

# North Dakota Septic Pumper Manual



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North Dakota Department of Environmental Quality  
Division of Water Quality

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## **Preface**

This manual is presented by the North Dakota Department of Environmental Quality, Division of Water Quality, as an informational guide only. The material contained within is a supplement to North Dakota Administrative Code (NDAC) 33.1-21-02. Septic System servicers must follow all applicable local, state and federal requirements.

## **Purpose**

The purpose of this manual is to establish standards for the servicing of private sewage systems, including cesspools, privies, chemical toilets, holding tanks, and similar devices that receive domestic wastewater; to provide for the use and disposal of wastewaters from these sources while protecting public health from unsanitary and unhealthful practices and conditions; and to protect surface waters and groundwaters of the state from contamination by septage.

## **Report Illegal Activity**

Anyone having knowledge of illegal dumping or unlicensed servicers should report that activity to the department at <https://deq.nd.gov/> or by calling 701.328.5210.

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## Definitions

- 1) **“Department”** means the North Dakota Department of Environmental Quality.
- 2) **“Incorporation”** means the mixing of septage with topsoil to a minimum depth of 4 inches within 48 hours.
- 3) **“Injection”** means the subsurface placement of septage to a depth of 4 to 12 inches.
- 4) **“Land application”** means the spraying or spreading of septage on to the land surface, the injection of septage below the land surface, or the incorporation of septage into the soil.
- 5) **“Litter”** means nonbiodegradable material such as plastics or glass.
- 6) **“Nonpublic contact site”** means land not frequently visited or used by the public. Examples include agricultural land, forests, and reclamation sites.
- 7) **“Portable restroom”** means a self-contained, portable enclosure including a holding tank designed to directly receive human excrement.
- 8) **“Privy”** means a self-enclosure over a watertight structure located in a pit designed to directly receive human excrement.
- 9) **“Public contact site”** means land with a high potential for contact by the public. Examples include public parks, ball fields, golf courses, and cemeteries.
- 10) **“Rural single-family residence”** means a dwelling occupied by a single family or household situated on a property of greater than 5 acres and used primarily for agricultural or horticultural purposes. Examples include growing and harvesting crops and raising livestock.
- 11) **“Septage”** means the liquid or solid material removed from septic systems, cesspools, privies, chemical toilets, holding tanks, and similar devices that receive domestic wastewater.
- 12) **“Septic system”** means a disposal system, and all of its components, used to receive, treat, and dispose of domestic wastewater through microbiological decomposition and soil absorption.
- 13) **“Septic system servicer”** means a person who engages in the business of servicing septic systems, cesspools, privies, chemical toilets, holding tanks, and similar devices that receive domestic wastewater.
- 14) **“Service”** or **“servicing”** means cleaning septic systems, cesspools, privies, chemical toilets, holding tanks, and similar devices that receive domestic wastewater; removing septage from these devices; transporting septage; or disposing of septage by applying it to land or otherwise.

- 15) **“Snow-covered ground”** means ground upon which the snow is at a depth of greater than 8 inches.
- 16) **“Spill”** means to cause or allow to fall, flow, or run out so as to be lost or wasted.
- 17) **“Treatment works”** means any plant or other works used for the purpose of treating, stabilizing, or holding wastes.
- 18) **“Wastewater treatment facility”** means an industrial structure designed to remove biological or chemical waste products from water, thereby permitting the treated water to be used for other purposes.

### **Additional Terms to Know**

- 1) **“Pathogen”** means an organism or substance capable of causing disease.
- 2) **“Vector”** means any living organism capable of transmitting a pathogen from one organism to another.

### **Septic Pumper Classification**

- 1) **Class I** classification includes septic system servicers that operate three or more permitted servicing vehicles or at least one portable toilet-servicing vehicle.
- 2) **Class II** classification includes all septic system servicers not classified as Class I.

### **Permit Application**

A person wishing to engage in the business of servicing septic systems, portable restrooms, holding tanks, and similar devices that receive domestic wastewater shall submit an application for a permit to the department on a form provided by the department. Permits are not required for rural, single-family residence owners applying their own septage to owned property; however, general land application guidelines still apply. If servicing septic systems is a part of a business, the company is considered “in the business” even if that service is not its primary activity. Electronic file submittal of application information is allowed through CERIS-ND. Guidance documents can be found at <https://deq.nd.gov/ereporting.aspx> under the header “CERIS-ND User Help Documents”. Access to the CERIS-ND login page is also located on the above-mentioned webpage. Contact the Septic Pumper Program Staff at 701-328-5210 if you have any questions.

#### **1) Applicant Information**

All applicants shall provide the following information to the department:

- a) The full name and physical business address (street address, not a PO box) of the applicant

- b) The mailing address of the applicant, if different from the physical address
- c) The records in accordance with NDAC 33.1-21-02-05(4)(a) for septic system servicers who have held a permit in North Dakota within the past five years
- d) A copy of a North Dakota state 5-year training certificate or other acceptable training course as pre-approved by the department
- e) A list of all counties in which business is conducted
- f) A list of all disposal methods and land application sites, not exempted under North Dakota Century Code (NDCC) 61-28-04.1, that the applicant proposes to use, if applicable
- g) The signature of the landowner, facility operator, or designated representative of the owner or operator, on a designated form granting permission to use the site for land application, disposal, or treatment.

## **2) Land Application**

Class I septic system servicers shall obtain the department's approval of all land application sites under section NDAC 33.1-21-02-08(2). In addition, Class I applicants shall include the following information on land application sites (even sites that have already been approved) that they propose to use for the permit period:

- a) The name of the property owner
- b) The street address or directions to the site
- c) The location of the property by township, range, section, and quarter section(s) or the latitude and longitude of the property in degrees decimal
- d) The type of vegetation on the land application site (fallow land, pasture, range, forest, other) and the nitrogen requirements for the vegetation
- e) The estimated depth (feet) to seasonally high groundwater at the site and the basis for the estimates
- f) A statement of the specific soil type (clay, gravel, sandy loam, other) at each site
- g) The approximate slope of the land
- h) The acreage available for land application
- i) A proposed summer and winter disposal operation and maintenance plan for each land application site, including provisions for access control and the types and sources of wastes to be managed on the site
- j) Indicate land application sites to be utilized between November 15 and April 1.

### 3) Permit Renewals

A permit shall expire on December 31 of each year. A permit holder shall have a grace period to submit a renewal application with appropriate application fee to the department by March 1 of the following year. After March 1, a new permit application with appropriate application fee shall be submitted to the department. A septic system servicer is not considered permitted until the department approves the new application. An applicant for permit renewal must submit the same information required of a new permit applicant. A septic servicer may NOT continue to operate after March 1 without a permit.

- a) An applicant for permit renewal must submit the same information required of a new permit application.
- b) In addition, septic system servicers shall submit an annual report of disposal activities to the department when applying for a permit renewal. The annual report must include:
  - (1) A list of the disposal sites used, including all land application sites and wastewater treatment facilities. For rural residential exemption land application sites you do not need to submit a list unless it is requested by the department. If requested, you may:
    - Use an invoice number or some other unique identifier for that site and date on your annual report. You will need to provide a disclosure statement on why you want to keep that information confidential,
    - Or submit information indicated as “business confidential”. State in your cover letter that you want the records to be “business confidential under NDCC 44-04-18.4” if you do not want that information as a public record.
  - (2) The type of treatment used to address pathogen and vector control requirements
  - (3) The total volume of gallons handled
  - (4) A record of all spills

### 4) Permit Transfers

Septic system servicers must notify the department upon sale or transfer of the business within 90 days. Upon notification and the new owner’s written agreement to comply with the permit’s terms, the new owner becomes the permit holder for the remainder of the calendar year and shall submit a renewal application in accordance with NDAC 33.1-21-07-05(4).

**5) Fees**

An applicant shall pay the permit or renewal fee to the department at the time the permit or renewal application is submitted. A permit may not be issued or renewed prior to payment of the appropriate fee as follows:

- a) A new permit application fee of \$100 and a \$50 fee per servicing vehicle
- b) A permit holder renewal fee of \$50 per servicing vehicle
- c) A late permit holder renewal fee of \$100 (After March 1) and a \$50 fee per servicing vehicle
- d) A new servicing unit (added to an existing permit) for a fee of \$50.
- e) A permit replacement fee of \$25 (examples include lost or damaged plates.)

Fee	
\$100	New Application
\$ 0	Renewal Application
\$100	Late Renewal Application
\$ 50	Servicing Vehicle (renewal or new)
\$ 25	Replacement Fee

Note: if the applicant holds a valid plumber’s license under NDCC 43-18 and operates no more than one servicing unit, they do not have to pay any fees. Proof of plumber’s license will need to be submitted with septic system servicer’s application.

**6) Application Review**

The department shall review each submitted application for a new or renewed permit. If additional information is required, the department shall notify the applicant within 30 days after the department receives the application, and processing shall be postponed until the application is complete. If the department does not receive the requested information within 90 days of the request, a new application may be required. The department shall review the completed application and either issue, deny, or renew a permit within 30 days after the completed application is received.

Type of Application	Completed Application	Class I Land Application Site Information	Annual Report	Fee
<b>Class I</b>				
New Permit	✓	✓		✓
Renewal	✓	✓	✓	✓
<b>Class II</b>				
New Permit	✓			✓
Renewal	✓		✓	✓

## **Waste Management**

Under a sanitary pumper license from the Division of Water Quality, pumpers ARE licensed to pump out liquid and solid material from septic systems, cesspools, privies, chemical toilets, holding tanks, and similar devices that receive domestic wastewater.

- 1) Pumpers are NOT permitted to pump out vehicle wash pits, vehicle service sumps and pits, vehicle maintenance sumps and pits, industrial sumps and pits, or restaurant grease traps. These are considered non-domestic wastes. If you are pumping out these types of wastes, please contact the Division of Waste Management at 701.328.5166 to obtain a Waste Hauler Transporter Permit.
- 2) Any mixture of domestic septage and non-domestic waste (e.g., in a pumper truck or holding tank) will cause the entire batch to be considered non-domestic waste and is NOT covered under this permit.
- 3) Pumpers are NOT permitted to remove sewage sludge from facilities or operations (e.g., wastewater lagoons) that treat sewage. If you are engaging in this type of activity, please contact the U.S. EPA Biosolids Coordinator at 913.551.7785.

## **Training Requirements**

- 1) Septic system servicers and their employees engaged in the servicing of septic systems are required to take and pass an annual exam provided by the department. The department will offer both a web-based and paper-based exam. The web-based exam can be accessed from the department website ([https://deq.nd.gov/wq/2\\_NDPDES\\_Permits/6\\_SepticPumper/SepticPumperExam/default.aspx](https://deq.nd.gov/wq/2_NDPDES_Permits/6_SepticPumper/SepticPumperExam/default.aspx)). To request a written exam, please contact the department at 701.328.5210.
- 2) All septic system servicers are required to attend a training course provided by the department once every five years. The 5-year training course will be conducted in a different area of the state each year and will rotate on a regular basis (e.g., Bismarck, Minot, Dickinson, Fargo, etc.) The department will also conduct a written test in conjunction with the 5-year training course.
- 3) Other exams or training courses taken may be substituted for the requirement in NDAC 33.1-21-02-06. To obtain pre-approval for a course or exam, submit a copy of the course material, agenda, date, time, and location to the department.

## **Vehicles and Equipment**

- 1) Septic system servicers shall allow the department to inspect the equipment used in servicing at any reasonable time and place designated by the department.
- 2) Vehicles used in servicing shall meet the following identification requirements:

- a) A valid septic pumper plate, as provided by the department, shall be prominently displayed on the rear of the servicing unit.
  - b) The septic system servicer's name shall be displayed on the side of the vehicle in writing no less than 3 inches tall with ½ -inch minimum thickness and in a color distinct from its background.
- 3) All servicing vehicles shall conform to the following:
- a) Be maintained in operational condition
  - b) Expressly used for the hauling or servicing of septage or municipal wastewater treatment sludge and for no other purpose. However, the use of the vehicle for fire protection service, oil recovery, and industrial wastes not regulated under this chapter, is permissible if the tank is flushed or cleaned as necessary prior to and after use.
  - c) Stored in a manner which will not cause a public nuisance
- 4) All approvable holding tanks or containers shall be attached to the vehicle by welding or bolts on a truck chassis or trailer.
- a) Holding tanks shall be constructed of suitable metal or materials approved by the department.
  - b) Each tank shall be strong enough for all conditions of operation, leak proof, contain inertia baffles, and designed to be kept tightly closed to prevent spillage or escape of odors while in transit or storage.
  - c) Discharge valves on tanks shall be watertight, capped when not in use, and constructed and located so as to permit unobstructed discharge.
- 5) Pumps shall be adequate for the required service. The installation shall be designed to prevent backflow or leakage. Connections shall be provided with caps or seals.
- 6) Hoses and piping, when not in use, shall be stored in a manner to prevent leakage or dripping of septage in transit.
- 7) All servicing equipment used for land application of septage shall have a splash plate or some other department-approved method or device to facilitate uniform septage application in land spreading.
- a) One method to help prevent pooling while uniformly spreading out the nutrients is to use a vehicle cab-controlled discharge valve.
- 8) Facilities used for washing the vehicles, tanks, implements, and tools shall be designed to prevent a public nuisance and shall comply with NDCC 61-28.

## **Septage Disposal**

### **1) Disposal**

Septage must be disposed of at a department-permitted wastewater treatment facility to be treated, with the exception of disposal to acceptable sites for land application if no other reasonable method of disposal is available. All septic system servicers shall submit disposal site information to the department with their permit applications as required under NDAC 33.1-21-02-05(2). Treatment facilities that do not have a NDPDES permit number can still be utilized if they are a municipal system but must be reported during the application/renewal process on SFN 60533. Treatment facilities that do not have a NDPDES permit number and are a privately owned facility should not be used.

### **2) Land Application Site Approval**

Class I septic system servicers shall obtain the department's written pre-approval for land application sites. Approval requests may be submitted with a permit application or during the term of the permit. Approval requests not included in a permit application shall include the proposed land application site information listed in NDAC 33.1-21-02-06(3). If the approval request contains all the required information, the land application site may be given conditional approval within 30 days of submission. Full approval is contingent on a site assessment conducted by the department and will be granted automatically unless otherwise notified by the department. The department will not approve sites that may cause harm to the environment or threaten public health. Once given full approval by the department, land application sites shall retain approval for a period of not less than five years, unless additional future information indicates a change in the environmental status of the property. Examples for cause of approval termination include excessive runoff, odor complaints, illegal disposal, etc.

Class II septic system servicers shall follow all general land application requirements as outlined in subsection 4-8.

### **3) Rural Single-Family Exception**

A septic system servicer land-applying septage from a rural, single-family residence on property owned or leased by the owner or lessee of the rural, single-family residence is exempt from obtaining the department's written approval for the land application site. General land application site requirements still apply and must be followed.

### **4) General Land Application Requirements**

Site requirements shall be followed by all septic pumper classifications, including rural, single-family exemptions, and are as follows:

- a) Application of septage is not allowed on a designated 100-year floodplain as defined by FEMA flood maps nor below the ordinary high-water mark.
- b) Application of septage is not allowed on areas of a site ponded with water or septage.
- c) Septage cannot be applied when soils are saturated.
- d) Septage cannot be applied by spraying from public roads or across road right of ways.
- e) All septage that is land-applied must be uniformly distributed over the area by use of a distribution device (such as a splash plate or spreader).
- f) Measures must be taken to ensure that the ponding of septage and runoff does not occur.
- g) Septic system operators are responsible for following all local regulations.
- h) Public contact sites shall be posted for 30 days after septage application.
- i) Land application sites shall be maintained litter free.
  - (1) Pre-screening septage prior to land application is one method in reducing the amount of litter.

**5) Slope Restrictions**

- a) Surface application, injection, or immediate incorporation of septage is allowed on slopes of 6 percent and less.
- b) Injection of septage is required on slopes of greater than 6 percent and up to 12 percent.
- c) Land application of septage is not allowed on slopes of greater than 12 percent.

<b>% of Slope</b>	<b>Type of land application allowed</b>
Slope 0% - 6%	Surface application, injection, or immediate incorporation
Slope 6% - 12%	Injection
Slope > 12%	Not allowed

## 6) Separation Distances

Feature	Surface Applied	Incorporated 48 hrs.	Injected
Private drinking water supply wells	200 feet	200 feet	200 feet
Public drinking water supply wells	1000 feet	1000 feet	1000 feet
Irrigation wells	50 feet	50 feet	50 feet
Residences*	1000 feet	1000 feet	1000 feet
Public contact sites, including roads	200 feet	200 feet	50 feet
Surface water features	200 feet	200 feet	200 feet

\*Distances are as shown unless permission is obtained by owner and resident to alter setback distance. A copy of the written permission will need to be available to the department upon request.

## 7) Application Rates/Hydraulic Loading

Septage shall be applied at a rate of less than 20,000 gallons per acre per day and less than 100 pounds of nitrogen per acre per year. The department may waive these rates upon a site-by-site review basis.

## 8) Pathogen Reduction

All classifications shall incorporate pathogen reduction measures.

a) Alternative 1. Septic system servicers shall pump domestic septage from a septic tank or holding tank and land-apply it without treatment. Crop, grazing, and site restrictions apply.

### (1) Crop Restrictions

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

- 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.
- 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.

(2) Grazing Restrictions

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

(3) Site Restrictions

- 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 trespassing signs, and/or simple fencing.

b) Alternative 2. Septic system servicers shall pump domestic septage from a septic tank or holding tank that has had its pH raised to 12 or higher by the addition of alkaline material. Without the addition of more alkaline material, the septage must remain at a pH level of 12 or higher for at least 30 minutes prior to being land-applied. Crop restrictions will apply.

(1) Crop Restrictions

- 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.
- 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.
- 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.
- 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.
- 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.

- c) Other equivalent alternatives may be acceptable with prior department approval.

## **9) Vector Attraction Reduction**

All classifications shall incorporate vector attraction reduction measures.

- a) Alternative 1. Septic system servicers shall inject below the surface of the land, and no significant amount of the septage shall be present on the land surface within one hour after the septage is injected.
- b) Alternative 2. Septic system servicers shall incorporate domestic septage applied to the land surface into the soil surface plow layer within 48 hours after application.
- c) Alternative 3. Septic system servicers shall raise the pH of domestic septage to 12 or higher by addition of alkaline material. Without the addition of more alkaline material, the septage must remain at a pH level of 12 or higher for 30 minutes prior to being land-applied.
- d) Other equivalent alternatives may be acceptable with prior department approval.

## **10) Snow-covered Ground Application**

Snow-covered ground application is acceptable if there are less than eight inches of snow and less than six percent slope on site and according to general land application requirements NDAC 33.1-21-02-08(4).

## **11) Storage**

Storage of more than 25,000 gallons of septage requires department approval. All storage sites shall be designed and maintained to prevent a public nuisance and shall be in compliance with NDCC 61-28.

## **Spill Reporting and Clean-up**

- 1) Septic system servicers and their employees are required to report all spills to the department as soon as possible, but within 24 hours. The septic system servicers shall keep a copy of the spill report for five years. To report a spill electronically, click on the following link: [https://deq.nd.gov/WQ/4\\_spill\\_Investigations/IncidentReporting.aspx](https://deq.nd.gov/WQ/4_spill_Investigations/IncidentReporting.aspx) or call 701.328.5210 or 701.328.5166. The report shall include:
  - a) Spill location
  - b) Spill volume

- c) Type of material spilled
  - d) Steps taken to clean up the spill
- 2) Septage shall be transported in a manner where it will not leak or spill on to public roads or into areas where it could enter surface or ground water. A written procedure for spill and accident cleanup must be developed by each permit owner, and a copy of the procedure must be kept in each permitted septic vehicle. When a spill occurs, a septic system servicer and any responsible employees shall:
- a) Contain the spill to minimize the impact to the environment and general public.
  - b) Notify the department of all spills.
  - c) Clean the spill area to render it harmless to humans and the environment.
  - d) Dispose of spilled material properly.

### **Record Keeping and Reporting Requirements**

- 1) Septic system servicers must keep records of all their servicing and disposal activities. Each septic system servicer shall maintain records for not less than five years. Records must be available to the department for review upon request. The record-keeping requirements are as follows:
- a) The origin of the septage
  - b) The location of the site where septage is applied or transported
  - c) The number of acres to which septage is applied at each site
  - d) The date and time of each septage application
  - e) Crop or vegetation at each site during the year
  - f) The gallons of septage which are applied to the site during the specified 365-day period
  - g) A description of how the pathogen requirements are met for each land application of septage
  - h) A description of how the vector attraction reduction requirements are met for each land application of septage

### **Inspections**

The department may conduct regular inspections of the records and equipment. These inspections may be random or as the result of complaints or concerns specific to one operation. The department will typically contact the permittee in advance of inspections that review

records; however, unannounced inspections of land application may be conducted. A written report will be provided to the permittee following the inspection.

### **Enforcement, Suspension, and Revocation**

Any permitted septic system servicer who engages in improper servicing or violates any provision of NDAC 33.1-21-02 may be subject to suspension or revocation.

Any person who violates this chapter, or any permit condition, rule order, limitation, or other applicable requirement implementing this chapter, is subject to a civil penalty not to exceed twelve thousand five hundred dollars (\$12,500) per day per violation.

### **Other Information**

#### **1) pH Adjustment**

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. Whichever method you choose, you must test two separate, representative samples of the batch of lime-treated domestic septage. These samples must be 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.

- a) Using Hydrated Lime: One method involves slurring 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.

Hydrated lime (calcium hydroxide) is placed in a plastic tank partly filled with water (e.g., 55-gallon open plastic drum or 100-gallon plastic tank). Add about 13 gallons of water to 50 pounds of lime and mix 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 (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.

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 (1/2 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. Draw a portion of the septage from a septic tank into the truck without bleeding in the lime slurry, then blow back the partially pumped load of septage into the septic tank to break up any layers of hardened septage solids and

grease. At the same time the septage is pumped back into the truck for hauling and land application, bleed 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.

- b) Using Quicklime: Another method uses quicklime (calcium oxide) instead of hydrated lime for raising the pH.

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 on 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 from coming into contact with the quicklime. In addition, a fire could start if a bag of quicklime gets wet and is not disposed of properly. Any fire involving quicklime must be put out using a carbon dioxide (CO<sub>2</sub>) extinguisher, not water. Water sprayed on to such a fire would only react with the quicklime and release more heat. 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.

- c) 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 is used, it could react with any moisture in the plastic draw line and release enough heat to damage the line.
- d) 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 below.

<b>Parameter</b>	<b>Pollutant Concentration Limit (PCL)* (milligrams per kilogram dry weight basis)</b>
Arsenic	41
Cadmium	39
Chromium	1200
Copper	1500
Lead	300
Mercury	17
Molybdenum	18
Nickel	420
Selenium	100
Zinc	2800

\*Pollutant Concentration Limits are from Table 3 of the Standards for the Use or Disposal of Sewage Sludge (40 CFR Part 503).

- e) 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. 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 a pH of 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.
- f) The pH of the domestic septage sample can be tested using either a pH meter or pH-sensitive, colored paper which can be obtained at most laboratories and environmental monitoring companies.

## 2) Web Soil Survey

For information on soil types, slopes, and groundwater, use a county soil survey or the Web Soil Survey found at: <https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>

### 3) US EPA CFR 40 Part 503

U.S. EPA also has requirements on the application of septage. Please refer to the 503 rules for septage found at: <https://www.ecfr.gov/current/title-40/chapter-I/subchapter-O/part-503>

### 4) North Dakota State University Extension Publications

For informational handouts to provide fertilizer recommendations (i.e. nitrogen) for crops and forage in North Dakota, request copies of publication SF882, or other crop-specific publications, from your county extension agent or refer to the North Dakota State University Extension Service website at: <https://www.ndsu.edu/agriculture/extension/publication-search>

### 5) Septic Tank Installers

Septic tank installers are licensed through the North Dakota Department of Environmental Quality. Information for On-Site Wastewater Treatment Systems is available at: [https://deq.nd.gov/WQ/2\\_NDPDES\\_Permits/7\\_SepticSystems/Septic.aspx](https://deq.nd.gov/WQ/2_NDPDES_Permits/7_SepticSystems/Septic.aspx). Installation permitting and inspections are addressed by the local health units.

### 6) Useful Formulas

- a) Annual Application Rate (AAR): the maximum volume of domestic septage that may be applied to any site during a 365-day period in gallons per acre per year.

$$AAR = \frac{\text{Pounds of Nitrogen Required for Crop Growth}}{0.0026}$$

So, for 100 pounds of nitrogen per acre per year, the annual application rate is 38,500 gallons per acre per year.

$$AAR = \frac{100}{0.0026} = 38,500$$

- b) Applied Gallons per Acre:  $= \frac{\text{Total Number of Gallons Applied}}{\text{Total Acres Used}}$

So, if you apply 3,400 gallons of septage on a 20-acre field, the applied gallons per acre would be:

$$= \frac{3400}{20} = 170 \text{ gallons/acre}$$

- c) Pounds of Nitrogen per Acre:  $= \frac{\text{Total Number of Gallons Applied} * 0.0026}{\text{Total Acres Used}}$

So, if you apply 3,400 gallons of septage on a 20-acre field, the pounds of nitrogen per acre would be:

$$= \frac{3400 * 0.0026}{20} = 0.442 \text{ lbs N/acre}$$

d) Gallons left in a horizontal cylindrical tank: = *Total Tank Volume \* Depth Factor*

In order to find the depth factor, please use the table below to make sure you are using the correct ratio. The ratio is:

$$= \frac{\text{Height of the Liquid in the Tank}}{\text{Diameter of Tank}}$$

Ratio (H:D)	Depth Factor	Ratio (H:D)	Depth Factor
0.02	0.0047728	0.52	0.525458
0.04	0.0134171	0.54	0.550875
0.06	0.0244963	0.56	0.576211
0.08	0.037478	0.58	0.601423
0.10	0.052044	0.60	0.62647
0.12	0.0679724	0.62	0.651309
0.14	0.0850946	0.64	0.675896
0.16	0.1032755	0.66	0.700186
0.18	0.1224023	0.68	0.724132
0.20	0.1423785	0.70	0.747684
0.22	0.1631194	0.72	0.770792
0.24	0.1845494	0.74	0.7934
0.26	0.2065999	0.76	0.815451
0.28	0.2292081	0.78	0.836881
0.30	0.2523158	0.80	0.857622
0.32	0.2758682	0.82	0.877598
0.34	0.2998139	0.84	0.896725
0.36	0.3241038	0.86	0.914905
0.38	0.348691	0.88	0.932028
0.40	0.37353	0.90	0.947956
0.42	0.3985771	0.92	0.962522
0.44	0.4237894	0.94	0.975504
0.46	0.4491248	0.96	0.986583
0.48	0.474542	0.98	0.995227
0.50	0.5	1.00	1