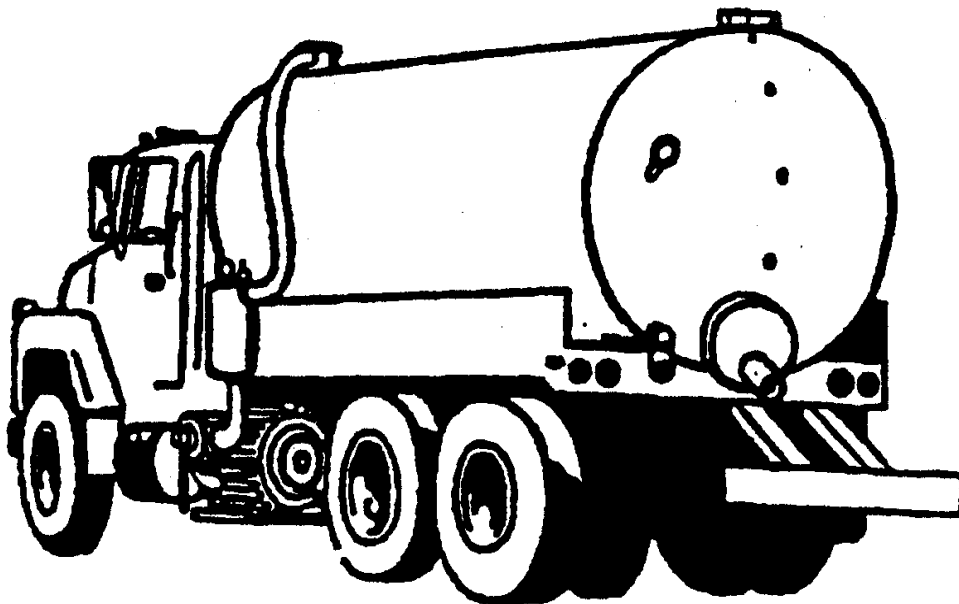


SEPTAGE OPERATOR SERVICING HANDBOOK AND STUDY GUIDE

**for
SEPTAGE SERVICING OPERATOR CERTIFICATION**



Find us on the web!
<http://dnr.wi.gov/regulations/opcert/septage.html>

PREFACE

This HANDBOOK and STUDY GUIDE represents an effort on behalf of the Department to assist those seeking certification as Septage Servicing Operators. The material contained should be used as a study supplement to Wisconsin Administration Code NR 113.

PURPOSE

This HANDBOOK and STUDY GUIDE contain the necessary information an individual would need to study to pass the Septage Servicing Operator certification exams at the Grade T or Grade L levels. Every certified Septage Servicing Operator shall have sufficient knowledge of sanitation and of the principles underlying the operation, servicing and disposal of Septic and Holding Tanks, dosing chambers, grease interceptors, seepage beds, seepage pits, seepage trenches, privies, and portable restrooms, to safeguard the public health and welfare.

SEPTIC TANK/SOIL ABSORPTION SYSTEMS:

A Septic Tank is a large, watertight container, sized to fit the expected loading of wastewater. It is designed to hold wastewater while some treatment takes place.

Three types of treatment happen while wastewater is being held in the Septic Tank. The first type of treatment is that some of the solids in the wastewater settle to the bottom of the tank by gravity and form a sludge blanket (sedimentation). The second type of treatment is that some solids float to the top of the tank and form a scum layer (floatation). In addition to these two physical processes, a third type of treatment, that of biological reactions, are also taking place. The biological reactions are mainly caused by microorganisms that can live without oxygen. This process is called anaerobic decomposition and results in some of the organic materials in the wastewater being broken down into simpler substances.

Byproducts of anaerobic decomposition can be methane gas, hydrogen sulfide gas, and an absence of oxygen. Because methane and hydrogen sulfide gases are very toxic, it is important to follow strict safety precautions when working around Septic Tanks.

Septic Tanks are designed to accumulate sludge and scum, and it is essential that they be emptied periodically. As the sludge and scum accumulate, they lower the capacity of the tank to hold wastewater long enough for anaerobic decomposition to occur and the wastewater is not adequately treated. The frequency of pumping depends on the size of the tank and the loading to it. Typically, a single family residential Septic Tank should be pumped once every two to three years.

The wastewater that flows out of the Septic Tank is only partially treated and receives additional treatment as it is released and absorbed into the soil. It is illegal for a Septic Tank to discharge directly to the land surface or to surface waters.

There are **four common types** of soil absorption systems:

A. Trench System

Many absorption fields consist of a series of trenches. Each trench has a distribution pipe near the bottom surrounded by a bed of gravel. The wastewater flows by gravity through the distribution pipes and into the gravel bed. From the gravel it is absorbed into the soil.

B. Seepage Bed System

A seepage bed is similar to a trench system, except instead of trenches the distribution pipes are laid in a bed of gravel in a large square or rectangular area. The bed of gravel is covered with a one to three foot layer of soil. The wastewater seeps through the gravel and is absorbed into the soil.

C. Pit System

A pit system is also commonly called a drywell. It consists of a deep excavation with the sides of the excavation lined with blocks or some type of porous material. The wastewater seeps into the soil on the bottom or sides of the pit. Many of these systems are still in use in Wisconsin, but they are generally not as desirable as the other three types of systems. They are more likely to fail and they do not provide as much protection to groundwater.

D. Mound System

A mound system is the newest method of soil absorption. It consists of built-up areas of sandy material with the distribution pipes near the base of the mound. They allow septic systems to function on soils that are not suitable for the other three types of absorption systems. Mound systems require a pump to lift the wastewater from the Septic Tank to the distribution pipes in the mound.

SEPTIC TANK MALFUNCTIONS:

Although Septic Tanks malfunction at times, it is usually the distribution system that fails, and not the tank itself. Septic Tanks can have structural failures, such as cracked or broken walls, which could cause septage leaks into the soil without adequate treatment. Groundwater could seep in and hydraulically overload the system. Septic Tank structural failure could also be broken baffles. When the baffles are broken, the wastewater can flow directly across the surface of the liquid in the tank without being held for treatment. This means inadequately treated wastewater reaches the distribution system and can cause failure of the absorption system. When an outlet baffle is broken, solids are more likely to flow out of the tank and into the absorption area, causing clogging of the soil and early failure of the system.

A non-structural type of failure is when a Septic Tank is not emptied often enough and solids accumulate, filling the tank. When this happens, the wastewater is not held in the tank and inadequately treated wastewater reaches the absorption system. This can lead to early failure of the absorption system.

Allowable work that Septic Tank pumpers can do for onsite sewage installations includes such minor repairs as: replacement or repair of manhole risers and covers; replacement or repair of distribution boxes ("D-Box"); and, replacement of Septic Tank baffles. All other replacement or repair work must be done by a properly licensed plumber.

The most common type of failure of an absorption system is when the absorption system loses its ability to accept wastewater as fast as it is discharged from the Septic Tank. This results in ponding in the absorption system, and in severe cases, ponding on the surface or backup of sewers into the house. This kind of hydraulic failure can be caused by either saturated soil conditions or clogging of the soil surface where the treated wastewater is absorbed into the soil.

CONFINED SPACE ENTRY:

Septic Tanks and Holding Tanks are both considered confined spaces because they have limited openings for entry and exit, and they have unfavorable natural ventilation. Because of the anaerobic decomposition of wastewater and the lack of natural ventilation, it is possible for toxic gases to be present in concentrations that can be fatal. Entry into a confined space should only be done in accordance with procedures that are approved by the Department of Workforce Development. These include:

- A. Continuous monitoring of the air with a tri-gas meter that will simultaneously test for oxygen, hydrogen sulfide and combustible gases and immediately signal when the atmosphere falls outside the air quality limits.
- B. Leaving the confined space immediately if the atmosphere falls outside any of the air quality limits.
- C. Not substituting forced ventilation in lieu of monitoring devices.

- D. The use of a harness, lifeline, and winch for emergency extraction of personnel.
- E. Having someone remain outside the confined space area to assist in case of an emergency.

PUMPING SYSTEMS:

The two most common types of pumps used on pumper trucks are vacuum and centrifugal. The vacuum pump system works by having an air pump mounted on the truck's tank to pump air out of the tank. The septage is drawn out of the Septic or Holding Tank by the vacuum in the tank truck. Advantages of the vacuum system are: the liquid does not have to flow through the pump, the system is less likely to freeze in winter, and the operator can use pressure when unloading. A disadvantage is that a vacuum system requires a heavy duty pressure resistant tank. Because of less mechanical problems, the vacuum pump is the most commonly used system.

The centrifugal pump system works by having a rotor spinning at high speed to move the liquid. It is more likely to clog and is subject to wear or damage by grit. More chance for damage is caused because the liquid moves through the pump rather than just through the hose.

Both the vacuum and centrifugal pumps have a maximum suction lift of approximately 27 feet. For higher lifts, a submersible pump is placed directly in the septage to pump into the pumper truck.

HAZARDOUS OR TOXIC WASTES:

Certified and Master Septage Servicing Operators working for a license Septage Business under NR 113 and NR 114 are authorized to haul septage, but are not authorized to transport Hazardous Wastes. Toxic or Hazardous Wastes that are land applied on a field may contaminate the site. Toxic or Hazardous Wastes that are disposed at a wastewater treatment plant may cause serious problems at the plant.

Operators should make sure their customers are reliable and that they will not contract to haul a waste that is contaminated with any toxic or hazardous materials. Operators should also be particularly careful about hauling any waste from a site that is known to handle, store, manufacture, or sell any type of materials that are toxic or hazardous. This could include service stations, garages, metal finishing plants, plating plants, facilities that handle pesticides, factories using solvents, or any chemical manufacturing or processing facilities. **If there is any doubt, it is better to refuse the business than to be responsible for inadvertently causing a toxic or hazardous contamination.**

DISPOSAL TO WASTEWATER TREATMENT PLANTS:

Hauling septage to wastewater treatment plants is a preferred option whenever possible. The Department is working to convince municipal treatment plants to provide excess capacity for septage treatment when possible and to accept septage at reasonable rates for treatment.

Disposal of septage at a wastewater treatment plant is good practice for environmental protection, but can cause problems for a plant. Septage is a high strength waste and can overload a treatment plant if too much is discharged in too short a time. This is especially a problem at small treatment plants. To avoid this problem, some plants have holding tanks to allow the septage to be detained and fed into the treatment processes slowly or during periods of low flow. If there is no holding tank, it may be necessary to unload the truck very slowly, or during off-peak times.

Septage is usually high in solids and may overload the sludge handling capacity of the plant. It may also be high in grit which will cause excess wear on pumps and other machinery.

If septage is high in ammonia it may overload the treatment plant and cause a permit violation. If septage contains toxic materials it could kill the microorganisms in the treatment plant and cause a major plant upset. This type of upset can take several days for the wastewater treatment plant to recover and get back to normal treatment efficiencies.

For these reasons, most plants have established fees for septage disposal and have strict rules relating to septage disposal. Some plants refuse to accept any septage, especially if they are already at or over their design loading capacity.

Large holding tanks proposed for development projects, which are designed to hold more than 3000 gallons per day, must have their waste hauled to a wastewater treatment plant. Before the Department of Commerce can review plans for the installation of these systems, the DNR must receive confirmation from a wastewater treatment plant of their ability and willingness to accept the projected volume of waste from the development.

YEAR-ROUND DISPOSAL:

Licensed haulers can apply to a Publicly Owned Treatment Works (POTW) for permission to discharge septage. In most cases a POTW can refuse to accept it. The exceptions are that a POTW must accept the septage if it comes from a holding tank that is located within the sewer service area or the holding tank service area for that POTW, or if it comes from a Septic Tank that is located in the POTW's sewer service area.

SAMPLING:

Frequently, wastewater treatment plants require that samples be taken from the load during discharge. These samples are used to measure loadings to the plant and to check for toxic or harmful materials if there are upsets or problems at the treatment plant.

In order for a sample to be useful, the sample should be representative of what the entire load contains. In the case of septage, this is not an easy thing to do because septage is high in solids and the solids tend to settle quickly when the truck is stopped.

The best way to get a representative sample from most trucks is to take a sample from the discharge hose as the load is being unloaded. The sample will be most representative if it is taken about midway during the unloading so that it is not influenced by an accumulation of solids on the bottom of the tank or the lower solids portion of the load on the top of the tank. It is also helpful to fill the sample container gradually by

taking several small samples to fill it as the septage is being discharged.

SPILLS:

Any spill of 50 gallons or greater MUST be reported to the Department within 24 hours. A written procedure, the Emergency Spill Plan, detailing spill cleanup must be developed by each licensee and a copy of the Emergency Spill Plan must be kept in the cab of each truck at all times.

Care should be taken to avoid septage spills. If a spill accidentally occurs, proper tools to contain it and clean it up should be available to the operator. This means having the proper tools stored on each septage truck. Common hand tools that should be available on each truck are: a shovel or spade, a squeegee with curved ends, flat suction wands for vacuum truck hose, garden hose, boots or waders, and gloves.

For large spills, it is important to have prior arrangements made to call in another truck to help clean up. This can be another truck from the same business or if only one company truck is available there should be a mutual agreement with other haulers in the area to respond in the case of an emergency. The Operator in Charge is responsible for creating the Spill plan, making sure copies are in each truck and training all employees on what to do in the case of a spill.

LAND APPLICATION:

Septage properly applied to the land is an environmentally sound method of disposal. Septage adds plant nutrients and organic matter to the soil, improving plant growth.

Improper land application of septage can cause a number of environmental and public health problems. That is why land application is so carefully regulated under Section 281.48 of State Statutes and Chapter NR 113 of the Wisconsin Department of Natural Resources Administrative Rules.

Disease causing organisms (pathogens) which may be present in the septage are a primary concern. Septage also contains organic matter that is decaying by anaerobic decomposition and producing the unpleasant odors often associated with land application. Vectors (birds, rodents and insects) are organisms capable of transporting pathogens from one location to another. Control mechanisms are required for pathogens and to reduce the attraction of the septage to vectors. Odors are also reduced by these controls. Any one of the following options act as controls for these problems:

1. Adjust the pH of the septage by adding alkali material to elevate the pH to at least 12 for at least 30 minutes. This must be done whenever septage is surface applied.
2. Incorporate the septage into the soil within 6 hours of surface applying it. (pH adjustment is not necessary in this case).
3. Inject the septage directly beneath the soil surface.

Because septage contains plant nutrients, it can also harm both surface and groundwater. Two of the nutrients of concern are nitrogen and phosphorus. Excess nutrients in surface water can cause unwanted growth of algae and other aquatic plants, lowering the value of the water for most uses. Excess nitrogen in groundwater can cause health problems when the groundwater is used for consumption. The restrictions on land application of septage are designed to minimize the impacts to both surface and groundwater from either run-off of septage or leaching of nutrients into the groundwater.

APPLICATION ON FROZEN OR SNOW COVERED GROUND:

The only septic tank waste which may be land applied on frozen or snow covered ground is waste which has been pumped due to an emergency or waste which has been removed from a septic tank that is a frequently pumped system. Septic tank waste which is **pumped due to routine maintenance may not be land applied on frozen or snow covered ground.**

The rationale behind this approach is that the Department recognizes that emergencies such as freeze-ups or failures can and do occur in parts of the state where disposal into a wastewater treatment plant is not available or feasible (nearest plant may be miles away). To address these emergency situations, land application during winter months will be allowed as long as more stringent conditions are adhered to. In addition, land application of frequently pumped (every 6 months or less) septic systems is also conditionally allowed. This waste is more like holding tank waste in that it is not as high strength as standard septic tank waste. Waste from these systems will continue to be considered like holding tank waste for regulatory purposes. In both situations mentioned above, the Department continues to strongly recommend that waste be taken to a publicly owned treatment plant (POTW) during winter months. It should also be noted that any land application on frozen or snow covered ground must be pH adjusted such that the pH is elevated to 12 or higher for at least 30 minutes, as specified on the previous page 7, in #1.

Septic tank waste which has been pumped due to routine servicing (typically occurs every two to three years) during months with frozen or snow covered ground, must be taken to a POTW. The reasoning behind this is that routine pumping can and should be planned and scheduled in advance to occur at appropriate times of the year. If a county has required the pumping to occur in the winter and will not grant an extension, then this may be considered an emergency and land application may be allowed. Consult with the local DNR representative in these circumstances. The language for septic tank waste disposal while there is frozen or snow covered ground can be found in NR 113.07(1)(b).

It is strongly encouraged to take holding tank waste to a POTW if possible. However, land application of holding tank waste is allowed on frozen or snow covered ground, subject to more stringent requirements, unless it is prohibited by NR 113.07(1)(f). The language for holding tank waste disposal while there is frozen or snow covered ground can be found in NR 113.07(1)(c)

SOIL COMPACTION:

Soil compaction can occur when heavy trucks drive over the soil on a landspreading site. When the soil becomes compacted, the infiltration rate will be lowered, and any rainfall or additional applications of septage may cause ponding or run-off. Soil compaction will lower crop yields and make it more difficult for the landowner to cultivate the land.

Soil compaction can be prevented by not driving on wet fields, staying well within the hydraulic loading rates, not driving on the same areas repeatedly, and by the landowner maintaining a grass or cover crop rather than bare soil.

NITROGEN:

Nitrogen is an essential element for plant growth. Farmers buy fertilizer containing nitrogen to improve their crop yields. Corn is one crop that requires large amounts of nitrogen, and much of the purchased nitrogen is used on corn crops. Because septage contains organic materials, it also contains nitrogen which can be used by the vegetation growing in fields used for landspreading.

Some plants such as alfalfa, clover, and soybeans, takes nitrogen from the air and converts it into forms they can use. Other plants such as corn, small grains, and grasses, must rely on nitrogen stored in the soil. Therefore, they remove much more nitrogen from the soil than the plants that can convert nitrogen from the air.

Loading rates for landspreading of septage are based in part on protecting groundwater from nitrate leaching.

Landowners can calculate the amount of nitrogen added by septage and use less amounts of nitrogen fertilizer on landspreading sites.

If there is not enough nitrogen in the soil, crop yields will be lowered. If there is too much nitrogen in the soil, some of it can leach into the groundwater and cause high levels of nitrate. High levels of nitrate in groundwater can cause problems for both humans and livestock if it is used for drinking water.

CALCULATIONS:

A. Gross and Axle Vehicle Weights:

Certain roads and bridges have either permanent or seasonal load limits. These limits may be given as either gross vehicle weights or axle weights. The operator should be able to calculate both if the empty weight of a truck, the capacity, and the number of axles on the truck is known.

Example

Given: Empty weight = 17,000 Pounds
Capacity = 2,100 Gallons
Number of Axles = 3
(Weight of one gallon = 8 Pounds)

$$\begin{aligned}\text{Gross Weight} &= \text{Empty weight} + (\text{Capacity} \times 8) \\ &= 17,000 + (2,100 \times 8) \\ &= 17,000 + 16,800 \\ &= 33,800 \text{ Pounds}\end{aligned}$$

$$\begin{aligned}\text{Axle Weights} &= \frac{\text{Gross Weight}}{\text{Number of Axles}} \\ &= \frac{33,800}{3} \\ &= 11,267 \text{ Pounds per Axle}\end{aligned}$$

B. Application Rate Limits:

In order to prevent environmental problems, it is necessary to limit septage application rates. Some of these limits are based on the hydraulic loading rate (gallons per acre), and some are based on the nitrogen loading rate (pounds per acre of nitrogen). The maximum allowable loadings are given in NR 113.09.

Nitrogen loading rates must be limited to the amount that will be used by the crop. For a High Use Field a soil analysis must be done, except that leguminous crops (alfalfa, clover) can receive up to 200 pounds per acre of nitrogen (140 pounds per acre for soybeans). For a Low Use Field application is limited to 39,000 gallons per acre (13,000 gallons per acre per week), assuming the crop needs at least 100 pounds of nitrogen per acre. If the crop needs less than 100 pounds of nitrogen per acre, reduce the hydraulic loading according to the following calculation:

Example:

Given: Type of Crop = Oats
Nitrogen needed = 80 pounds per acre
EPA Factor = .0026

$$\begin{aligned}\text{Gallons per acre applied} &= \frac{\text{Pounds of Nitrogen Required}}{.0026} \\ &= \frac{80}{.0026} \\ &= 30,770 \text{ gallons}\end{aligned}$$

C. Actual Rate of Application:

In order to stay within the maximum hydraulic loading rates, the operator must know at what rates the septage is applied. First, the operator should be able to calculate the application rate from one truckload of septage.

Example:

Given: Capacity = 1,000 Gallons
Spreading Width = 10 Feet
Feet Required To Spread Load = 500 Feet
(One Acre = 43,500 Ft.²)

$$\begin{aligned}\text{Area Covered} &= \text{Spreading Width X Feet Required to Spread Load} \\ &= 10 \text{ X } 500 \\ &= 5,000 \text{ Ft}^2\end{aligned}$$

$$\begin{aligned}\% \text{ Of An Acre} &= \frac{\text{Area Covered}}{43,500} \text{ X } 100 \\ &= \frac{5,000}{43,500} \text{ X } 100 \\ &= 11.5\%\end{aligned}$$

$$\begin{aligned}\text{Gallons Spread Per Acre} &= \frac{\text{Capacity}}{\% \text{ of an acre}} \\ &= \frac{1000}{.115} \\ &= 8,696 \text{ gallons}\end{aligned}$$

VEHICLES:

Administrative Code NR 113 requires that every Septage Servicing Business shall provide or have available: facilities for washing vehicles, tanks, implements, and tools. These facilities should be designed to prevent a nuisance to the general public. In addition, clean and well maintained equipment provides an image of a well run professional business.

The wastewater from equipment cleaning must be handled in the same manner as septage. This means it must go to an approved land application site or to a wastewater treatment plant. Discharge to a sanitary sewer is acceptable. **Discharges to roadside ditches, storm sewers, or land that is not an approved land application site are not acceptable.**

LOG BOOKS AND CERTIFICATION STATEMENT:

Each licensed business must keep log books and records of all their servicing and disposal activities. The specific information required is specified in s. 113.11(3). The certification statement is required for all land application activity regarding the pathogen and vector control requirements and is also specified in s. 113.11(3).

ANNUAL REPORTS:

1. Annual Land Application Report (3400-55) - This form must be completed annually if any land application is done. Items which must be reported include: the business name and license number; which method(s) is used to satisfy the pathogen and vector attraction reduction requirements; all sites actually used during the year; the total acres used per site; the total volume applied each field (not the amount applied per acre);

NOTE: Since the computer system tracks Municipal sludge and Industrial waste, it is necessary to enter an outfall number in one column. Use 990 for septic tank waste, 995 for holding tank waste, or 997 if more than 25% grease trap waste. If more than one waste type was applied on the same field, the information must be entered on separate lines (use a separate line for each outfall number). If there are spring and fall applications to the same field, enter data on two separate lines and distinguish them by the different crop years (ie, spring application for 1998 crop year and fall application for 1999 crop year). Leave the "nitrogen supplied from waste" and "other sources of nitrogen" columns **blank**, unless the site is approved as a "high use" field.

2. Other Methods of Disposal or Distribution Report (3400-52) - This form is to be completed annually if any waste was hauled to a wastewater treatment plant (end use = A), other facility (end use = A), or out of state (end use = H). Enter the appropriate "end use" code, the permit number of the receiving entity, the outfall number of the hauled waste (990, 995 or 997), the total volume reported in the units used (ie, gallons).

NOTE: Since this system also tracks Municipal sludge and Industrial waste, it is necessary to enter an outfall number. Enter 990 for septic tank waste, 995 if holding tank waste, or 997 if more than 25% grease trap waste.

**Annual report forms can be viewed and downloaded from the DNR website:
<http://dnr.wi.gov/topic/wastewater/ereporting.html>**

PERSONAL HEALTH:

Hauling septage is not considered a high risk occupation, but because septage does contain disease causing organisms it is important for haulers to follow certain personal safety precautions. Two types of immunizations are commonly recommended by physicians. The first is a primary series for tetanus with a booster every ten years. After five years a booster is recommended if a person is cut or wounded. The second immunization is poliomyelitis. This consists of a primary series with booster recommended by some physicians. Consult your personal physician for a recommendation on boosters.

STUDY GUIDE

PREFACE

This STUDY GUIDE represents the results of an ambitious program. Operators of septage servicing facilities, regulators, educators, and local officials jointly prepared the objectives and exam questions for the Septage Servicing Operator Grade T and Septage Servicing Grade L Certification Exams.

The objectives in this study guide have been organized into four modules: (A) Principle, Structure and Function, (B) Operation and Maintenance, (C) Monitoring and Troubleshooting, and, (D) Safety and Calculation. The objectives are organized to correspond to the major concepts in each module.

Exam questions have been written to correspond to the concepts included in this study guide.

HOW TO USE THESE OBJECTIVES WITH REFERENCES

In preparation for the Grade T and Grade L Exams, the operator should:

1. Determine which Grade Level Exam is to be taken. The Grade L exam is for operators who will be land applying waste and/or taking it to a treatment plant. The Grade T exam is for operators who will only be taking waste to a wastewater treatment plant – land applying is approved. Applicant need to take only one exam; either the Grade L OR the Grade T.
2. Locate the Grade Level designation box to the left of each objective

T	L

T = Grade T

L = Grade L

An (X) beneath the Grade Level designation box indicates that that Objective should be studied for the Grade Level Shown.

1. Read all appropriate objectives and write down the answers to the objectives that readily come to mind.
2. Use the resources at the end of the objectives to look-up those answers you are not sure of.
3. Write down the answers found in the resources to those objectives you could not answer from memory.
4. Review all answered objectives until you can answer each from memory.
5. It is also recommended to read through ALL the definitions listed in NR114.153 and NR113.03.

GENERAL PREPARATION FOR CERTIFICATION EXAMS

Test-Taking Strategies

The DNR certification exams for these grade levels contain multiple-choice questions that offer four answer choices from which you are to choose the correct, or best, answer. There is only one best answer.

Pace Yourself

It is important to pace yourself so you will not spend too much time on one question. If you do not readily know the answer, skip the question and return to it later. Applicants have up to 3 hours to take the exam, although most operators have the exam completed within 60 minutes.

Read Each Question Carefully

It is important that you understand what each question is asking. Some questions may require you to go through more than one step to find the correct answer, while others can be answered quickly on the basis of your acquired knowledge.

Answer The Easy Questions First

The best strategy for taking the exam is to answer the easy questions and skip the questions you find difficult. After answering all of the easy questions, go back and answer the more difficult questions.

Use Logic in Answering More Difficult Questions

When you return to the more difficult questions, try to use logic to eliminate incorrect answers to a question. Compare the answer choices to each other and note how they differ. Such differences may provide clues as to what the question requires. Eliminate as many incorrect answers as you can, then make an educated guess from the remaining answers.

Review Your Work

If there is time left after you have answered every question in an exam, go back and check your work in that exam. Check to be sure that you marked only one answer to each question.

Answer Every Question

Your score on the exam will be based on the number of questions that you answer correctly. Make sure you answer all the questions – even if you have to guess. A question that is missing an answer is marked wrong and will count against your score.

Preparing For Test Day

Although what you know will determine how well you do on the exam, your attitudes, emotions, and physical state may also influence your performance. The following tips will help you do your best on the exam.

- Be confident in your ability to do well on the exam.
- Be prepared to work hard on the exam.
- Know what to expect on test day.
- Prepare well in advance of the exam.
- Get plenty of rest the night before the test.
- Plan to arrive one-half hour before test time.
- Dress comfortably.
- Cellphones are not permitted to be on and may not be used as your calculator.
- **Bring to the test center three sharpened soft-lead (No.2) pencils with erasers, and a calculator.**

GOOD LUCK!!!!!!!!!!

MODULE A: PRINCIPLE, STRUCTURE AND FUNCTION

Directions: The questions below pertain to the certification grade levels (T, or L, or both). The “X” under either of the T or L means the particular question pertains to the marked Grade level(s).

T	L

T = Grade T

L = Grade L

CONCEPT: PRINCIPLE OF SEPTAGE SERVICING

T	L
X	X

1. Describe the environmental concerns associated with the disposal of Septage.

NR 113.01, p.121

T	L
	X

2. Define the following:

A. Publicly Owned Treatment Works Planning Area.

B. Publicly Owned Treatment Works Sewer Service Area.

C. Publicly Owned Treatment Works Holding Tank Service Area.

NR 113.03, (46), (47), (48), pp.122-123

T	L
	X

3. Define the following:

A. Agricultural Land.

B. Approved Site.

C. Complete Application.

D. Hydraulic Loading Rate.

E. Permeability.

F. Site Management.

G. Vector Attraction.

H. Wetlands.

NR 113.03, (1), (4), (11), (27), (39), (59), (69), (71), pp. 121-123

T	L
X	X

4. Explain the general requirements for disposal of Septic and Holding Tank waste to a Publicly Owned Treatment Works (POTW).

NR 113.07, (1), (a),(e-g),(2), (a-c), pp. 125-126

HANDBOOK, p. 6

CONCEPT: STRUCTURE AND FUNCTION

T	L
X	X

5. Describe two types of pumping systems commonly used on pumper trucks.

HANDBOOK, p. 5

T	L
X	X

6. Define the following:

A. Septic Tank.

B. Holding Tank

C. Grease Interceptor.

D. Dosing Chamber.
 E. Privy.
 F. Portable Restroom.
NR 113.03, (56), (26), (21), (15), (43), (41), pp. 122-123

T	L
X	

7. Discuss the following Soil Absorption Systems:
 A. Seepage Trench System.
 B. Seepage Bed System.
 C. Seepage Pit (Drywell) System.
 D. Mound System.
NR 113.03, (54),(52),(53), p. 123
HANDBOOK, pp. 3-4

T	L
	X

8. Define the following:
 A. High Use Field.
 B. Low Use Field.
NR 113.03, (24), (34), p. 122

MODULE B: OPERATION AND MAINTENANCE

CONCEPT: OPERATION

T	L
	X

9. List the items that must be considered to get site approval for Septage land application for the following:
 A. High Use Fields.
 B. Low Use Fields.
NR 113.08, (1), (2), p. 128

T	L
	X

10. Describe how the pH of Septage is controlled and tested.
NR 113.07, (3), (d), (1), (b), p. 128
HANDBOOK, pp. 7

T	L
	X

11. Discuss the special operational restrictions and requirements for land application of Septic Tank and Holding Tank waste on snow covered soil.
NR 113.07, (1), (a-d), p. 125
NR 113.07, (3), (c), (5), p. 128
HANDBOOK, p. 8

T	L
X	X

12. Explain what constitutes a spill and the procedures and tools necessary for clean-up in the event of a spill.
NR 113.03, (65), p. 123
NR 113.06, (3), (b-f), p. 125
HANDBOOK, p. 7

T	L
X	X

13. Discuss when and how Septage is best discharged to a wastewater treatment plant.

NR 113.07, (2), p. 126

HANDBOOK, p. 6

T	L
X	X

14. List some problems wastewater treatment plants have with the treatment of Septage.

NR 113.07, (2), p. 126

HANDBOOK, pp. 6

T	L
X	X

15. Discuss the impact of shock loads and toxic dumps on wastewater treatment plants.

NR 113.07, (2), (b), (3), p. 126

HANDBOOK, p. 6

T	L
X	X

16. State the starting and ending dates for winter Septage disposal to a wastewater treatment plant and know the application deadline for applying to the POTW for permission to dispose of septage during winter.

NR 113.07, (2), (b), p. 126

T	L
X	X

17. Explain the procedure and exceptions to making application to a wastewater treatment plant for winter Septage disposal.

NR 113.07 (2),(b),(1-2), p. 126

HANDBOOK p. 6

T	L
X	X

18. Describe in what situations a wastewater treatment plant is required to accept Septage on a year-round basis.

NR 113.07, (2), p. 126

HANDBOOK, pp. 8

T	L
	X

19. Define surface application and incorporation.

NR 113.03, (66), (28), pp. 122-123

HANDBOOK, p. 7-8

T	L
X	X

20. Discuss size limitations and restrictions on Septage Storage Facilities.

NR 113.12, (1-6),p. 131

T	L
	X

21. List the maximum weekly hydraulic loading applied to an agricultural site in a seven day period for the following:

A. Septic Tank Waste

B. Holding Tank Waste

C. Grease Traps.

NR 113.09, (TABLE 4), p. 129

T	L
	X

22. State the yearly hydraulic loading to a Low Use Agricultural site in gallons for the following:

A. Septic Tank Waste.

B. Holding Tank Waste.

C. Grease Traps.

NR 113.03, (34), p. 122

NR 113.09, (1-6), (TABLE 4), p. 129

T	L
	X

23. Discuss the conditions that cause soil compaction and suggest ways to keep it to a minimum.

HANDBOOK, pp. 8

T	L
	X

24. Describe the positive and negative impacts on Septic tank waste on land use.

HANDBOOK, p. 8

T	L
	X

25. Explain why nitrogen is a concern in the following:

A. Crop Management.

B. Crop Selection

C. Groundwater Protection

HANDBOOK, p. 8-9

T	L
	X

26. List the maximum depth from surface to bedrock/groundwater for the following:

A. Surface Spreading.

B. Incorporation

C. Injection.

NR 113.07, (3), (TABLE 3), pp. 127-128

NR 113.07, (3), (c), p. 128

T	L
	X

27. List the maximum allowable slope for Surface Application, Incorporation and Injection:

A. On Unfrozen Land.

B. On Frozen or Snow Covered Land.

NR 113.07, (3), (TABLE 3), pp. 127-128

NR 113.07, (3), (c), (4), p. 128

T	L
	X

28. List the minimum allowable distance for Surface application, Incorporation, and Injection, from the following:

A. Community Well.

B. Private Well.

C. Residence, Business or Recreational Area.

D. Stream, River or Pond.

E. Dry Run or Property Line.

NR 113.07, (3), (TABLE 3), pp. 127-128

T	L
	X

29. Estimate the permeability in inches/hour for the following:

A. Sandy Loam Soil.

B. Silt Loam Soil.

C. Clay Loam Soil.

NR 113.03, (39), p. 122

NR 113.07, (3), (b), (1-2), p. 127

T	L
	X

30. Define and suggest strategies to avoid ponding.

NR 113.03, (40), p. 122

NR 113.06, (2), (j), (n), p. 125

NR 113.07, (3), (b), (6), p. 127

T	L
	X

31. Describe ways of landspreading Septic Tank waste on field sites with greater than six inches of snow.

NR 113.07, (3), (c), (5), p. 128

T	L
	X

32. Know the amount of time after Septage application that the following crops can be harvested from an agricultural field:

A. Food crops grown in soil.

B. Food or feed crops grown above soil.

C. Crops likely to be in contact with soil/Septage mixtures.

NR 113.07, (3), (d), (2), (a-f), p. 128

T	L
	X

33. Identify the records which must be kept concerning hauling and disposing of Septic wastes.

NR 113.11, (1), (2), (3), pp. 130-131

T	L
X	X

34. Describe the official business documentation that must be carried in each Septage Servicing Vehicle.

NR 113.06, (3), (c), p. 125

T	L
	X

35. Explain the vector attraction reduction requirements on Septage that is applied to agricultural land, a forest, or reclamation site.

NR 113.07, (3), (e), (1-3), p. 128

T	L
	X

36. Explain the pathogen control requirements on Septage that is applied to agricultural land, a forest, or reclamation site.

NR 113.07, (3), (d), (1-2), p. 128

CONCEPT: MAINTENANCE

T	L
X	X

37. Outline a vehicle maintenance and inspection plan.

NR 113.06, (2), (3), pp. 124-125

T	L
X	X

38. Discuss proper truck cleaning procedures.

NR 113.06, (3), (f), p. 125

HANDBOOK p. 10

MODULE C: MONITORING AND TROUBLESHOOTING

CONCEPT: MONITORING

T	L
X	X

39. Discuss what a representative sample is.

HANDBOOK, pp. 6-7

T	L
X	X

40. Describe the procedures for taking a representative sample.
HANDBOOK, pp. 6-7

CONCEPT: TROUBLESHOOTING

T	L
	X

41. Describe the most frequent reasons for a Septic Tank malfunction.
HANDBOOK, p. 4

T	L
X	X

42. Discuss the kinds of repairs that may be required for a malfunctioning Septic and Holding Tank system, and state who may perform these tasks.
HANDBOOK, p. 4

T	L
	X

43. Discuss the problems caused by improper application of Septage.
HANDBOOK, pp. 7

MODULE D: SAFETY AND CALCULATION

CONCEPT: SAFETY

T	L
X	X

44. Understand the Confined Space Entry procedures and requirements.
HANDBOOK, pp. 4-5

T	L
X	X

45. Describe the recommended immunizations for Septage haulers.
HANDBOOK, p. 11

CONCEPT: CALCULATION

T	L
X	X

46. Given a truck with known capacity, estimate the maximum total and axle weights.
HANDBOOK, pp. 9-10

T	L
	X

47. Calculate appropriate Septic Tank waste application rates.
HANDBOOK, pp. 9-10

T	L
	X

48. Determine vehicle spreading rates when applying Septage.
HANDBOOK, p. 9-10

T	L
	X

49. Calculate the Available Water Holding Capacity of a soil sample.
NR 113.03, (6), p. 121

T	L
	X

50. Describe and illustrate an example of how to determine the Annual Agronomic Rate.
NR 113.03, (2), p. 121
NR 113.09, (4), p. 129

RESOURCES

- **Administrative Code NR 113 & NR114**
- **Septage Servicing Handbook.**

Copies may be downloaded from the DNR website:
<http://dnr.wi.gov/regulations/opcert/septage.html>