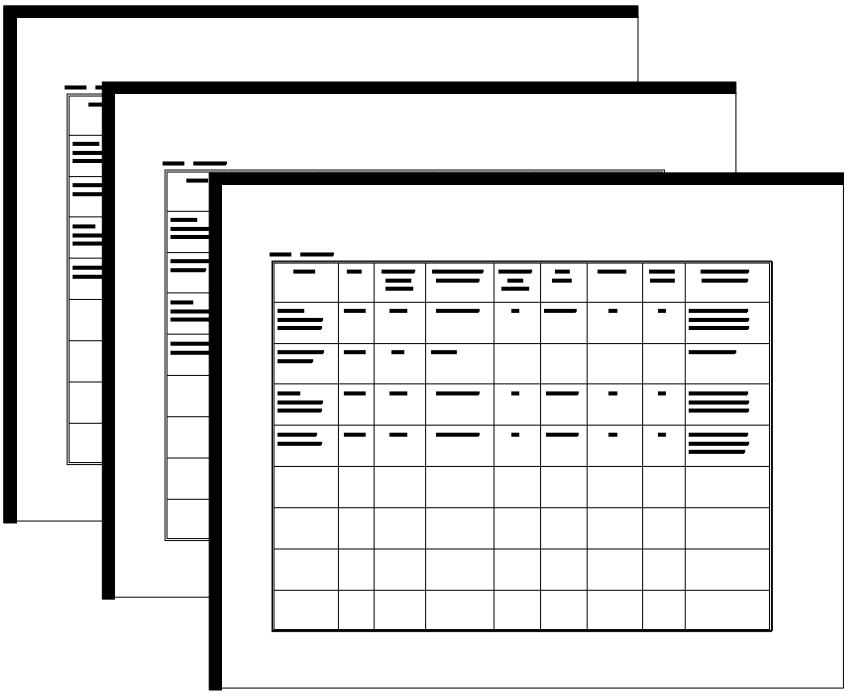
4: BOD_5 varies greatly among sewage sludges.

APPENDIX C

SAMPLE METHODS FOR RECORD KEEPING

There are two examples of ways that might be helpful to you for keeping your records. The first of these examples is for recording information that pertains to the different fields onto which you apply domestic septage.

The second is an example of a daily log that might be kept in the truck as domestic septage is pumped. A sample has also been filled in as an example of the type of information you might actually record.



APPENDIX C-1

EXAMPLE RECORD KEEPING OF GENERAL INFORMATION

SITE: _____

REPORTING YEAR: _____

FIELD NUMBER: _____

CROP(S) and EXPECTED YIELD: _____

_____

NITROGEN REQUIREMENT OF CROP: _____ pounds N per year

ANNUAL APPLICATION RATE (AAR): _____ gallons per acre per year

$$AAR\ (gallons/acre/year) = \frac{Nitrogen\ Requirement\ of\ Crop}{0.0026}$$

HARVESTING SCHEDULE: _____

_____

DATE OF APPLICATION TO SITE	ACREAGE OF SITE TO WHICH SEPTAGE WAS APPLIED	GALLONS APPLIED TO SITE TODAY	TOTAL GALLONS APPLIED YEAR TO DATE

I certify under penalty of law, that the pathogen requirement [*insert alternative 1 or 2*] and the vector attraction reduction requirement [*insert alternative 1, 2 or 3*] have/have not [circle one] 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 that there are significant penalties for false certification including the possibility of fine and imprisonment.

Signature: _____

Printed Name: _____ Title: _____

APPENDIX C-2

DRIVER'S LOG

Driver: _____

Source	Date	Septage Amt. (Gallons)	Type of Alkaline Material Used	Amount (pounds)	How Mixed	Initial pH	pH after 30 Minutes	How Applied & Site/Field/Crop

DRIVER'S LOG

Driver: Sam Stevens

Source	Date	Amount (Gallons)	Type of Alkaline Material Used	Amount (pounds)	How Mixed	Initial pH	pH after 30 min.	How Applied & Site/Field/Crop
Wayside Trailer Park	8-8-93	3000	NONE					Knorr, Stump Rd Pasture, injected Corn, 125 bu
S. Arnold 445 Spring Wayside	8-8-93	1500	NONE					Knorr, Stump Rd Corn, 150 bu Plow in 6 hours
T. Jones East Main Shadyside	8-9-93	1500	NONE					Shadyside Wastewater Treatment Works Shadyside, MD

APPENDIX C-2

DRIVER'S LOG

Driver: Ed Warren

Source	Date	Amount of Septage (Gallons)	Type of Alkaline Material Used	Amount of Lime (pounds)	How Mixed	Initial pH	pH after 30 min.	How Applied & Site/Field/Crop
H. Toms 2331 Webster Camp Springs	7-8-93	2000	hydrated lime	50	slurry bled	12	12	Babett East Hwy 2 Corn 100 bu, plow Camp Springs, MD
Grease Trap at Mel's Diner	7-8-93	300	N O N E					County Landfill
P. Saul 2335 Webster Camp Springs	7-9-93	1500	hydrated lime	35	slurry bled	12	12	Babett East Hwy 2 Corn 100 bu, plow Camp Springs, MD
Napier Apts. Camp Springs	7-9-93	3500	hydrated lime	85	slurry bled	12	12	Babett East Hwy 2 Corn 100 bu, plow Camp Spring, MD

APPENDIX D

TYPES AND SOURCES OF SAFETY AND pH TESTING EQUIPMENT

Safety items needed:

1. Safety Goggles
2. Emergency Eyewash Station
3. Half-mask respirator with appropriate cartridge
4. Shoulder length fully coated neoprene gloves
5. Carbon dioxide fire extinguisher

Some sources of these items are:

Direct Safety Company
7815 South 46th Street
Phoenix, AZ 85044
(800) 528-7405
(800) 366-9662 - fax

Prendergast Safety Equipment Co.
8400 Enterprise Avenue
Philadelphia, PA 19153
(215) 937-1900
(215) 365-7527 - fax

pH Indicator Paper and Meter Sources:

Hach Company
5600 Lindbergh Drive
Loveland, CO 80539
(800) 227-4224

Fischer Scientific
711 Forbes Avenue
Pittsburgh, PA 15219-9919
(800) 242-3772

Lab Safety Supply
P.O. Box 1368
Janesville, WI 53547-1368
(800) 356-0783

Thomas Scientific
P.O. Box 99
Swedesboro, NJ 08085
(800) 345-2100
(609) 467-3087 - fax

Brands of pH meters include Oakton, Fischer and Corning. Suitable meters cost between $50 and $150 depending on features. Indicator paper is a much cheaper method of monitoring pH. A 50 foot roll of pH paper costs under $10.

CAUTION: Trade names and vendors are provided for the benefit of the reader and do not imply endorsement by the U.S. Environmental Protection Agency.

APPENDIX E

EXAMPLE STATE RULES FOR LAND APPLICATION OF DOMESTIC SEPTAGE

Appendix E contains examples of rules and guidelines from two States for governing the use or disposal of septage. The two examples presented are rules from Florida and guidelines from Minnesota. These examples are only given as an indication of how some State rules currently look and how they differ from each other and from the Federal rule. In no way are these examples meant to serve as a model of how a State rule or guideline should look.

THESE AND OTHER STATE REGULATIONS MAY CHANGE AT ANY TIME.

YOU SHOULD NOT RELY ON THIS SUMMARY OF THE FLORIDA AND MINNESOTA RULES TO ENSURE YOU ARE IN COMPLIANCE WITH THEIR SEPTAGE MANAGEMENT REQUIREMENTS.

FLORIDA

Regulations and Restrictions

Florida regulations define septage as "a mixture of sludge, fatty materials, human feces, and wastewater removed during the pumping of an on-site sewage disposal system." Unlike the Federal Part 503 Regulation, Florida does not include the contents of portable toilets or holding tanks. The Florida regulation requires permits for both handling and disposing of septage. These permits are issued by the Department of Health and Rehabilitative Services (HRS) of each county.

FLORIDA Con't

The Florida regulation prescribes when, where, and how much septage should be applied to land, In general, these restrictions are more limiting than the Federal Part 503 regulation. Only septage that has been properly treated by lime stabilization may be land applied. The Florida regulation defines stabilization as raising the pH of the septage to at least 12 for a minimum of 2 hours.

Other Florida restrictions are as follows:

1. Septage may not be spread on land where frequent public access is likely to occur, such as playgrounds, parks, golf courses, lawns and hospital grounds. Suggested suitable lands for septage application include sod farms, pasture lands, forests, highway shoulders and medians, plant nurseries, land reclamation projects and farmland.

2. When applied to areas without vegetative cover, septage must be incorporated into the soil within 48 hours.

3. Pasture land may not be grazed for 30 days following application of septage.

4. Crops may not be harvested for hay or silage for 30 days following application of septage.

5. Human food chain crops other than hay, silage and orchard crops, may not be harvested for 60 days following application of septage.

6. Vegetables and fruits which come into contact with the soil surface may not be grown for a minimum of 18 months following application of

septage.

FLORIDA Con't

7. Septage may not be applied to land used for the cultivation of tobacco, root crops, leafy vegetables or vegetables to be eaten raw.

8. No more than 500 pounds of nitrogen may be applied to each acre in any 12 month period.

9. Septage may not be land applied within 3000 feet of any Class I water body or Outstanding Florida Water. For surface waters of lesser quality (except irrigation canals and ponds), a buffer zone of 200 feet must be maintained. No buffer is required around irrigation waters that are located entirely on the land application site and do not flow off the site.

10. Septage may not be applied within 500 feet of any shallow public water supply wells, nor closer than 300 feet to any private drinking water supply well.

11. At the time of septage application, a minimum of 24 inches of unsaturated soil above the ground water table must be present.

12. Septage may not be applied during rain events when runoff might occur.

13. Septage application area must have buffer zones and stormwater management structures with a capacity to hold runoff during flash floods. Florida also requires on-site facilities for storing septage during periods of poor weather and equipment failures.

FLORIDA Con't

14. The slope of the land application area may not be more than eight percent and a layer of permeable soil at least two feet thick should cover the surface.

15. Land used for septage application may not contain any hole or channel (such as subsurface fractures, solution cavities, sink holes, or excavated core holes) which would allow the septage to contaminate the groundwater. Also, septage may not be applied within a 200 foot buffer from such geologic formations or features.

16. Septage may not be applied within 300 feet of any dwelling.

17. Septage may not be applied within 75 feet of the property boundary or any drainage ditches.

An agricultural use plan (AUP) for the septage application site must be prepared, and reviewed by HRS. An AUP describes how stabilized septage will be used as part of planned farming operations. It includes methods of application, crops to be grown and their fertilizer requirements, erosion control measures, access control measures, harvesting periods and information on the soil and geological conditions at the site which could limit its use for septage application. An AUP must be updated every year.

FLORIDA Con't

Reporting and Record Keeping

The reporting and record keeping requirements of the Florida regulations are very similar to those in the Federal rule. Records must be maintained for five years and made available to State inspectors upon request.

The following information must be included in the records:

1. Dates of septage application;
2. Weather conditions during application;
3. Location of septage application site;
4. Amounts of septage applied;
5. Acreage of the area where septage was applied;
6. The pH of the stabilized septage applied;
7. Depth to the water table from the soil surface when septage applied; and,
8. Percentage of total application area covered by plant growth.

In contrast to the Federal regulation, Florida requires that a quarterly report be submitted to the HRS summarizing the total volume of septage applied.

MINNESOTA

Regulatory Overview

Minnesota's septage management program is more informal than either the Federal or State of Florida programs. The Minnesota Pollution Control Agency has issued a document entitled Land Application of Septage which explains the State's guidelines for land applying domestic septage. The Minnesota definition of septage includes the solids and liquids removed during the periodic maintenance of septic, aerobic or holding tanks, dosing chambers, pit privies or chemcial toilets. Industrial wastes are not covered by this guidance publication; these can only be land applied under the terms of a solid waste disposal permit. No permits are required in Minnesota to apply domestic septage. No formal regulations have been adopted to cover this practice.

Figure E-1: MINNESOTA SEPTAGE APPLICATION SETBACKS (in feet)

Item	Surface Spread		Incorporated Within 2 Hrs	Incorporated Within 24 Hrs	Injected
	lime treated	not treated			
Occupied Dwellings	200	200	100	200	100
Recreational Area, Residential Development & Commercial Development	600	600	300	600	300
Municipal Well	1000	1000	1000	1000	1000
Private Well	200	200	200	200	200
Property Lines & Road Right of Ways	10	10	10	10	none
Intermittent Streams	100	100	25	100	25

MINNESOTA Con't

The Minnesota guidance document provides the following controls for land application of domestic septage:

1. Setbacks: These vary with the method of applying the septage, the time of year and if the septage was stabilized using alkali treatment. Figure E-1 presents the numerous set backs required in Minnesota. In addition to these, the Minnesota guidance document includes setbacks for surface waters, drainage tile inlets and sink holes. These setbacks vary with the slope of the site, the method of application and the time of year.

2. Slope restrictions: These are based on the method used to apply the septage and whether the soil is frozen (see Figure E-2). Minnesota does not prohibit application of septage on frozen grounds but has limited the slope of the land to be used during the winter months. A ban on applications on frozen grounds in this area of the country would severely limit the use of land application and would force development of considerable storage capacity.

Figure E-2: MINNESOTA LAND APPLICATION OF SEPTAGE SLOPE RESTRICTIONS

	Surface Applied	**Injected or Incorporated Within 24 Hours**
Unfrozen Soil	6% slope or less	12% slope or less
Frozen Soil	2% slope or less	not possible

MINNESOTA Con't

3. Soil criteria: Minnesota has developed several characteristics for determining a suitable soil for septage application. These are listed in Figure E-3.

Figure E-3: MINNESOTA REQUIREMENTS FOR SUITABLE SOIL FOR LAND APPLICATION OF SEPTAGE

Medium to fine textured soils (no sandy, peaty or mucky surface textures)

Minimum depth to watertable of three feet through natural or artificial drainage

Minimum depth to bedrock of three feet

Minimum of 6 inches of available water holding capacity between application depth and the watertable and bedrock

Free from flooding hazard

At least one soil horizon in the upper five feet must have a permeability of less than six inches per hour.

If septage is to be surface applied (rather than injected), the soil must have a surface permeability greater than 0.2 inches per hour.

4. Public access controls: The guidance document recommends either fencing or posting septage application sites to avoid the possibility of uninformed people contacting septage that has been applied. Remote sites are not affected by this recommendation.

MINNESOTA Con't

5. Harvest limitations: These are much simpler than the harvesting options provided in the Federal regulation. In Minnesota, septage can only be applied to hay when the leaf area is minimal (primarily early spring, late fall and within one week following cutting). Hay should not be harvested for one month following application of septage. Animals should not be grazed on pasture where septage has been spread or injected for one year following application. Crops with edible portions that may come in contact with the soil can not be planted for one year following application of septage. Root crops or crops for direct human consumption can not be planted for two years after application. No food chain crops should be planted within 30 days of septage application. These waiting periods are based on non-treated septage.

6. Application rates: Minnesota application rates for septage are based on the nitrogen required by the crop grown, residual soil nitrogen, imput of nitrogen from the previous crop, and input of nitrogen from commercial fertilizers and manures. The guidelines also contain daily hydraulic loading limits. Also, septage can not be applied when it is raining.

MINNESOTA Con't

Regarding stabilization, Minnesota recommends that domestic septage, regardless of application method, be mixed with alkaline material to raise its pH to at least 12 and maintain that pH for 30 minutes before it is land applied. If the septage is not stabilized, injection is the suggested method of application. Also, the soil pH at application sites should be maintained at 6.5 to reduce the potential for uptake of metals by plants.

Reporting and Record Keeping

Minnesota has no reporting or record keeping requirements for land application of domestic septage. However, the Minnesota guidelines do contain charts to aid the land applier in keeping track of relevant information.

COMMENTS REQUESTED ON THIS GUIDE

Please let us know what you think about this document. Please offer any suggestions you might have for future improvement using this comment sheet. Please send your comments to us at the U.S. EPA, Office of Wastewater Enforcement and Compliance, Municipal Technology Branch, (4204), Washington, DC 20460.

1) Is this domestic septage guidance document useful to you?

2) Please indicate what you like about the document.

3) Please also indicate what you do not like about the document.

4) Please offer suggestions for its improvement.

5) Please offer suggestions for development of other materials that you believe would be helpful.

6) Name and phone number (optional).

EPA/832-B-92-005

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