WISCONSIN

PRIVATE ONSITE WASTEWATER TREATMENT SYSTEM (POWTS)

INSPECTOR'S HANDBOOK

SBD-10089-P (R. 02/22)

FORWARD

The "Private Onsite Wastewater Treatment System (POWTS) Inspector Handbook" is intended to be a self-taught instructional publication primarily for persons interested in becoming certified POWTS inspectors. This handbook and the associated required and recommended reading materials provide the basic knowledge required to perform soil and site verification inspections, review basic POWTS plans, issue state sanitary permits, inspect new system installations, and seek code compliance, if necessary.

The implementation of a significantly revised chapter Comm 83, (now referred to as SPS 383) *Wisconsin Administrative Code*, on July 1, 2000 has resulted in many new technologies being acceptable for POWTS. The technologies offer many options for property owners to choose from on how to treat their domestic wastewater. The use of some of these technologies requires that POWTS Inspectors and installers receive additional training on the installation and use of these system components. Private industry has been very cooperative in providing several opportunities each year to POWTS Inspectors to receive training on the various technologies now available. It is extremely important for the POWTS Inspector to understand these systems and obtain additional training to insure their proper installation, operation, and maintenance.

The "Private Onsite Wastewater Treatment System (POWTS) Inspector Handbook" may also be of interest to those that inspect existing systems for code compliance or are interested in taking the Certified Soil Tester exam.

This handbook is not intended to prepare a person for the Certified Soil Tester exam. It will not, by itself, be sufficient reading and study material for the POWTS Inspector exam because other publications are referenced as necessary study materials.

Other necessary reference materials include the following:

Soil and Site Evaluation Handbook, Rev.01/07 Form SBD-9046 April 2021 Edition
Soil Survey Manual, Chapter 3, March 2017 Edition
Wisconsin Administrative Codes, Chapters SPS 305, SPS 381-387 and SPS 391

If you have any questions about the reading material or self-checks that you will be completing, please feel free to contact one of our wastewater specialists. Please consult the map at the following Department of Safety & Professional Services website for the wastewater specialist nearest you. https://dsps.wi.gov/Documents/Programs/Maps/Wastewater.pdf

POWTS Inspector examinations are conducted monthly at several locations in the state. Exam applications must be submitted 30-days prior to the exam date. You may contact the department's credentialing section at (608) 261-8500 for further information.

Additional information may be obtained on the Department of Safety & Professional Services website: www.dsps.wi.gov

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PRIVATE ONSITE WASTEWATER TREATMENT SYSTEM

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HANDBOOK

An instruction aid prepared by
Division of Industry Services
staff for onsite system practitioners.

Department of Safety & Professional Services
Industry Services Division
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(Revised)

POWTS INSPECTOR - CHAPTER 1

BASIC PRINCIPLES OF ONSITE TREATMENT AND DISPERSAL SYSTEMS

INTRODUCTION

Domestic wastewater may contain harmful substances and must be treated and dispersed in a safe manner to protect the health of the public. To ensure safe dispersal of this wastewater in un-sewered areas, Chapters SPS 383 and 385 of the *Wisconsin Administrative Code* and approved design manuals, establish siting, design, installation, inspection, and maintenance criteria for POWTS. In order to properly inspect these systems, the inspector must understand not only the code, but also the basic principles involved.

OBJECTIVES:

IDENTIFY the harmful substances contained in domestic wastewater.

UNDERSTAND the basic principles that apply to the dispersal of wastewater in relation to protecting public health and the environment.

DEFINE the term local environment as used in the *Soil and Site Evaluation Handbook*.

IDENTIFY the components that have most often been used in Wisconsin for onsite treatment and dispersal.

DESCRIBE the basic operation of a septic tank.

DETERMINE how often the septic tank scum and sludge layers must be pumped out.

IDENTIFY the general content of the wastewater or clarified liquid (effluent) flow from the septic tank.

IDENTIFY the substances that are not affected in the septic tank but can be removed by soil absorption.

DETERMINE how inground dispersal cells are constructed.

RECOGNIZE and **UNDERSTAND** the six factors that must be considered in evaluating land for onsite systems.

LEARNING ACTIVITIES:

READ Chapter 1, Pages 3-9 *Soil and Site Evaluation Handbook*, April 2021

READ Chapters SPS-381, 383, 384 and 385, *Wisconsin Administrative Code*. Inground Soil Absorption Component Manual for Private Onsite Wastewater Treatment Systems Version 2.0 SBD-10705-P (N.01/01)

(Optional) **VIEW** *Producing Watertight Concrete Septic Tanks*, Video by NOWRA/NPCA, 1998

COMPLETE the Self-Check.

SELF-CHECK

1. Of the following named substances, circle those considered to be undesirable and potentially harmful contaminants in domestic wastewater.

   a. Graywater
   b. Pathogenic bacteria
   c. Anaerobic bacteria
   d. Infectious viruses
   e. Putrescible organic matter
   f. Rainwater
   g. Toxic chemicals
   h. Drinking fountain wastes
   i. Excess nutrients

2. Every building for human habitation which cannot be served by a _____ sewer must be served by a _____ that treats and disperses wastewater so that it does not discharge to _____ or _____.

3. What is local environment as used in the *Soil and Site Evaluation Handbook*?

4. Circle the item(s) that can be used to treat and disperse wastewater onsite.
   a. Cesspools
   b. Holding tanks
   c. Spray Irrigation
   d. Septic tank - soil absorption systems
   e. Landfill areas

5. In your own words, how does a septic tank operate to treat domestic wastewater?

6. How often must the sludge and scum layers be pumped from a septic tank?

   a. When it does not receive any waste or is plugged
   b. Every three to five years
   c. When the combined volume of the sludge and scum exceeds 1/3 the capacity of the tank
   d. Each year in the fall or early winter

7. Circle the items considered to be the general content of the septic tank wastewater or effluent.

   a. Odorous liquid
   b. Suspended solids
   c. Organic material
   d. Fats, oil and grease
   e. Ammonia nitrogen
   f. Pathogenic bacteria and viruses

8. What substances are not significantly affected in the septic tank but can be eliminated by soil absorption?

9. Based on the Inground Soil Absorption Component Manuals, dispersal system components may be constructed to a maximum of _____ feet wide. The undisturbed earth between each dispersal component is a minimum of_____ feet wide. The top of the distribution cell is a minimum of _____ inches from the original surface.

10. Determine which soil and site factors in Column I apply to the characteristics listed in Column II. Place the capital letter of the soil or site factor in Column I in the blank space to the left of the number in Column II. (Some items in Column II may have more than one answer.)

	COLUMN I		**COLUMN II**
A.	High groundwater	1.	Land in excess of 25 percent requires additional consideration for conventional systems.
B.	Bedrock	2.	Systems located in floodplains could become a source of water pollution and health hazards.
C.	Flooding	3.	May restrict vertical movement of liquids and can result in back-up or surface discharge of liquids.
D.	Land slopes	4.	Soils affected are unsuitable for POWTS because they result in failure during periods of seasonal saturation.
E.	Permeability	5.	It is essential to have 3 feet of soil from the bottom of the system infiltrative surface to a limiting condition.

F. Setback

6. Soils having design loading rates of .5 to 0.7 gal/ft^2/day are most desirable; those with rates of .3 or slower are generally less suitable for conventional systems.

7. Construction of systems on steep areas is sometimes impractical. Systems may be subject to erosion hazards and side hill seepage of wastewater.

8. Should be evaluated only after other four factors are evaluated and determined not to be problems.

9. Systems located too close to water mains and wells could compromise public health and ground water.

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POWTS INSPECTOR - CHAPTER 2

BASIC SOILS

INTRODUCTION

Soil is defined differently by different people. For example, a biologist or plant scientist accepts the dictionary definition that is "the loose surface material of the earth in which plants grow." Geologists may think of soil as the upper part of the earth's crust that covers the rocks. Engineers usually define soil as any unconsolidated material over bedrock. Soil scientists think of soil as a collection of three-dimensional bodies that together blanket most of the earth's land surface.

Inspectors of Private Onsite Wastewater Treatment Systems (POWTS) that utilize soil for dispersal of treated domestic wastewater must be able to verify findings of soil testers and determine whether the soil is correctly described in the soil test reports. To inspect is sometimes to challenge. Therefore, it is vital to understand the basic concepts of soil science to be able to make the necessary determinations.

This chapter is split into four parts dealing with basic soils. The learning activities for each section are listed at the start of each section. The objectives of this chapter (listed by each section) are:

OBJECTIVES FOR SECTION A:

LIST the five soil-forming factors that determine the way a soil develops.

DEFINE soil parent materials.

IDENTIFY three soil parent materials and **MATCH** the description of the material to its numerical symbol.

IDENTIFY the three basic types of land slopes and **DESCRIBE** how runoff water is affected by these slopes.

IDENTIFY the four natural drainage classes of soil used for soil testing and briefly **DESCRIBE** each class.

OBJECTIVES FOR SECTION B:

DETERMINE the three basic particles defined as soil separates. **APPLY** the separates to an USDA system for classifying soil as to size and texture.

MATCH the twelve texture classes of soil used by soil testers with feel and appearance characteristics for moist soil conditions.

DETERMINE the types and grades of structure used to describe soil structure.

OBJECTIVES FOR SECTION C:

DEFINE terms used to describe water movement in soil.

DESCRIBE what soil mottling is and how it can be identified in soil and described in a report.

IDENTIFY the groundwater monitoring procedures used to document whether mottling is an accurate indication of groundwater at a specific site.

CITE reasons for dispersal area failure due to high groundwater.

OBJECTIVES FOR SECTION D:

IDENTIFY the two general types of soil maps.

IDENTIFY the limitations in using soil maps. Given an example of a parcel of land as a proposed subdivision site, **LOCATE** the site on the maps concerned.

IDENTIFY the types of soils on the parcel, briefly **DESCRIBE** the soils, and **DETERMINE** if a soil treatment and dispersal area would be allowed.

SECTION A: BASIC SOIL TERMINOLOGY

LEARNING ACTIVITIES:

READ Chapters II, III, and IV in S*oil and Site Evaluation Handbook*, April 2021

READ Chapter 3 Examination and Description of Soils in USDA Soil Survey Manual

(Optional) **READ** *Soils of Wisconsin* (1976) by F. D. Hole or *The Soils of Wisconsin* (2021) by Bockheim & Hartemink

COMPLETE the Self-Check.

SELF-CHECK

1. What are the five soil forming factors that the character and arrangement of horizons in each soil depend on?

2. Continuum, to a soil scientist, means:

   a. Water moving at a continuous rate
   b. All soils the same texture
   c. How individual soils blend into each other
   d. Loose surface material of the same color

3. What are soil parent materials?

4. Below are two columns of information. Match the correct term from Column I with the description in Column II. Place the capital letter of the term in Column I in the blank space to the left of the number in Column II. (The responses in Column I may be used more than once.)

	COLUMN I		COLUMN II
A.	Residuum	1.	Fine sands, silts, and clays; laminated or massive; deposited in lake environment; usually nearly level areas, glacial lake plains and terraces.
B.	Glacial till	2.	Material transported by flood waters and deposited on lands along waterways; may be transported for some distance; usually silty, loamy, or clayey.
C.	Glacial-fluvial	3.	Mainly sand or gravel; good to poor stratification; deposited by glacial melt waters as outwash plains, kames, and eskers.
D.	Glacial-lacustrine	4.	Weathered in place from igneous, metamorphic, or sedimentary rock.

E.	Alluvium	5.	Material moved downslope by gravity, sheet erosion, rilling or gullying and redeposited on lower portions of slope or in fan-shaped local deltas; composition dependent on source.
F.	Colluvium	6.	Heterogeneous deposits; lithology related to source materials; transported by glacial ice; found in ground moraine, end moraine, drumlins, etc.

5. Organic soils are typically not suitable for POWTS because:

   a. They are too permeable (fast)
   b. They are very wet
   c. They are not permeable

6. A soil dispersal component will have the least trouble with runoff if it is located on a:

   a. Plane slope
   b. Concave slope
   c. Convex slope

7. Using the three basic types of slopes in Column I, match them with the effects of water movement in Column II. Place the capital letter of the type of slope in Column I in the blank space to the left of the number in Column II.

	COLUMN I		**COLUMN II**
A.	Convex	1.	Runoff carrying and contributing areas.
B.	Concave	2.	Runoff receiving areas.
C.	Plane	3.	Water shedding areas.

8. Circle the letter of the soil drainage class that represents a soil that has seasonal saturation at a depth of one to three feet below the surface.

   a. Excessively drained
   b. Well to excessively drained
   c. Somewhat excessively drained
   d. Moderately well drained
   e. Somewhat poorly drained
   f. Poorly and very poorly drained

9. A soil that has mottles which begin at 3 1/2 feet from the surface is:

   a. Well drained
   b. Poorly drained
   c. Moderately well drained

SECTION B: PHYSICAL PROPERTIES OF SOIL

INTRODUCTION

In Section A, the concepts, formation, profiles, horizons, and composition of soil were covered by reading Chapters II, III and IV of the *Soil and Site Evaluation Handbook*. In this section, soil properties, such as mineral and organic, will be covered. Texture and structure are very important properties, with texture being the most important single property. It is vital for the POWTS inspector to know these properties in order to inspect the site or to determine if reports and test results are valid.

LEARNING ACTIVITIES:

READ Chapter II and III, *Soil and Site Evaluation Handbook*, April 2021

READ Chapter 3 Examination and Description of Soils in USDA Soil Survey Manual

(Optional) **PARTICIPATE** in a soil verification onsite in the field with a county soil specialist or Wastewater Specialist present. Compare soil observation findings.

(Optional) **READ** *Soils of Wisconsin* (1976) by F. D. Hole or *The Soils of Wisconsin* (2021) by Bockheim & Hartemink

COMPLETE the Self-Check.

SELF-CHECK

1. The three phases found in soil, identified as the three-phase system are:

   a. Solid phase
   b. Sandy phase
   c. Silty phase
   d. Liquid phase
   e. Clay phase
   f. Gas (or air) phase

2. The three basic particles defined as separates are:

   a. Sandy loam
   b. Sand
   c. Silt loam
   d. Clay loam
   e. Silt
   f. Mineral
   g. Gas
   h. Clay

3. If the average diameter of a soil separate was 0.05 to 0.002 mm in size, it would be identified as:

   a. Sand
   b. Silt
   c. Clay

4. If a soil separate was gritty (individual particles that are readily seen when dry and gritty when moist), it would be:

   a. Sand
   b. Silt
   c. Clay

5. Below are two columns of information. One statement from Column II is closely related to an item in Column I. Place the capital letter of the soil class in Column I in the blank space to the left of the number of the description in Column II.

	COLUMN I		**COLUMN II**
A.	Sand	1.	Barely forms a moist cast which can bear slight pressure. Does not form a ribbon. Feels very gritty.
B.	Loamy sand	2.	Moist casts can bear considerable handling without breaking; forms a long flexible ribbon and retains plasticity when elongated.
C.	Sandy loam	3.	Moist cast can be handled quite freely without breaking; very slight tendency to ribbon; slightly gritty, fairly smooth and slightly plastic.
D.	Loam	4.	Dry soil is loose; single grains feel gritty and can be seen with the naked eye; when moist and squeezed in hand, the soil mass crumbles when touched.
E.	Silt loam	5.	When moist, feels very gritty; forms a cast that bears careful handling without breaking; doesn't form a ribbon; will compact when squeezed between thumb and forefinger.
F.	Clay loam	6.	When dry, peds can be easily pulverized; feels soft and floury. Moist casts can be freely handled. Will form a ribbon short ribbon with broken appearance.
G.	Clay	7.	Moist casts can bear much handling without breaking; pinched between the thumb and forefinger, it forms a short ribbon whose surface tends to feel slightly gritty when dampened and rubbed.

6. In Wisconsin, the adjectives that are accepted and used in modifying textural classes by the rules of soil science are:

   a. Clay loam
   b. Gravelly
   c. Loam
   d. Cobbly
   e. Silt loam
   f. Sand
   g. Stony
   h. Sandy loam

7. These adjectives are used to modify the soil textural class when the soil horizon has an amount of the soil occupied by rock fragments in the range of:

   a. 1% - 5%
   b. 5% - 10%
   c. 15% - 35%
   d. 20% - 25%

8. If a soil horizon had rock fragments raging in size from 3 to 10 inches (75-250 mm), it would have a texture adjective of:

   a. Gravelly
   b. Cobbly
   c. Stony

9. The textural class adjective given to horizons with 15% - 35% of the material being 12 inches average size would be:

   a. Gravelly
   b. Cobbly
   c. Stony

10. In your own words, define soil structure.

11. Match the type of soil structure in Column I with the definition in Column II. Place the capital letter of the soil structure in Column I in the blank space to the left of the number of the definition in Column II.

	COLUMN I		**COLUMN II**
A.	Platy	1.	Soil peds are longer in the vertical than in the horizontal direction. The peds look like columns or are columnar and the vertical

surfaces are relatively flat and well defined.

B.	Blocky	2.	The soil peds have a blocky appearance and the edges and the sides of the ped can be either flat or somewhat rounded.
C.	Granular	3.	The soil peds are platelike and are oriented in a horizontal plane.
D.	Prismatic	4.	The soil peds have surfaces that are rounded or irregular and the peds are spheroidal or look like crumbs.

12. Match the grade of structure with the description that best fits the grade. Place the capital letter of the structure grade in Column I in the blank space to the left of the number of the description in Column II.

	COLUMN I		**COLUMN II**
A.	Structureless	1.	Has well-formed, distinct peds that will bear careful handling; is still hard to see when in place; is evident when observed in an open pit wall.
B.	Single grained	2.	Soil has poorly formed peds that are not very distinct (barely visible in place); are easily broken when disturbed or handled.
C.	Massive	3.	If a soil contains a considerable amount of clay and is plowed, driven on, or walked on when it is very wet, it will form large clods when it dries out.
D.	Weak	4.	Is easily seen in undisturbed soil; the peds are durable and can easily be picked out of the wall of an observation pit.
E.	Strong	5.	A fine textured soil that is structureless.
F.	Moderate	6.	Sands are structureless and are further described as being of this grade.
		7.	A soil such as sand; has no observable aggregation of particles.

SECTION C: WATER MOVEMENT IN SOIL AND SOIL MOTTLING

INTRODUCTION

The principles of water movement in soil have been studied for many years and continue to be studied today. Much is known about the movement of water in soils. Research studies have influenced the development of codes and guidelines that will safeguard the health of the public. The Wisconsin code has been revised several times over the years to apply what is known about water movement in soil as it relates to POWTS. The applicable code provisions and these principles must be understood in order to properly inspect, evaluate, and determine the suitability of soils for POWTS.

LEARNING ACTIVITIES:

READ Chapter III of *Soil and Site Evaluation Handbook*, April 2021.

READ Section SPS 385.20, 385.30, and 385.40 Wis*consin Administrative Code*, "Soil evaluations", "Soil profile description and interpretations", and "Evaluation reports."

READ Section SPS 385.50 and 385.60, *Wisconsin Administrative Code*, "Governmental unit review", "Soil saturation determinations".

(Optional**) READ** *Redoximorphic Features for Identifying Aquic Conditions* NCSU Tech. Bul. 301, Dept. of Agr. Communications, Box 7603 North Carolina State University, Raleigh, NC 27695-7603

(Optional) **READ** National Resources Conservation Services publication: "Indicators of Hydric Soils."

(Optional) **PARTICIPATE** in verification evaluation of soil backhoe pit to observe and identify soil mottling.

COMPLETE the Self-Check.

SELF-CHECK

1. Match the following terms in Column I with the proper definition in Column II. Place the capital letter of the term in Column I in the blank space to the left of the number definition in Column II.

	COLUMN I		COLUMN II
A.	Bulk density	1.	The energy status of water in soil.
B.	Particle density	2.	Measurement of the ability of soil to transmit water.
C.	Hydraulic Conductivity	3.	To measure the density of the soil particles only.
D.	Permeability	4.	Water having an attraction for itself.
E.	Moisture potential	5.	Densities measured in soils.
F.	Gravitational potential	6.	The total amount of pore space in a given volume in soil.
G.	Matric potential	7.	The attraction of water to soil particles.
H.	Cohesion	8.	The effect of the attraction of water toward the center of the earth.

2. Soil mottling is:

   a. A morphologic indicator of soil saturation
   b. A contrast of colors in a soil indicating seasonal groundwater level
   c. Caused by a fluctuating water table or seasonal zones of saturation
   d. A powerful tool for soil testers to estimate high groundwater conditions
   e. All the above

3. List the three main categories or descriptors used to describe soil mottling.

   a.
   b.
   c.

4. Other than the three main descriptors found in the S*oil and Site Evaluation Handbook*, what main items are used to describe soil mottles?

5. The creation of a soil mottle results from a bacterial action that occurs above the temperature of:

   a. 0° F.
   b. 32° F.
   c. 40° F.
   d. 50° F.

6. Soil mottling is dependent upon the following item(s):

   a. The pH of the soil
   b. Presence of iron and manganese
   c. Temperature above 40° F.
   d. Temporary unsaturated conditions
   e. All the above

7. Premature POWTS failure due to high groundwater can be caused by: (Circle T for TRUE or F for FALSE before each statement.)

T	F	a.	Soil flowing at saturation and clogging the dispersal component or distribution piping.
T	F	b.	The travel times in sandy soils being long enough to assure treatment at all moisture potentials below saturation.
T	F	c.	Accelerated clogging of the dispersal component by slime bacteria that operate during high groundwater and wet soil conditions.
T	F	d.	Slow or no movement of wastewater out of the dispersal component because the soil is already filled with water and is unable to accept additional liquid.
T	F	e.	The movement of liquids and gases in soil that occurs in the soil pores which are the voids between soil particles and soil peds.

8. One condition that is encountered where soil mottling from wetness need not be used to estimate high groundwater is:

   a. Fine textured soil with a mottled zone less than two feet thick that has a depth in the unmottled loamy sand or coarser material, adequate to accommodate a distribution cell.

   b. If a site with more than one foot of mottling is used, the POWTS must be monitored and inspected annually.

   c. The temperature of the soil must be high enough to allow biological activity.

9. If a property owner or developer takes the option to provide documentation that soil mottling is not an indication of high groundwater, a soil saturation determination could be performed according to what section of the code?

   a. SPS 383.44 (3)
   b. SPS 385.50 (2)
   c. SPS 383.42
   d. SPS 385.60 (3)

10. According to the code section that applies to soil mottling and soil saturation determinations, the soil saturation determination shall be done according to the following statements: (Circle T for TRUE or F for FALSE before each statement.)

T	F	a.	Monitoring shall be done in a near normal fall season.
T	F	b.	A near normal spring season is when precipitation received for two out of three years is equal to or exceeds 8.5 to 7.6 inches.
T	F	c.	Monitoring shall be done by a master plumber.
T	F	d.	At least four locations shall be monitored at each site.
T	F	e.	In general, observation wells should extend to a depth of at least 4 feet below ground surface and shall be a minimum of 2 feet below the designated system depth.
T	F	f.	Observations shall be made within two weeks after the frost is absent and thereafter every seven days.

T F g. If any of three of the successive observations show the presence of water above the critical depth, the site is unacceptable.

T F h. A site that is saturated above the critical depth for more than ten days is an unacceptable site.

SECTION D: USE OF SOIL INFORMATION

INTRODUCTION

Soil is managed to a greater extent than years ago. Many studies have been done and much information has been recorded on national, state, county, and municipal levels. Standards have been developed that help understand the language of soil scientists and other groups working with soil. This valuable information should be used to help inspect sites and to aid in evaluation of soil.

LEARNING ACTIVITIES:

READ Chapter 4, *Soil and Site Evaluation Handbook*, April 2021.

(Optional) **OBTAIN** and **READ** published soil surveys (or NRCS Web Soil Survey) for the county of your residence. **LOCATE** your land and **WRITE** a brief summary of the land description.

COMPLETE the Self-Check.

SELF-CHECK

1. In the following matching exercise concerning the categories used by the National Soil Survey, place the capital letter of the term in Column I in the blank space to the left of the number for the descriptor or related item in Column II.

	COLUMN I		COLUMN II
A.	Soil series	1.	Consists of two or more soil series that occur in such an intricate pattern that it is not possible to map them out at the scale used.
B.	Soil phase	2.	Name is usually the name of a town or geographic feature near the place where the series was first observed.
C.	Soil complex	3.	A unit of classification used in detailed mapping that varies slightly from the typical series description.
D.	Map Unit	4.	A named group of soil having soil horizons similar in differentiating characteristics, and arrangement in the soil profile, except for texture for the surface soil.
		5.	Soils of the same series; having similar surface textures; are included in a single soil type (e.g., Plainfield Loamy Sand).

2. What are the two general types of soil maps?

   a. Complex
   b. Reconnaissance
   c. Topographical
   d. Detailed

3. In the following matching exercise, place the capital letter of the term in Column I in the blank space to the left of the number of the item that best applies in Column II.

	COLUMN I		COLUMN II
A.	Reconnaissance map	1.	Are tools for a certified soil tester when understood properly.
B.	Detailed map	2.	Can provide expected site conditions such as possibility of high groundwater, bedrock, steep slopes, or impermeable soils and the extent of suitable soils such as well drained sandy soil.
		3.	Map units consist usually of soil associations and land types (e.g., wet marsh, stony, geographically associated soils).
		4.	Usually prepared on air photos at a scale of 3.17 or 4 inches to one mile.
		5.	Generally of a scale of one inch to one mile or less and made in the field by studying soils at wide intervals.
		6.	When making the map, soil scientists periodically examine soil profiles and record their observations by means of a detailed description.

4. Published soil surveys contain:

   a. All the soil maps of the survey area

   b. Descriptions of the soil map units and their inclusions, interpretive sections for use and management of soils

   c. Engineering section including information on limitations for POWTS

   d. All the above

5. Describe in your own words what an inclusion is; and what the size is of the smallest acreage that can be shown on a soil map and be effectively mapped as a map unit.

POWTS INSPECTOR - CHAPTER 3

LEGAL LAND DESCRIPTIONS OF WISCONSIN REAL ESTATE

INTRODUCTION

It is necessary for POWTS inspectors to find properties where POWTS installations are proposed. To do this, the inspector must know how to read legal land descriptions and maps. This chapter will help in becoming familiar with the maps, procedures, and descriptions of land in Wisconsin.

OBJECTIVES:

IDENTIFY the methods used in layout of the north-south, east-west lines for townships in Wisconsin.

DETERMINE how land descriptions are written and read.

DEFINE terms used in land description and location.

DESCRIBE the Wisconsin Coordinate System.

IDENTIFY the procedures for establishing plats of land.

LEARNING ACTIVITIES:

READ Chapter 5, Legal Land Descriptions of Wisconsin Real Estate, in *Soil and Site Evaluation Handbook*, Rev. 04/21

(Optional) **SECURE** and **READ** one or more of the "Maps in Common Use," listed on Pages 60-61 of the *Soil and Site Evaluation Handbook*, Rev.04/21.

(Optional) **LOCATE** and **GIVE** a legal land description of the property you own or rent.

COMPLETE the Self-Check.

SELF-CHECK

1. The familiar checkerboard pattern of the fields in Wisconsin is the result of the _____ land survey.

2. The method employed in making the survey in Wisconsin was to run parallel east-west lines across the state at _____ intervals.

3. Townships have _____ square miles with _____ acres in each square mile and a total of _____ acres in each township.

4. When you write descriptions of land, start with the _____ unit and end with the _____ unit.

5. If given the description NW of the NW, Section 36 - 37 - 9, which number indicates the township?

6. Using the figure on page 67 of the *Soil and Site Evaluation Handbook*, give a legal description of a 40-acre parcel in the southeast corner of the section.

7. Using the figure on page 67, give the legal description of a 20-acre parcel in the bottom of the southeast corner of the southwest quarter of the same section.

8. Any statement that describes a parcel of land by starting from a known point and following the outside boundaries of the parcel, giving the direction and length of each side, is a _____ and _____ description.

9. Using the figure on page 69 of the *Soil and Site Evaluation Handbook*, write the abbreviated identification of the line in the NW 1/4 of the circle.

10. In your own words, describe the Wisconsin Coordinate System.

11. When a parcel of land is platted, it is done in the following sequence: (number the items in order, 1, 2, and 3, in the space before the item)

    a. The corners of each lot are marked on the ground and a detailed map is made giving all necessary metes and bounds descriptions for locating the boundaries of each lot.

    b. It is surveyed and divided into lots and blocks, each of which is given a number.

    c. The map is called a plat and is recorded in the office of the Register of Deeds in the county where the land is located.

12. A subdivision as defined in Chapter 236, Wisconsin Statutes, is:

    a. A division of land 10 acres or less divided into 2 acres or less

    b. A division of land within a period of five years in five or more parcels of 1 1/2 acres or less

    c. A division of land within a period of ten years in five or more parcels of 1 acre or less

    d. All of the above

13. The following statements are either TRUE or FALSE. (Circle T for TRUE or F for FALSE before each statement.)

T	F	a.	The platting of land is a complex procedure that requires the services of an attorney and a certified soil tester.
T	F	b.	It is illegal to divide any lot of any state level plat for the purpose of sale or building development if the resulting parcels do not conform to the requirements of Chapter 105, Wisconsin Statutes, and local government units.
T	F	c.	Any person causing or making an illegal plat subdivision is subject to forfeit not less than $100 nor more than $500.
T	F	d.	A certified survey map of not more than six parcels of land may be recorded in the Register of Deeds office in the county in which such land is located.
T	F	e.	Only registered soil testers can perform the survey and record the Certified Survey Map.

POWTS INSPECTOR - CHAPTER 4

SITE REQUIREMENTS

INTRODUCTION

The procedures for soil and site evaluation are detailed and defined in Chapter SPS 385 *Wisconsin Administrative Code*. It is the job of a certified soil tester (CST) to carefully evaluate the soil, establish a permanent elevation reference point (bench mark), determine slope, and locate and size the soil dispersal component area. The POWTS inspector must make sure that the evaluation is correct and properly reported. The POWTS must be designed and installed in accord with the results of the soil test, all measurements, elevations, and slopes. At times, the POWTS inspector may have to re-evaluate the soil or advise if site conditions are actually the way they were reported and whether the site will support a code compliant POWTS.

OBJECTIVES:

IDENTIFY purpose for and information needed by a certified soil tester when making client contact.

DETERMINE items to be considered by the certified soil tester when conducting an initial site review.

SELECT and **IDENTIFY** procedures and the needed number and locations of soil borings when making soil evaluations.

LIST requirements needed to document test site locations.

DETERMINE information needed and items reported on the SBD-8330 report form.

IDENTIFY safety requirements when digging and entering excavations and trenches.

IDENTIFY the horizontal and vertical distance requirements involving soil dispersal components.

CALCULATE land slope using hand-held and tripod-mounted instruments.

IDENTIFY procedures for installation of soil dispersal components on a slope or grade.

LEARNING ACTIVITIES:

READ Chapter 6, *Soil and Site Evaluation Handbook*, Rev.01/07.

READ Chapter SPS 385, *Wisconsin Administrative Code*, Soil and Site Evaluation.

(Optional) **READ** *Excavation and Trenching Operations* (SBD-6920)

(Optional) **READ** *Builder's Level* (SBD-6921)

COMPLETE the Self-Check.

SELF-CHECK

1. The following items concern client contact. (Circle T for TRUE or F for FALSE before each statement.)

   T F a. When the client makes contact, the soil tester should obtain the legal description of the property, the size of the property, and other needed information to locate the property boundaries.

   T F b. If a home is to be built, the size of the bedrooms must be known.

   T F c. There should be a written contract between the client and the soil tester.

2. When making an initial site review, the following items should be done:

   a. Check published soil survey from county
   b. Check shoreland areas for flood hazard map
   c. Check road maps to find area
   d. All of the above

3. The following statements are TRUE or FALSE. (Circle T for TRUE or F for FALSE before each statement.)

   T F a. A check of the vegetation and topography will help rule out some areas of wet soil, bedrock outcroppings, and steep slopes.

   T F b. Cattails, tag alders, dogwood, willows, tamaracks, and sedge grasses all indicate dry soil.

   T F c. Areas of a site that are 20 feet back from the top of a slope that exceeds 25 percent must be ruled out for a soil dispersal component.

   T F d. A 25 percent slope is the maximum allowed for a conventional system under the component manual.

   T F e. When cutting a site to reduce the critical slope, 5 feet of permeable soil over bedrock and high groundwater must be present after cutting.

4. The following statements are concerning soil testing procedures. (Circle T for TRUE or F for FALSE before each statement.)

T	F	a.	Soil borings, backhoe pits, or other observation pits must be constructed to a depth of at least 5 feet below the expected bottom of the system.
T	F	b.	Backhoe pits should be inside and within the area to be used for the system.
T	F	c.	On a new property, three borings are usually required as a minimum.
T	F	d.	For sites with estimated daily flows of 1,000 gallons per day or less at least one "soil boring" must be constructed as a soil pit.
T	F	e.	Boring information must include a report on the thickness in inches of the different soil horizons.
T	F	f.	Bedrock is defined as having greater than 75 percent consolidated material by volume.
T	F	g.	High chroma mottles are gray, white, or greenish blue mottles. Low chroma mottles are red, yellow, or brown mottles.

5. The main reason for documenting test site location is:

   a. To be able to locate the site at later date
   b. To keep a good county record system
   c. To provide a process for a future owner to locate the POWTS
   d. To eliminate failure of the soil dispersal component

6. What is a vertical elevation reference point? Please describe briefly in your own words.

7. A vertical elevation point may be:

   a. A pipe or stake driven in the ground where it will not be removed and may be located later

   b. The top of a well casing

   c. The centerline of the road or top of a manhole

   d. Lot line corner

   e. All of the above

8. The following statements are concerning the soil report form (SBD-8330). (Circle T for TRUE or F for FALSE before each statement.)

T	F	a.	In the section dealing with bore hole data, report the total diameter of each of the borings.
T	F	b.	If the boring is 60 inches deep and no mottling is observed, write >60 inches in the "estimate highest" column.
T	F	c.	Instead of identifying the surface soil as "topsoil," use proper abbreviations when describing the texture and color of each horizon.
T	F	d.	The abbreviations for texture are all capital letters.
T	F	e.	An example of reporting a surface horizon would be 6" 10YR 2/1 sil. This means 6 inches of black sandy loam.
T	F	f.	If the sketch on the form is not to scale, it will be necessary to show all distances to locate test sites, suitable areas, as well as all structures and features requiring minimum setback.
T	F	g.	If an extra sheet is used, three copies of the additional sheet are needed.
T	F	h.	Placement of fill does guarantee the approval for the

installation of a soil dispersal component.

T F i. When cutting a site to alter the critical slope, soil test data should be provided to show that sufficient soil material is present over bedrock and groundwater before and after alteration.

POWTS INSPECTOR - CHAPTER 5

SIZING, DESIGN, AND CONSTRUCTION OF POWTS

INTRODUCTION

The July, 2000 revisions to Chapters SPS 383, SPS 384 and SPS 385, *Wisconsin Administrative Code,* altered the way information and requirements for POWTS design and installation is obtained. Under the previous editions of the codes the required information was in the code itself, usually in the form of specific rule requirements. The current code contains a certain number of requirements and standards that must be met. However, design specifications and other guidance is located in POWTS component manuals. To be able to review POWTS plans and perform construction inspections the POWTS Inspector must be able to successfully use a variety of documents. These documents are intended to be used individually or as a series by soil testers, designers and installers to design what is sometimes referred to as a POWTS "treatment train" for a property. The POWTS Inspector must be able to interpret and understand the design to verify if it is code compliant.

OBJECTIVES:

LIST the minimum and maximum distances and measurements that apply to the installation of POWTS.

IDENTIFY the materials, measurements, and design criteria that apply to the construction of septic tanks.

LIST the minimum and maximum depths and distances that apply to construction and installation of soil dispersal components.

IDENTIFY the general requirements of soil dispersal components that are installed during periods of inclement weather conditions.

DETERMINE the sizing requirements, design criteria, and distances that apply to holding tanks.

LEARNING ACTIVITIES:

READ Chapters SPS 383, 384, 385, *Wisconsin Administrative Code* and the following component manuals, SBD-10855-P (N.03/07), & SBD-10705-P (N.01/01)

READ Section SPS 384.25, *Wisconsin Administrative Cod*e, "POWTS holding components or treatment components"

READ Chapter SPS 383 Subchapter V-Management, *Wisconsin Administrative Code*

COMPLETE the Self-Check.

SELF-CHECK

1. The size and potential design criteria for a proposed soil dispersal component shall be determined from:

   a. Existing, surrounding installations
   b. Good plumbing practices
   c. Morphological characteristics of the soil borings

2. No septic tank shall be located within _____ feet of a structure, _____ feet of a well, or _____ feet from any high water mark of any lake, stream, pond, or flowage.

3. Based on the In-ground Soil Absorption Component Manuals, for facilities that have a design wastewater flow of _____ gallons per day or less, flow from the septic or treatment tank to the soil dispersal component may be by _____ or by _____.

4. Based on the In-ground Soil Absorption Component Manuals, for facilities that have a design wastewater flow greater than 1,500 gallons per day, the wastewater must be discharged by _____ or by use of a _____.

5. The bottom of the soil dispersal component shall be level with the excavation no greater than _____ feet in width. The absorption area of a stone aggregate soil dispersal component shall be computed by using the _____ area only.

6. If the distribution header is constructed of approved _____ wall pipe the bottom area of the header excavation _____ be computed as absorption area.

7. Soil dispersal component excavations shall be spaced at least _____ feet apart.

8. The soil dispersal component shall be provided with 2 observation pipes a minimum of _____ inches in diameter and extending to or above final grade.

9. A minimum of _____ inches of stone aggregate ranging in size from _____ to_____ inches shall be laid below the distribution pipe and shall extend at least _____ inches over the top of the distribution pipe which shall be covered with synthetic material accepted by the Department.

10. According to information contained in the In-ground Soil Absorption System Component Manual, Version 2.0, where dosing of the distribution pipe network is required, a _____ or _____ pump shall be used
11. A soil dispersal component shall not be installed if the soil at the system elevation is _____.

12. If the excavated material freezes solid, it shall not be used as _____. The first _____ inches of backfill shall be loose, unfrozen soil.

13. Inspection of soil dispersal components installed during winter conditions shall include inspection of the _____ prior to placement of gravel and inspection of the _____ at the time of placement.

14. All septic tanks shall be fabricated or constructed of:

    a. Welded steel
    b. Monolithic concrete
    c. Fiberglass
    d. Department-approved materials
    e. All of the above

15. Each covered tank shall be provided with _____ or_____ openings of sufficient_____ and located in such a manner to provide a means for _____ or required _____or _____ of the tank. Servicing and maintenance openings for treatment tanks located below ground shall terminate no more than _____ inches below finished grade and terminate with a _____ that prevents entrance of _____ material.

16. Covers which terminate at or above grade, 8 inches in diameter or larger, shall be provided with a _____ _____and shall remain _____ except for cleaning or maintenance purposes.

17. For openings larger than _____ in diameter, a ____ x ____ label must be affixed to the cover, warning of the hazards present when entering a treatment tank.

18. The minimum liquid capacity of a septic tank may be based on daily flow and a _____ year servicing cycle.

19. The wording on a warning label must be a minimum of _____ in height.

20. A _____ inch label printed in red or other contrasting color and approved by the _____ must be affixed to all manhole covers used in tanks warning of the _____ present when entering such tanks.

21. Septic tanks and other treatment tanks shall be cleaned whenever the sludge and scum occupies _____ of the tank's liquid capacity.

22. If a tank is installed in groundwater, adequate _____ provisions shall be made.

23. All chemical products and chemical restoration procedures for POWTS shall be approved by the _____.

24. The wastewater from holding tanks that receive greater than 3,000 gallons per day shall be disposed of at a _____ _____ _____ or by such manner approved by and with concurrence of the _____ of _____ _____ for the specific installation.

25. Based on a three year maintenance cycle, the approximate minimum liquid capacity of a septic tank for a one- and two-family three bedroom residence would be _____ gallons.

26. Habitable buildings shall have a minimum holding tank capacity of _____ estimated daily wastewater flow but not less than _____.

27. Holding tanks shall be located _____ feet from any part of a building.

28. An approved watertight vessel for the retention of sewage is called a _____ tank.

29. Holding tanks shall be constructed of _____ _____, _____ _____, _____, reinforced polyester or other approved material.

30. Holding tanks shall be so located to a service road or drive so that the pumper may drive pumping equipment to within _____ feet of the servicing manhole.

31. All holding tanks shall be provided with a high water _____ _____ that shall be either an _____ or _____ alarm.

32. Manholes on holding tanks shall extend a minimum of _____ inches above finish grade.

33. A vent shall terminate in accordance with _____, *Wisconsin Administrative Code*.

34. The use of _____ _____ switches in POWTS tanks is _____.

35. The holding tank vent and manhole shall extend _____ feet above regional flood elevation.

36. A mobile home park was built to serve ten mobile homes. A design loading rate of 0.7 gal/ft^2/day per day was selected for a soil dispersal component

    a. Is dosing required for this system?

    b. Calculate the minimum square footage required for a soil dispersal component.

37. A soil tester has identified soils on a property that are assigned a soil application rate of 0.5 gal/ft^2/day per square foot per day. Calculate the minimum soil dispersal component area for a three bedroom home.

38. In a medical office building there will be 4 medical staff, 2 office staff, and 30 patients per day. A soil application rate of 0.4 gal/ft^2/day was determined from the soil test report. The minimum soil dispersal component size required is _____.

39. Calculate the minimum size septic tank for a 15-bedroom condominium. Calculate by multiplying the estimated daily wastewater flow by 2.088. _____.

40. What is the soil application rate for 2msbk sil, when discharging effluent pretreated to the 30/30 standard in Table 383.44-2 in Chapter SPS 383? _____. How many square feet of soil dispersal component would be required for a 4 bedroom home on this site? _____.

41. By what means shall effluent be discharged to a soil dispersal component, where the effluent is pretreated to the 30/30 standard and the fecal coliform reduced to 10,000 cfu/100 mL or less? _____ _____.

42. The maximum particle size that may be discharged to a soil dispersal component is?

    a. 1/4 inch
    b. 3/16 inch
    c. 1/8 inch
    d. 1/2 inch

43. Each dose of effluent by means of pressurized distribution into a treatment dispersal component consisting in part of in situ soil may not be less than _____ times the void volume of the POWTS distribution laterals.

44. The design of a treatment or dispersal component consisting in part of in situ soil shall reflect _____ _____ _____ that affect _____ or _____.

45. The soil application rates specified in Table 383.44-1 shall only be recognized where the percolation results have been filed with the governmental unit before July 02, _____.

POWTS INSPECTOR - CHAPTER 6

PRESSURE DISTRIBUTION DESIGN

INTRODUCTION

A very important part of a POWTS is the soil dispersal component, commonly referred to as the "leach field," "filter bed," "seepage system," "soil absorption system", or "dispersal cell". Pressure distribution of effluent has emerged as the preferable way to get wastewater spread evenly across the soil dispersal component. Pressure distribution systems are also known as Low Pressure Distribution (LPD) or Low Pressure Pipe (LPP) systems. This chapter provides an overview of how to design pressure distribution systems.

OBJECTIVES:

LIST the information needed to design a pressure distribution network.

EXPLAIN what system head is.

IDENTIFY and **USE** the graphs and charts for pressure distribution design.

DETERMINE how a pressure system can be designed using the graphs in the Pressure Distribution Component Manual Version 2.0 SBD-10706 (N01/01)

DESIGN a pressure distribution network.

SIZE and **SELECT** a pump for a pressure distribution network.

IDENTIFY minimum dose volumes and how to select the correct dose volume.

LEARNING ACTIVITIES:

READ the attached material.

STUDY the Pressure Distribution Component Manual and Chapter SPS 383 *Wisconsin Administrative Code* and **COMPLETE** the design example.

(Optional) **READ** "Design of Pressure Distribution Networks for Septic Tank - Soil Absorption Systems," Publication 9.6, January 1981, SSWMP, University of Wisconsin Extension and "Siphons for On-site Systems Lab and Field Evaluation," Publication 9.12, Glen M. Falkowski and James C. Converse, SSWMP, University of Wisconsin Extension.

COMPLETE the Self-Check.

A soil dispersal component must be able to disperse and adequately treat the wastewater it receives. The soil dispersal component also must function for a reasonable period of time, as nobody wants the soil dispersal component of their POWTS replaced every 4 or 5 years.

Many systems incorporate large diameter (4 inches), large perforation, gravity-fed distribution networks, leaching chambers and other synthetic media. These "conventional" soil dispersal components can work well for many years if installed properly. Conventional systems do not uniformly distribute the wastewater; it flows into the pipe and out of a few holes either at the inlet, middle, or far end. This can cause local overloading of the soil. When soil is kept continually wet, a bio-mat formed by bacteria begins to clog the soil. Soon the soil under the section of pipe that wastewater comes out of cannot accept the wastewater. It flows along the soil dispersal component bottom until it reaches an unclogged area. Eventually, this area forms a bio-mat too. This "progressive clogging" will eventually cause the entire bottom of the soil dispersal component to become clogged. Once the entire bottom of the soil dispersal component is clogged, wastewater will pond in the component.

Soil clogging is not all bad in a gravity-fed system. Gravity-fed systems achieve equal distribution of wastewater only after the entire system is clogged and the bio-mat does an excellent job of removing wastewater contaminants. The bio-mat may continue to grow and thicken and eventually the ponding wastewater may either back up into the home or seep out at the ground surface. This progressive clogging can be minimized by the use of a pressure distribution system.

To achieve uniform distribution of wastewater in a soil dispersal component, a pressurized small diameter pipe distribution network is used. The pressure distribution system, when designed following the criteria in the Pressure Distribution Component Manual, exerts pressure of about one pound per square inch (1 psi).

A way to compare gravity-fed systems to pressure distribution systems would be to think of the difference between watering a lawn with the end of a 3/4-inch hose (gravity-fed) versus watering with a soaker type sprinkler (pressure).

The smaller pressure distribution system designs described in the manual is made up of small diameter piping (3/4 -inch to 3-inch) with small diameter holes (1/8-inch to 1/4-inch) drilled on the bottom of the pipe at intervals of one to five feet. The distribution system must be designed so that the number of gallons of water passing through each hole is the same. By selecting the correct pipe size, hole diameters and hole spacing and pressurizing the system, the gallons supplied to each hole can be balanced. Really what is balanced in designing these systems is the amount of head and head loss that occurs within the system. "Head" is pressure in terms of feet of water and is a unit of pressure similar to pounds per square inch (psi). Head differences are most easily thought of in terms of the difference in elevation between a supply of water and the outlet for that water. In pressure distribution systems, a minimum 2.5 feet of head is supplied to the distal end of the distribution network. If an observation pipe was installed with a tee pointing upward on the distribution system, then, when the system was operating, there would be a standing water level 2.5 feet above the system in the observation pipe. The pressure in a system

with 2.5 feet of head is about 1 psi. This is enough head to pressurize the system, but is still very low pressure and will not cause damage to the piping network.

The flow in gallons/minute out of the holes in these systems is dependent on the amount of head in the system. If there is 1 foot of head then the flow out of a 1/4-inch hole will be approximately 3/4 gallon per minute. If 2 feet of head is supplied, then the flow from a 1/4-inch hole would be a little over 1 gallon per minute.

When designing a pressure distribution system, the Component Manual requires a minimum 2.5 feet of head to be provided at the distal end of the distribution network.

Fortunately, it is not necessary to solve a series of complicated equations every time a small pressure distribution system is designed. The Pressure Distribution Component Manual includes a set of graphs (charts) and tables for designing pressure distribution systems. To design a pressure distribution system, the following steps are taken:

1. Assemble the following information:

    a. Soil test report. Check the depth to high groundwater and bedrock to make sure the site is suitable. Be sure that enough area is available to install the system with a level bottom (infiltrative surface) and still maintain 3 feet from the bottom of the system to a soil limitation.

    b. Find out how many bedrooms are in the home and determine the daily wastewater load. Use 150 gallons per bedroom per day to establish the design wastewater flow. If you are sizing for a commercial use, use appropriate factors for sizing septic tanks. The sizing criteria for commercial/public uses are listed in a table in the component manuals. Add the factors together and multiply by 1.5 to get the number of gallons per day (design wastewater load).

    c. Select the proper soil application rate (how much water will be put on the soil each day) from Table 383.44-1 or 383.44-2. This is based on the soil test results the certified soil tester has reported on the soil report form. Divide the gallons per day from step “1.b.” above by the design loading rate. This number is the required soil dispersal component area in square feet.

    d. Pressure distribution systems can discharge to one or more cells. If more than one cell is proposed, each must be installed at an equal elevation (level), or calculations must be done to show that any one distribution cell will not become overloaded. (The distribution cell with more head at the manifold will have a higher flow rate.)

To size the soil dispersal component, choose the longest dimension possible that is perpendicular to any slope on the property. This will be the system length. Divide the soil dispersal component area in square feet from step "1.c." above by the proposed length to find the soil dispersal component width (remembering the maximum width of an in-ground system is listed in the component manuals as 6 feet). Make sure that the area you are designing this system for is the area the soil tester evaluated and has found suitable.

2. Size the distribution pipes:

   In order to determine the size of the distribution pipes the following must be considered:

   a. Length of the system.

   b. Whether a central manifold or end manifold will be used.

   c. Hole size.

   d. Hole spacing.

The designer must pick a hole size and spacing. If at the end there is a problem with too large or too small a flow, then a different hole size or spacing is selected and the design is reworked.

Use the graphs in the component manual to determine the distribution pipe diameter.

3. Determine distribution pipe discharge rate:

   a. The distribution pipe length, diameter, hole size, and hole spacing are now known. Use this information to determine how many gallons/minute will come out of each distribution pipe. Turn to Table 4 in the component manual. Based on head pressure, hole size, and number of holes, determine the pipe discharge rate.

   b. Total system discharge rate will be discharge rate/lateral times the total number of laterals.

4. Size the manifold to serve the system:

   Select either an end manifold or central manifold design. Central manifolds allow more flexibility in that longer systems can be designed. Each lateral coming off of a central manifold is counted as a separate distribution pipe. Table 5 in the component manual is used to select the manifold diameter.

The pipe sizes for the distribution system have now been selected. The final steps are to select a force main diameter and size and select a pump for the system.

5. Select a force main diameter:

   Refer to Table 6 of the Pressure Distribution Component Manual, Version 2.0 to determine friction loss. A force main must be selected that will carry the wastewater to the system without losing all its energy (pressure) in friction losses inside the pipe. Why is friction force important to consider? Any object or liquid that is moving has a friction force trying to slow it down. As the speed of the object gets faster, the frictional force gets larger. Re-stated - as the velocity of an object goes up, the frictional force acting against it gets larger. In pipes, the frictional force is due to the liquid moving through the pipe where it is touching the side of the pipe. Friction is a contact force. It depends on the roughness of the surfaces of the objects involved and the rate of speed (velocity) of the two objects. As an example, radial tires are sold to people on the basis that they save gas. Radials save gas because there is less friction (they are less rough) when they roll than when a regular polyester tire rolls.

6. Select a pump for the distribution system:

   The final component of the distribution system that must be selected is the pump or mechanical dosing apparatus. Only pump selection will be discussed in this chapter. Two items are needed to select a pump. One piece of information needed, is already available. That's the dosing rate for the system that was determined previously. The other information we need is to calculate the total dynamic head for the system.

   Total dynamic head has three parts:

   a. Elevation head;
   b. Friction loss in the force main;
   c. Minimum of 2.5 feet of head, (hole size determines minimum head), that must be supplied at the distal end(s) of the distribution network.

   Elevation head is nothing more than the difference in elevation from the pump for the system to the elevation of the distribution network. The system elevation was determined by the soil tester. The house location and the elevation of the building sewer coming out of the home influences septic tank and dose tank location. That in turn usually determines the pump elevation.

   Friction loss is calculated by taking the head loss per 100 feet from Table 6 in the component manual and multiplying times the number of 100-foot increments.

The minimum 2.5 feet of head at the distal end of the distribution network is that amount of head required to pressurize the system. Minimum head is dependent on hole size and ranges up to 5.0' for 1/8 inch holes. The minimum head must be supplied in order to get the flow rate out of each hole that was designed for. The head is multiplied by 1.3, to account for head loss through fittings in the distribution network. After adding together those three components of total dynamic head, a pump may be selected that can supply the discharge rate at whatever head was calculated.

The information obtained is used to select a pump from the performance curves supplied in each pump manufacturer's specifications. Care should be taken in matching calculated dose rates and total dynamic head to the pump curves available. Do not select a pump that cannot supply the minimum required dosing rate at the total dynamic head for the site. Likewise, a pump that is too big will supply more than the required head to the system and will not perform satisfactorily for a long period of time.

7. Minimum dose volume and dose volume check:

The distribution network is designed and the pump has been selected. The last thing that must be done is set the dose volume. The dose volume must be set so that the system doses a minimum of 5 times the void volume of the distribution laterals or a maximum of 20% of the daily wastewater flow. 5 times is the minimum number of doses per day. To determine maximum dose volume, divide the wastewater load (from Step 1) by five. This will be the maximum dose size. On a system where the force main drains back into the dose chamber, the number of gallons it takes to fill the force main must be added to this dose size. Finally, the dose volume must be checked to make sure that it is large enough to pressurize the distribution network long enough to give equal distribution. Use Table 7 in the component manuals to assist in determining if the dose volume is five times the void volume of the pipe.

The design is now completed. This method is the same for mound systems and in-ground pressure distribution systems. In-ground pressure systems, because of their smaller pipe size, can sometimes be installed on sites where a gravity flow in-ground conventional system could not be.

Other Types of Pressure Distribution Networks

There will be times when site conditions, slope, and depth to limiting factor require the design of soil dispersal components with pressure distribution networks at different elevations. The design problem faced with this situation is to distribute the wastewater properly throughout the system without overloading one or more of the dispersal components. This requires considerably more calculation than the standard distribution network. The most common method is to calculate the discharge rate of the hole size being used in the network at the various flow heads and then adjust hole spacing to provide the appropriate flow to each dispersal component. If more information about this type of design is desired, it is suggested that material from Publication 9.6, available from the Small Scale Waste Management Project of the University of Wisconsin—Madison be obtained and read. The main point is that there are a variety of options for a designer to provide an in-ground system by utilizing currently available technology. When situations arise that call for a more complex design, the district Wastewater Specialists or POWTS Plan Reviewers may be contacted for assistance.

SELF CHECK

1. "Old age" failure of gravity fed systems is due to _____ _____.

2. In the pressure distribution component manual graphs, the smallest hole size for a pressure system is _____ while the largest hole size can be _____.

3. If the outlet to a water tower is 31 feet high with 3 feet of water in the tower, the amount of head on the water hitting the ground surface is _____.

4. A minimum _____ feet of head must be supplied _____ the pressure system.

5. A pressure distribution system can be installed in-ground, if there are _____ inches to a limitation from the bottom of the infiltrative surface.

6. Based on the specifications in the component manuals, what is the maximum allowable land slope for in-ground pressure systems? Why is slope important to consider in the design?

7. System elevation is often set by a _____.

8. Systems can have no less than _____ doses per day per Version 2.0 Pressure Distribution Manual.

9. Head is measured in units of _____.

10. To design a pressure system, the designer must select a hole size and _____.

    You have been contacted to design a pressure distribution system for a small commercial use. The soil tests show the site is suitable with an area 40 x 120 feet identified and has a soil loading rate at the system elevation of 0.7 gal/ft^2/day. The estimated wastewater load is 600 gallons per day. There is no slope in the system area. Design a pressure distribution system for the site using the Version 2.0 Pressure Distribution Component Manual. Vertical lift is 8 feet. The force main is 140 feet long. Use a hole size of 1/4 inch and hole spacing of 4 feet.

    (Use Calculation Worksheet below)

11. System length _____.

12. System width _____.

13. Distribution pipe spacing _____.

14. Number of distribution pipes

15. Hole size and spacing 1/4" 4' spacing

16. Distribution pipe diameter _____.

17. Distribution pipe discharge rate _____.

18. Manifold length _____.

19. Manifold diameter _____.

20. System discharge rate _____.

21. Force main diameter _____.

22. Calculate total dynamic head.

    Vertical lift is 8 feet. The force main is 140 feet long.

    T D H = _____ _____ _____ = _____.

23. If the minimum number of doses in 24 hours is 5 cycles, the maximum dose volume would be _____ gallons. The system force main drains back into the dose chamber. The minimum dose volume that may be used is _____gallons.

POWTS INSPECTOR - CHAPTER 7

MOUND SYSTEMS: PRINCIPLES, DESIGN, AND CONSTRUCTION

INTRODUCTION

Many areas of the state are not suited for in-ground POWTS. This is due to soil limitations such as slowly permeable soils, shallow soils over bedrock, and seasonal or periodic saturation. To overcome these limitations, one alternative is to build a mound of sand, raising the dispersal cell above the in situ (natural) soil surface. This allows the dispersal cell to be installed in a permeable material above the limiting soil condition so that the wastewater can be adequately treated before it reaches groundwater. While the sand fill does the majority of wastewater treatment, the in situ soil above the limiting factor also plays an important treatment role.

The objective of this chapter is to explain the principles upon which the mound designs are based, the sizing and siting criteria, construction techniques, and the inspection procedures.

OBJECTIVES:

IDENTIFY the soil and site characteristics that require a mound system. See chapters SPS 383 and SPS 385 *Wisconsin Administrative Code* and the Mound Component Manual.

DETERMINE mound design based on soil and site factors.

LOCATE the best site for the mound on the lot.

DIMENSION and **DESIGN** a mound.

KNOW mound construction techniques. Refer to Mound Component Manual Version 2.0, SBD-10691-P (N.01/01)

LEARNING ACTIVITIES:

STUDY the Mound Component Manual

STUDY and **KNOW** how to use Tables and Charts in Pressure Distribution Component Manual SBD-10706-P (N01/01) Version 2.0

COMPLETE the Self-Check.

SOIL AND SITE REQUIREMENTS

Mound designs have been developed to provide safe treatment and dispersal of wastewater at sites that have one of three restrictions. Slowly permeable soils often have seasonally saturated soil very close to the surface and present a wastewater assimilation problem. To address this issue, the wastewater in a mound system, is distributed in the sand fill area and spreads out over a long and narrow zone into the permeable surface soil horizon. The wastewater is then absorbed by the more slowly permeable subsoil. A potential treatment problem may also exist on sites where there is shallow permeable soil over creviced or porous bedrock. The crevices in the bedrock can allow the wastewater to short-circuit to groundwater before it is adequately treated. The addition of sand fill to the dispersal area increases the amount of soil available for treatment. The third potential site problem is seasonal or periodic soil saturation at shallow depths where the soil is permeable. In this case, the objective of the mound design is to treat the wastewater before it enters the zone of saturation.

The specific soil and site factors that may restrict mound system installation are in chapters SPS 383 and SPS 385, *Wisconsin Administrative Code*, and the mound component manual. In addition to those limitations, a mound system cannot be installed in a compacted area because permeable in situ soil is critical to the performance of the mound. Compacted layers restrict downward flow and dispersal of the wastewater and can cause partially treated wastewater to seep out of the mound toe. Placing a mound in a floodplain presents a potential problem because when flooding occurs, an improperly located mound may become saturated or erode away. Mound system installations in filled areas may require detailed onsite investigations to determine if the fill is acceptable. Removal of the fill material does not always make a site suitable for a mound.

Land slopes can impair mound operation but more often, the slope can be managed in the design to be beneficial. Proper location of the mound in relation to the slope is very important. On sloping sites, the mound is placed so that the longest dimension is perpendicular or at right angles to the slope. This permits the wastewater to be spread along the length of the mound and then be treated and dispersed as it moves into the in situ soil. Level sites permit the wastewater to move downward and then away from the site in all directions, especially in permeable soils. A site with a 2-4 percent slope is more desirable than a level site with slowly permeable soils because the sloping site does not concentrate the wastewater in one location beneath the mound. Sites with slopes in more than one direction, for example a crested site, are good mound sites if the system is located at the top of the crest. The wastewater can then move laterally in the two directions of the slopes. Locating a mound at the base of a slope is not recommended unless surface water from upslope areas can be diverted away from or around the mound. Maximum allowable slope is limited by design loading rates of the natural soil.

MOUND DIMENSIONS AND DESIGNS

Since the purpose of a mound system is to provide treatment and dispersal of wastewater, it must be large enough to handle the daily flow of sewage produced in the building it serves. To calculate this amount, it is necessary to know how many bedrooms there are in a residence or the combined discharge from all the plumbing fixtures in a public building. Water consumption is estimated to be about 50 gallons per person per day in a residence or 100 gallons per bedroom, assuming two people per room. The wastewater volumes that are listed in Table 4 of the component manuals are used to calculate the estimated wastewater flow for a restaurant, office, retail store, etc. To accommodate peak wastewater flows the design wastewater flows that are used to calculate the distribution cell area, basal area, and mound dimensions are based on 150 percent of the estimated wastewater flow.

When the wastewater reaches the mound, the first point of contact with soil is in the sand fill. The sand fill shall meet ASTM standard C-33 for fine and coarse aggregates. The importance of using an appropriate sand as the fill material is due to the unique water movement properties of this material. The sand gradation specified in ASTM C-33 is a material that can allow water to move almost as rapidly to the side as it can move downward. This allows the wastewater to spread out until enough in situ soil is contacted to accept all of the wastewater. On sites with very permeable soil, the flow is almost straight down through the mound and into the in situ soil. The wastewater continues to move down through the in situ soil until it hits the soil limitation. On sites with more slowly permeable soil, the ability of the wastewater to spread over the in situ soil is crucial to proper operation of the system. If the fill covers enough area, the fill allows the wastewater to spread over and be dispersed into the in situ soil. Permeable soils that are over bedrock or groundwater at shallow depths need the sand fill material to provide enough soil material for wastewater treatment.

Chapter SPS 383, *Wisconsin Administrative Code*, requires at least 3 feet of unsaturated soil in most cases for treatment of wastewater. Sites where a mound is proposed must have at least 6 inches (0.5') of in situ soil over the limiting factor. The addition of 2.5 feet of sand fill increases the total depth to at least 3 feet.

The sand fill material will accept septic tank effluent at a rate of 1.0 gallons per square foot per day. The absorption area is calculated with this formula:

$$\text{Design Wastewater Flow (in gal/day)} \div 1.0 \text{ gal/ft}^2\text{/day} = \text{Distribution Cell Area (in ft}^2\text{)}.$$

Based on the mound component manuals the distribution cells can be up to 10 feet wide. Narrow cell designs are often used on sites with slowly permeable soil because the wastewater should be spread over a larger area. The distance between cells has to be great enough so all the wastewater from each cell is properly dispersed before it reaches an adjacent cell. The wastewater may spread across the sand/soil interface rather than moving down into the surface horizon on these sites.

Narrow cells are also used on sites with permeable soils over high groundwater. The longest side of the distribution cell is placed perpendicular to the slope, and the wastewater is spread out

before it begins to move downslope. The length should be as long as the site allows. Mound systems for sites with shallow depths to bedrock should also have a long and narrow distribution cell because there could be either a permeability or treatment problem.

The formulas used to calculate the amount of fill under the distribution cell are in the mound manuals. Note that the minimum depth of sand fill is 6 inches and is increased at the downslope edge of the cell if there is a slope. The additional fill is needed so that the distribution cell and piping network will be level.

If stone aggregate is used, at least 6 inches is laid on top of the sand fill underneath the distribution pipes. At least 2 inches of stone aggregate is distributed evenly over the top of the pipe. The specifications for stone aggregate are in s. SPS 384.30(6)(h), *Wisconsin Administrative Code*. An approved synthetic cloth barrier is then placed over the entire stone aggregate cell to prevent fines from entering the cell.

One foot of soil backfill material is put on top of the stone aggregate at the center of the system and is tapered to one-half foot over the outer edges of the cell. The cover material must be able to support vegetative cover and allow oxygen exchange between the distribution cell and the atmosphere.

There are three other measurements that have to be determined to complete the mound dimensions. They are the endslope, upslope, and downslope widths. Refer to the component manuals for the formulas. Note that these formulas use a maximum 3:1 slope. This means that the endslope, up and downslope widths are gradually tapered to original grade to promote surface drainage away from the mound and allow rain and snow melt to run off. If water is allowed to stand on the mound surface, the mound can become saturated and fail. The 3:1 side slopes are gentle enough for easy mowing and yard maintenance.

Formulas for calculating the total mound length and width are in the component manuals.

The last step in the mound design process is to check that there is enough area beneath the mound for final treatment and dispersal. This area is known as the basal area and is under the distribution cell. It includes the downslope area on sloping sites or the “upslope” and “downslope” (terms used only to identify portions of the mound) areas on level sites. On level sites, the wastewater can be spread evenly through the sand fill so both upslope and downslope widths are included in the calculations. On sloping sites, the wastewater should move laterally in the direction of the land slope. This is why the downslope edge or toe must be lengthened as the percent of land slope increases.

Refer to the component manuals for the formulas for calculating the amount of basal area in the mound. Check this figure against the minimum required basal area that is equal to the design wastewater flow divided by the loading rate of the in situ soil. This rate is dependent upon the in situ soil application rate.

If the calculated basal area beneath the mound is not as large as the required basal area, the mound dimensions have to be increased. This seldom occurs but sometimes happens in mounds

with wider dispersal cells. The best way to increase the basal area is to lengthen the downslope dimension on sloping sites or the "upslope" and "downslope" dimension on level sites. Finally design the pressure distribution network for the cell or cells.

The design of a mound system includes these steps:

- Calculate the estimated and design wastewater load.
- Design the distribution cell within the mound.
- Calculate the dimensions of the mound.
- Check the basal area requirements.
- Design the distribution network.
- Size the pumping system.

1. **Design wastewater flow:** s. SPS 383.43 and Mound Component Manual Version 2.0

2. **Design the distribution cell(s):** Component Manuals

    a. Cells

3. **Mound dimensions:** Component Manuals

    a. Height
    b. Length
    c. Width

4. **Basal area:** Component Manuals

EXAMPLE PROBLEM: PERMEABLE SHALLOW SOIL OVER CREVICED BEDROCK

- 3-bedroom home
- slope 6 percent
- soil application rate of 0.5 gal/ft^2/day
- creviced bedrock at 24 inches
- use a distribution cell width of 6 feet = A

1. **Design wastewater flow:** 150 gal/day/bedroom x 3 bedrooms = 450 gal/day
2. **Distribution cell area:**
    Area required: 450 gal ÷ 1.0 gal/ft^2/day = 450 ft^2
    Cell length: 450 ft^2 ÷ 6 ft = 75 ft = B
3. **Mound height**

- fill depth (D): 1 ft

- fill depth (E): 1 ft + .06 (6) = 1.36'
- bed depth (F): .75 ft
- cap (H): 1.0'
- cap (G): 0.5'

4. **Mound length and width**

End slopes (K) = mound depth at center x 3:1 slope

$$= \left[\left(\frac{D+E}{2}\right) + F + H\right] \times 3$$

$$= \left[\left(\frac{1 + 1.36}{2}\right) + .75 + 1.0\right] \times 3$$

= 8.79 ft = 9 ft

Upslope width (J) = mound depth at upslope edge x 3:1 slope x slope correction factor

= (D+F+G) x 3 x 0.85

= (1+.75+0.5) x 3 x 0.85

= 5.74 ft = 6 ft

Downslope width (I) = mound depth at downslope edge x 3:1 slope x slope correction factor

= (E+F+G) x 3 x 1.22

= (1.36+.75+0.5) x 3 x 1.22

= 10.29 ft = 10.3 ft

Mound length (L) = B + (2xK)

= 75 ft + (2x9) ft

= 93 ft

Mound width (W) = I + A + J

= 10.3 + 6 + 6

= 22.3 ft

5. **Basal area:** On sloping sites, the basal area is that area under and downslope of the cells B x (A+I). On level sites, it is the total area under the mound (B x W) except for end areas (K). The soil application rate of the soil is 0.50 gal/ft^2/day.

Basal area required = design wastewater flow ÷ infiltrative capacity of soil

= 450 gal/day ÷ 0.50 gal/ft^2/day = 900 ft^2

Basal area available: B x (A+I)

= 75 ft x (6+10.3)

= 1,222.5 ft^2

Sufficient basal area is available. If it were not, then the downslope width (I) would have to be increased until sufficient basal area would be available.

6. **Distribution system:** Pressure Distribution Component Manual Version 2.0

7. **Pump selection:** Pressure Distribution Component Manual Version 2.0

8. **Review construction techniques:** Mound Component Manual Version 2.0

MOUND CONSTRUCTION

There are several steps in the mound construction process that should be taken not only to ensure that the mound is built properly, but also to minimize compacting and disturbance of the soil. The first step is to remove excessive vegetative cover. Some sites with large trees, boulders, or numerous bushes may not be suitable for mounds. Small trees must be cut level at ground surface. The stump should be left in place so wastewater will not have channels to follow.

The second step, and most important step, is to check the soil moisture at the site. The moisture should be checked at several locations in the area for the mound and at several levels to a depth of about 8 inches. Construction cannot begin if soil from any level can be formed into a wire. Construction in soils that are too moist results in smearing of the soil. This will reduce the permeability of the in situ soil that can lead to system failure.

Proper plowing is also important in preparing the site for construction. The plowing should be done from the upslope edge of the mound. Moldboard plows or chisel plows can be used. Chisel plowing is the preferred method for preparing the site. Plowing should be to a depth of 7 to 8 inches. This will effectively break up the surface soil horizon. If a Moldboard plow is used, the furrows should be thrown upslope. This creates small ridges or dams and increases the surface area that the wastewater encounters as it moves into the in situ soil. Rototillers may not be used because they destroy the structure of the soil.

After plowing and during the rest of the construction process, all traffic must be kept off of the area extending 15 feet beyond the downslope edge of the mound. This will prevent compacting of that area which, if compacted, could form a subsurface barrier to the movement of the wastewater away from the mound site. Additionally, if the mound needed to be enlarged in the future, it would need to be expanded on the downslope edge.

Another step is placement of the sand fill. When the sand fill material is brought in, it should be moved into place from the upslope edge. There must always be at least 6 inches of sand under the tracks of the vehicle moving the sand in place. Wheeled vehicles cannot be used to place the sand within the mound area. When stone aggregate or other media is placed in the distribution cell, the bottom of the cell must be level.

After the distribution network is installed and covered with the required synthetic fabric, the cap should be put over the mound. The mound should be landscaped by sodding or seeding immediately. This will prevent erosion of the mound surface.

The following step-by-step construction procedures should be observed for mound installations. (In this example, stone aggregate will be used in the design.)

- Stake out the mound so that the dispersal cell is perpendicular to the direction of the slope. Reference stakes are recommended in case corner stakes are disturbed.

- Measure the average ground elevation along the upslope edge of the dispersal cell. This is necessary to determine the bottom elevation of the dispersal cell.

- Determine where the pipe from the pumping chamber connects to the distribution network in the mound.

- Trench and lay the force main from the pumping chamber to the mound. Cut and cap the pipe several feet above the ground surface. Lay pipe below frost line or sloping uniformly back to the pumping chamber so that it drains after dosing. Backfill and compact soil around pipe to prevent back seepage of wastewater along pipe. This step must be done before plowing to avoid disturbing the plowed surface.

- Cut trees and brush at ground level. Do not remove stumps.

- Check the moisture content of the soil at several depths and to at least 8 inches deep. If it is too wet, smearing and compacting will result, thus reducing the infiltrative capacity of the soil. Soil moisture can be determined by rolling a soil sample between the hands. If it rolls into a wire, the site is too wet to prepare. If it crumbles, soil preparation can proceed.

- Prepare the site using a moldboard plow or chisel plow by plowing perpendicular to the slope. Immediate placement of sand fill after plowing is required. All foot and vehicular traffic must be kept off plowed area.

- Check the quality of the sand fill material.

- Place the fill material around the edge of the plowed area. Keep truck wheels off the plowed areas. Keep traffic off the downslope side of mound. Work from the end and upslope side.

- Move the fill material into place using a small track type tractor with a blade. Always keep a minimum of 6 inches of sand beneath tracks to prevent compacting of the in situ soil.

- Place the fill material to the required depth that is the top of the distribution cell. Shape sides to the desired slope.

- With the blade of the tractor, form the distribution cell. Hand leveling of the bottom of the distribution cell may be needed. The elevation of the bottom of the distribution cell shall be checked at the upslope and downslope edges to make certain that the fill has been placed to the proper depth.

- Place the stone aggregate in the distribution cell. There should be 6 inches of 1/2- to 2 1/2-inch stone aggregate. Level the top of the stone aggregate.

- Place the distribution network on the stone aggregate with the holes on the bottom of the distribution pipes. Connect the manifold to the force main pipe from the pumping chamber. Lay the distribution network pipes level, removing large rises and dips.

- Place 2 inches of stone aggregate over the distribution pipe network.

- Place a synthetic fabric over the stone aggregate.

- Place the soil cap on top of the distribution cell to a depth of 1 foot in the center and 6 inches at the outer edge of the distribution cell. This may be topsoil or soil that will promote vegetative growth and allow air exchange.

- Landscape the mound by planting grass, using the best vegetation adaptable to the area. A mixture of 90 percent birdsfoot trefoil and 10 percent timothy may be desirable if the mound is not manicured. If manicuring is desired, a combination of 60 percent bluegrass, 30 percent creeping red fescue, and 10 percent annual rye grass may be used for the vegetative cover. Shrubs can be planted around the base and up the sideslopes. They should be somewhat moisture tolerant since the toe of the mound may be somewhat moist during various times of the year.

- Mound maintenance must be performed in accord with the Management Plan, (see s. SPS 384.54, *Wisconsin Administrative Code*), When the septic tank is pumped, the pump chamber should also be checked for accumulation of solids. A good water conservation plan within the house assures the mound will not be overloaded. Avoid excess traffic in the mound area. Winter traffic on the mound should be avoided to minimize frost penetration.

MOUND INSPECTION

Mound construction inspections must be performed by certified POWTS Inspectors.

Inspection procedures are detailed in the Mound Component Manual. In addition to No. 3 below, there are other inspections that could be made during installation.

1. At the time the ground surface is plowed and the stone aggregate and fill are placed;

2. At the time the distribution piping network installation has been completed; and prior to backfilling.

3. After all work has been completed.

Other inspections should be conducted whenever required for specific installations.

SELF-CHECK

1. Mounds can be placed in a floodplain.

   a. True
   b. False

2. Mounds cannot be placed in filled areas.

   a. True
   b. False

3. A mound can be installed on a site with slowly permeable soils if the loading rate is greater or equal to _____ gal/ft^2/day and the linear load rate is not greater than _____.

4. There shall be at least _____ inches of unsaturated natural soil over creviced or porous bedrock.

5. There shall be at least _____ inches of unsaturated natural soil over high groundwater.

6. How many soil borings, as a minimum, are necessary in determining mound site suitability? _____

7. According to the mound component manuals, a mound may not be installed on a slope that is greater than _____ percent.

8. Evaluate the two sites below and determine if a POWTS can be installed and what kind of system would be best for the site.

SITE A

Gently sloping (6 percent) grassy upland with a few scattered small oaks and a few willows in ditch at lower end of property. Lot area is 40,000 square feet. The soil profile is:

0-4” Very dark grayish brown silt loam
4-21” Dark yellowish brown silt loam
21-24” Yellowish brown sandy loam
24-60” Brown sandy clay loam with common medium distinct strong brown and pinkish gray mottles.

The design loading rate is 0.4 gal/ft^2/day in the natural soil.

SITE B

Almost level (3 percent slope) lowland previously farmed, growing to willows, sedges, and grasses.

0-8” Black sandy loam
8-14” Brown sandy loam
14-60” Gray loamy sand with few fine faint reddish brown mottles.
The design loading rate of the natural soil is 0.6 gal/ft^2/day.

Are these sites suitable for a mound system?

A
B

9. Why or why not?
   A
   B

10. Explain what type of mound design should be used if the sites are suitable.
    A
    B

POWTS INSPECTOR CHAPTER 8

INITIAL ADVERSE DETERMINATION

INTRODUCTION

The current chapter SPS 383, *Wisconsin Administrative Code*, allows a property owner to select from a variety of POWTS options. However, depending on specific soil and site conditions, or other issues such as local ordinance requirements, the number of POWTS options may be more limited for a specific property.

It is important for the property owners to communicate their wastewater treatment choices to the soil tester, designer and installer that they hire. These professionals are in the best position to provide the most accurate information about POWTS options to the property owner. They can also inform the property owner what provisions in the code may be used to secure a more viable wastewater treatment alternative. Section SPS 383.24, *Wisconsin Administrative Code*, describes the Petition for Variance process that allows a property owner to provide documentation of an equivalent way to satisfy a code requirement. Similarly, s. SPS 385.60, *Wisconsin Administrative Code*, describes several options for challenging the validity of redoximorphic features that have been identified and reported by a soil tester.

Local POWTS ordinances must also be considered. Many municipal (county, town, city or village) POWTS ordinances ban or limit certain POWTS such as holding tanks. Some ordinances also state that all soil based POWTS options must be explored before a holding tank system will be permitted by the municipality.

The vast majority of county code administrators (POWTS Inspectors) prefer to work with property owners and assist them in finding the most suitable POWTS option for their property. And most property owners are satisfied with the information they receive. However, there will be times when upon review of a state Sanitary Permit application, the application will have to be denied. Section SPS 383.21(3), *Wisconsin Administrative Code*, contains the processing information for state Sanitary Permits. The county must make a decision on the application within 30 days of receipt of all needed information. If the decision is to deny the application, the county must provide in writing to the applicant the reason for denial, a notice for the right to appeal and the procedures for appeal. An applicant whose state Sanitary Permit is denied by the county may appeal the decision in accordance with chapter 68, *Wisconsin Statutes*.

Based on past statewide permit issuance history, the likelihood of a state Sanitary Permit being formally denied is relatively small. Most POWTS Inspectors prefer to work with permit applicants to revise the application as needed to make it acceptable. There may be times when the POWTS Inspector will have to deny the permit application and be prepared to explain what recourse the applicant has.

OBJECTIVES:

BE FAMILIAR with permit issuance and denial requirements and procedures.

IDENTIFY the alternative actions available for a site where a petition for variance is needed or where soil and site conditions are challenged.

LEARNING ACTIVITIES:

READ Section SPS 383.32, *Wisconsin Administrative Code*, "Prohibitions and Limitations."

READ Section SPS 383.24, *Wisconsin Administrative Code*, "Petitions for Variance."

READ Section SPS 385.60, *Wisconsin Administrative Code*, "Soil Saturation Determinations."

READ Section SPS 383.22, *Wisconsin Administrative Code*, "Plan Review and Approval."

COMPLETE the Self-Check.

SELF-CHECK

1. In the following TRUE-FALSE statements, circle T if the statement is TRUE; circle F if the statement is FALSE.

T	F	a.	A governmental unit may approve plans for a mound system.
T	F	b.	Lots that meet the minimum requirements for a conventional system cannot use a mound.
T	F	c.	Department or designated agent approval is not required for use of a pressure distribution system on a site meeting the minimum requirements for a conventional system.
T	F	d.	Plans and specifications prepared in accord with s. SPS 383.22, *Wisconsin Administrative Code*, shall be approved by the Department or the appropriate county prior to permit issuance.
T	F	e.	The use of a mound or in-ground pressure system is not acceptable when a lot meets the site criteria for a conventional system.
T	F	f.	A county may pass an ordinance that a holding tank cannot be used if the site limitations are such that any other type system can be used.

2. Redoximorphic features as an indicator of seasonally or periodically saturated soil conditions may be challenged by the owner or developer and a soil saturation determination may be conducted in accordance with:

   a. Section SPS 385.60, *Wisconsin Administrative Code*
   b. Section SPS 385.06, *Wisconsin Administrative Code*
   c. Section SPS 384.01, *Wisconsin Administrative Code*
   d. Section SPS 383.21, *Wisconsin Administrative Code*

3. The use of a holding tank system requires:

a. Department or designated county plan review agent approval
b. Municipal government approval
c. Issuance of a state Sanitary Permit
d. All of the above

4. The use of a common system or a system on a different parcel than the structure to be served:

a. Will be subject to county or department approval depending on the type of system
b. Will be subject to the same plan review procedures as for a system serving a public building
c. Is prohibited
d. All of the above
e. a and b

5. A certified soil tester may perform a _____ _____ _____ to challenge the significance of redoximorphic features.

6. At least _____ observation pipes must be installed to delineate the area under investigation for evidence of soil saturation.

7. A POWTS can be owned by:

a. Only one property owner
b. A sanitary district
c. A condominium association
d. All of the above

8. A list of alternative courses of action for a _____ _____ to follow on a site that is denied a state _____ _____ is provided by the _____.

9. An owner may follow the appeal process listed in _____ ____, *Wisconsin Statutes*.

10. A county must make a decision to issue or deny a state Sanitary Permit within _____ days after receiving all required information.

11. The department may consider petition for variance requests in accordance with chapter _____, *Wisconsin Administrative Code*.

POWTS INSPECTOR – CHAPTER 9

STATE LEVEL SANITARY PERMITS

INTRODUCTION

The sanitary permit is the regulatory device for assuring compliance with chapters SPS 382-385, *Wisconsin Administrative Code* and for granting permission to install a private onsite wastewater treatment system (POWTS). No septic tank may be sold at retail and no POWTS installed unless the owner of the property holds a valid sanitary permit. The fee for the sanitary permit provides revenue for both the state and local sanitary permit issuing agents (SPIA). The county must charge at least $141.00 for the sanitary permit. The county must forward $100.00 of the fee to the Division of Safety & Buildings. The county must use the remainder of the sanitary permit fee for the purposes of administering the POWTS program. Sanitary permits are renewable, transferable, and can be revoked. This guidance document will discuss the procedures to issue, renew, transfer, and revoke sanitary permits.

OBJECTIVE:

UNDERSTAND the procedures for issuance of state Sanitary Permits.

READ the applicable sections of Chapter 145, Wis. Stats., and Chapters SPS 383-385, Wis. Adm. Code cited in this chapter.

COMPLETE the Self-Check.

BACKGROUND

A sanitary permit is required to install a new system or to modify an existing system. If a modification involves the addition or replacement of a POWTS holding, treatment, or dispersal component a state level sanitary permit is required. The county may issue repair and reconnection permits and permits to operate, only if the county sanitary ordinance authorizes such county permits. Only the county (villages and cities in Milwaukee County) or the Division of Industry Services can issue a state level sanitary permit. The uniform sanitary permit that covers both the purchase of septic tanks and the installation of a POWTS has been in effect since mid-1980.

The fee for the sanitary permit provides revenue for both the state and local sanitary permit issuing agent programs. The county must charge at least $141.00 for the sanitary permit. However, the county may establish a charge of more than the minimum fee. The county must forward $100.00 of the fee to the Division of Industry Services. This fee includes a $25.00 Groundwater Surcharge Fee on each permit issued. The surcharge fee is later transferred to the Department of Natural Resources (DNR). The county must use the remainder of the sanitary permit fee for the purposes of administering the POWTS program in the county. A permit submittal form and corresponding fees must be submitted to the Division of Industry Services within 90 days of permit issuance. You must remember that all revenues generated by permit issuance must remain in the county's POWTS program.

WHEN A STATE LEVEL SANITARY PERMIT IS NEEDED

Sanitary permits are needed to install or modify a POWTS. If a septic tank or dose chamber is being replaced or added, a sanitary permit must be issued. It is also necessary to obtain a sanitary permit for modification or alteration of a soil distribution or dispersal system. The addition of a septic tank outlet filter requires a state level permit since it is the addition of a treatment component. A permit is needed for such modification; otherwise noncompliant (too close to bedrock, etc.) onsite systems might be repaired and allowed to continue in operation. Only a licensed plumber can perform such installations and modifications. By modification, we do not mean "rodding out" or cleaning a building sewer. Prior to "modifying" or "altering" the septic tank, distribution system, or dispersal system a permit must be issued and a licensed plumber must perform the work. Many times a system or soil and site evaluation will be needed before issuing the permit.

A state sanitary permit is also needed to install or modify a POWTS on land owned by the state or for buildings owned by the state. These types of permits are issued by the department and not by the county. State inspectors will conduct the final system inspection at these sites.

NEVER allow a system to be installed, replaced, or repaired without first having issued the appropriate permit. To do so will jeopardize enforcement of the statutes and/or ordinance that require the permit to be issued. For example, if you were to take a person to court for failing to obtain a sanitary permit for an installation, what would you say (under oath) if the defendant's attorney asked if you had ever allowed a project to commence without a permit? If your answer is yes, how do you think the judge or jury might rule? Always issue the permit first, even if it is

issued as an emergency permit to replace a collapsed tank. Owners and installers will better respect the permitting process if the issuing agents insist that the law be precisely followed. The emergency permit can later be revised to reflect the proposed final installation. Such permits are normally issued "with conditions" that spell out the expected actions of the owner to complete the project in a code compliant manner. The issuing agent needs to alert the owner to the special conditions prior to permit issuance, and it is best to have the owner sign a statement indicating he/she understands and agrees to the conditions of permit. Any such statements or affidavits are filed with the sanitary permit.

SPECIAL REQUIREMENTS

1. Pursuant to s. SPS 383.21 (3)(c) *Wisconsin Administrative Code*, a governmental unit shall review and make a determination on the submission of a sanitary permit application within 30 days of receiving all the required information. NOTE: The issuance of a state sanitary permit cannot be held due to issues not directly related to the permit application. For example, the issuance of a state sanitary permit cannot be held because a zoning or other local ordinance issue is unresolved.

2. Prior to issuing a sanitary permit the issuing agent must complete approved training on the proposed POWTS technology or method if the application is for any system listed in s. SPS 383.04 (1) *Wisconsin Administrative Code*. Those technologies include: Pressure distribution components with < 1/8 inch orifice diameter, mechanical POWTS treatment components, disinfection units, or, sand, gravel, peat filter components [ref. Table 383.04-1 *Wisconsin Administrative Code*].

Table 1 – Permit Issuance Requirements[1]

Condition	**State Sanitary Permit**	**County Sanitary Permit[2]**
Any system on federal lands	No	No
Distribution pipe installation, replacement or modification[3]	Yes	No
Grease interceptor	No	Yes
Industrial or commercial wastewater system under DNR jurisdiction	No	No
Installation or repair of turn-ups, vent, or observation pipes	No	Yes
Large system installation (>12,000 gpd design flow)	Yes	No
Manhole riser, tank cover replacement	No	Yes
New system installation	Yes	No
New treatment device installation (e.g. outlet filter, ATU)	Yes	No
Outlet filter repair or replacement with equal	Yes	No
Privy, composting toilet, or incinerating toilet installation	No	Yes
Pump or blower motor installation or replacement	No	Yes
Reconnection to existing system	No	Yes
Repair of a component (e.g. replace a piece of broken pipe)	No	Yes
Replacement system installation	Yes	No
Septic, holding, dose tank installation	Yes	No
Transfer container installation	No	Yes

Treatment/dispersal system installation, replacement, or modification	Yes	No

1. This table is not all-inclusive.
2. Only if specified in the county sanitary ordinance.
3. State plan approval may be required.

3. As per the requirements of s. SPS 383.21 (2)(c)5 *Wisconsin Administrative Code*, prior to issuance of a sanitary permit the issuing agent shall require documentation that evidence of maintenance requirements for the POWTS have been recorded with the deed for the property if any component requires evaluation, monitoring, service or maintenance at an interval of 12 months or less.

4. Emergency sanitary permits can be issued for tank replacements or limited system modifications if the nature of the emergency is system failure or an impending failure that is likely to result in an unsafe condition, or human health hazard. Emergency permits should not be issued for situations that are not hazardous. The fact that someone wants to start construction on a new home and needs a sanitary permit to obtain a building permit does not constitute an "emergency".

INFORMATION NEEDED TO ISSUE A PERMIT

Each part of the sanitary permit application (SBD-6398) and supporting data must be accurately completed. The permit application is a form available at the following web site location http://dsps.wi.gov/Documents/Industry%20Services/Forms/POWTS/SB-FormPowtsSanitaryPermit0209App6398.pdf. This form must be completed and signed by the MASTER PLUMBER or MASTER PLUMBER RESTRICTED SERVICE who will be in charge of the installation of the system.

There are samples of permit applications included with this document. In most instances, the permit will be accompanied by a complete and accurate soil and site evaluation report. Section 145.20 (2)(a), *Wisconsin Statutes*, requires the county to review all soil and site evaluation reports and, if necessary, verify the reports in the field. Section 145.135, *Wisconsin Statutes*, requires the county to file and permanently retain all soil and site reports. Soil and site reports must be made available, on request, to any person applying for a permit on the site covered by the report. New tests or additional testing can be required by the county during the application review. The important thing to remember is that the soil and site evaluation report must be complete and accurate. To be a complete and accurate report, it must include the following:

1. Legal description to within 40 acres.

2. The date the data was collected.

3. A legible and permanent soil and site plan that includes the following:

   a. Paper no smaller than 8.5 inches by 11 inches in size.

b. Drawn to scale or fully dimensioned.
c. The extent of the area evaluated. Make sure adequate area is identified.
d. Location information for all points under investigation.
e. Pertinent elevation data that includes reference to a permanent vertical and horizontal reference point, elevation of all soil borings, percent and direction of slope, ground surface contours, floodplain elevation, and the elevation of any adjacent navigable waters.
f. A soils report that includes soil profile descriptions for all soil borings pursuant to s. SPS 385.30, *Wisconsin Administrative Code*.

4. Soil profile descriptions must be written in accord with s. SPS 385.30, *Wisconsin Administrative Code*. Make sure elevations are given for each of the borings and related to the permanent elevation reference point. Make sure that enough borings were performed (three for each system area). The depths to observed water or estimated high groundwater must be indicated.

   Make sure the certified soil tester (CST) completely describes soil horizons including the thickness of each soil horizon and all other necessary morphological features. If bedrock is found in the profile, the CST must indicate this as BR and the depth in inches to bedrock. All borings constructed must be reported.

5. The CST must specify a soil application rate for each fully described soil horizon within the area for the system.

6. Floodplain elevations must be given for sites with land subject to flooding. If no portion of the tested area is subject to flooding, then the letters NA should be placed in the blank to indicate not applicable. The county must check this against their floodplain maps.

7. CSTs must sign, date, and place their address and certification number on all pages of the report unless a signed, dated cover sheet/page identifies all the pages in the report. The first page of the SBD-8330 report form serves as an adequate cover sheet if completed properly.

SYSTEM PLANS

Section SPS 383.21 (2) (c), *Wisconsin Administrative Code*, requires the submission of plans as a part of the sanitary permit application. Plans should be submitted on paper no less than 8 ½ x 11 inches in size. The county must review this plan and make sure they have all the information needed to locate the system on the parcel and within the area tested by the CST. The plans must include a site plan that conforms to the requirements of s. SPS 383.22 (2)(a) 3 and (c), *Wisconsin Administrative Code*. The plans must have a vertical elevation and horizontal reference point, preferably the same reference points as used by the CST. If a different reference point or points are used, then the plumber or designer must relate the new reference points to the CST's data (give a conversion factor).

The plans should include a cross-section view of the system. The plans must show the piping detail including building sewer and effluent piping, setback from sidewalls, and distance between pipes and or cells. If a pump or siphon is being used, then specifications for pump and alarm controls, elevation differences, friction loss, and dose volume must be given. If serial (drop box) distribution is being used, elevations at each inlet and outlet should be shown. The elevation of the bottom of the distribution cell must be shown on the plans. On any system with absorption areas at different elevations, the elevations of each part of the system must be given.

Pursuant to s. SPS 383.22 (2)(b)1.d, *Wisconsin Administrative Code,* the management plan for the system is a necessary part of the plan submittal for any project. Also please note that a management plan includes a contingency plan should any component fail, and information on the methods and frequencies of service, as well as how the system needs to be abandoned. Section SPS 383.54 (c), *Wisconsin Administrative Code,* specifies the minimum components of a management plan.

Remember that your inspection of the system required by s. 145.20 (2)(d), *Wisconsin Statutes*, must be based on the permit and plans you have approved. If the plans are complete and accurate, the inspection process is much easier.

REVIEW RESPONSIBILITY OF THE SANITARY PERMIT ISSUING AGENT

As we have discussed in the previous sections, there are several components of a valid sanitary permit application. It is the county's responsibility to review the permit applications in accord with Chapters SPS 382-385, *Wisconsin Administrative Code*, and Chapter 145, *Wisconsin Statutes*.

It is also the permit issuer's responsibility to make sure the correct fees are paid before issuing the permit. A total of $100.00 ($75.00 & $25.00 surcharge), of each permit fee collected must be turned into the Division of Industry Services within 90 days of permit issuance. By law, you are responsible for that money. The permit issuer also is responsible for making certain that the sanitary permit card (SBD-6499) or electronic equivalent is posted. The person picking up the permit must be made aware of the posting requirements. The easiest way to do this is to show the person the permit card and go over the statements on it.

When new permit cards are received from the department, the county should inventory the permits to make sure they have received the correct number of permits and that all permit cards bear a permit number.

WHO CAN SIGN PERMITS

Section 145.20 (1), *Wisconsin Statutes*, indicates that the county can assign the administration of the POWTS program to "any office, department, committee, board, commission position, or employee." The administrator may delegate the ability to physically sign the permit to any employee. The people who review the soil and site evaluation report and POWTS plans can be different than the person who signs the permit. Your files should indicate who reviewed the

application. Whoever signs the permit, signs for, and in the name of, the county. That person commits the county to the adequate review of the application and the validity of the permit. If someone other than the person reviewing the soil test and POWTS plans will issue the sanitary permit, a procedure needs to be in place to ensure all reviews are completed prior to permit issuance.

It is the county's responsibility in reviewing permit applications to properly transfer, renew, reissue, or, when needed, deny or revoke permits. We now will discuss these aspects of POWTS permitting.

DENIAL OF PERMIT APPLICATIONS

If a permit application or any part of the supporting data (soil report and plans) is incomplete or incorrect, then you must deny the permit application. Section 145.20 (2)(c), *Wisconsin Statutes*, requires that when a permit is denied, the reasons for denial be given in writing. This may be done in the bottom portion of the SBD-6398 form or it may be done by letter. This does not mean however, that minor corrections cannot be made without a formal letter or action being taken. Often, minor corrections can be made "at the counter" by the designer, and this action does not require a formal denial action. Additionally, s. 145.20 (2)(b), *Wisconsin Statutes*, states that you must assist applicants in completing the application properly. These two sections together mean that we must educate or explain to people whose permits are denied the reasons why the permit cannot be issued. This listing of options to make the application acceptable can be complicated.

If the permit is denied due to incomplete soil tests or plans or an incorrectly filled-out application, you must explain to the owner what additional information is needed and refer them to the CST, plumber, or designer. You are not required to do a licensed person's work for them.

If continual or chronic problems are encountered with a licensed individual, this documentation should be referred to the district Wastewater Specialist. If warranted, the Department can revoke or suspend a license for repeated gross negligence, incompetence, or misconduct. It is extremely important that you keep on file the permit applications you deny, along with any correspondence as to why the permit was denied. Sections 145.20 (2)(e) and (f), *Wisconsin Statutes*, indicate you must keep files and reports related to your administration of the POWTS program.

NEVER return all copies of a denied permit. Not matter how small the reason for denial, denial must be in writing and you MUST show this action in your files.

TRANSFER OF SANITARY PERMITS

There is only one occasion when a sanitary permit can be transferred. Where a change of ownership for the parcel has occurred the permit may be transferred by completing a new application form and assigning a new permit number. A change of plumbers is not considered a transfer, but rather a revision and is processed accordingly.

Section 145.135, *Wisconsin Statute*s, provides that a sanitary permit can be transferred between owners, but the new owner must obtain a new copy of the permit. To transfer a permit where there is no change in location or design of the system, a new SBD-6398 form must be completed and signed by the responsible plumber. The transfer permit application form must indicate that it is a transfer and the previous permit number must be referenced.

If, in the transfer of land, the planned residence goes from a three-bedroom home, as covered by the current permit, to a four-bedroom residence, requested by the new owner, then a revised sanitary permit application form and a revised system design must be submitted. In addition, if in the transfer of the permit the location of the system changes or there is a change in the type of system requested (e.g. from a below grade system to a mound system), then a revised sanitary permit must be secured. Both processes can be accomplished at the same time. It is recommended to write ”VOID” on the old plans and permit application form and note that revised or transferred plans exist.

Once an individual obtains or renews a sanitary permit, that permit can be used for two years to install the proposed POWTS, even though possibly the system could not be installed under any new regulations adopted during the specified two-year period of sanitary permit validity.

When there is a change in the installing plumber the permit file is revised to show who the responsible plumber is for the installation. It is important to understand that the sanitary permit issued by your office legally belongs to the site and the owner of the site. It is not the property of the master plumber who signs the permit. It is well within the owner’s right to request a change in installing plumber.

This provision does not, however, mean that a sanitary permit cannot be revised for some other reason. For example, the permit holder may decide to locate the proposed system elsewhere on the property or the permit holder may alter soil/site conditions at the location of the proposed system. These and other changes in the conditions forming the basis for the original approval would require the permit holder to obtain a revised sanitary permit. There may be situations where a system revision may conflict with newly established rules. If this occurs, the permit must be revised based on the current regulations.

To revise a permit from one installing plumber to another, a new SBD-6398 form must be completed. Also, a properly sealed site plan and system design shall be submitted by the new plumber who will be doing the installation. A new plan is not necessary however, if a registered plumbing designer or engineer sealed the original plans.

The statutes allow counties to charge a fee for transfer of a sanitary permit. The provision that more than one fee cannot be paid in any one 12-month period for a sanitary permit does not apply to transfer of a permit. If it is felt that staff time is taken executing the transfer of a permit or in the filing of the appropriate papers, a transfer fee may be charged. This transfer fee must be noted in your POWTS ordinance. The same logic applies to county fees charged for the revision of a permit application.

RENEWAL OF SANITARY PERMITS

Section 145.135, *Wisconsin Statutes*, states in part that a sanitary permit is valid for two years and is renewable for like periods thereafter.

Additionally, s. 145,135, *Wisconsin Statutes*, states that more than one fee for a sanitary permit or the renewal of a sanitary permit may not be charged in one 12-month period. There are several reasons why a sanitary permit may be renewed. The most common reason or case involving renewal of a sanitary permit is when a permit is nearing the end of its two-year life.

As an example, the permit is issued for a site on July 22, 2011. On July 20, 2013, the landowner appears in your office saying that he would like to renew his sanitary permit. First of all, the permit is still valid. Secondly, the renewal of this permit must conform to the regulations in force on July 20, 2013. In other words, if a code revision or statutory change has taken place during the two-year period, a renewal cannot be performed until any needed revision is made to the plans and/or specifications.

The revised permit must conform to the new standards. The next issue is whether a fee is required for this renewal. Since the permit is still valid, state statutes do not require the payment of an additional fee. The county ordinance may, on the other hand, require a new sanitary permit fee if renewal is sought more than one year after issuance. All that the statutes require is that no more than one fee be charged in any 12-month period.

In a second example involving a request to renew a sanitary permit the sanitary permit is not renewed within the two-year period for which it was valid. Returning to our first example, the landowner appears in your office seeking renewal of the sanitary permit after July 22, 2013. The permit cannot be renewed, it must be reissued. When the two-year period of the sanitary permit runs out, the permit ceases to exist. A new SBD-6398 form, POWTS plans, and a soil test conforming to the regulations in effect at the time of issuance of the new permit must be submitted and a new sanitary permit must be issued. Since a new sanitary permit must be issued, the $141.00 minimum sanitary permit fee also must be paid, and $100.00 of that fee must be sent to the Division of Industry Services.

A third example is where a sanitary permit holder wishes to renew the sanitary permit during the first year of its life. Again, with the sanitary permit issued on July 22, 2011, no additional fee may be charged for the renewal of that permit until July 23, 2012. Section 145.135, *Wisconsin Statutes*, does not, however, prohibit the charging of a transfer fee where a permit is transferred between owners or when a revision is made to the original permit.

The next issue is what type of paperwork must be completed for the renewal of a sanitary permit. In the first example, if the permit is being renewed during its two-year life and there is no change in the system configuration, septic tank size, location of the home, or location of the dispersal system, then only a new SBD-6398 form needs to be completed. The section indicating that the renewal occurs before the expiration of the original permit must be completed. A new permit card and number are assigned to take the place of the soon to expire permit. An attempt to

retrieve the old permit card from the owner or plumber should be made, but is not mandatory. The county will have to sign the SBD-6398 form and approve or disapprove it, indicate any fees that were collected, and write the previous sanitary permit number in the appropriate space on the form. The renewal application paper work should then be added to the file for that sanitary permit. In the second example, where a sanitary permit lapses or its two-year life expires, a new SBD-6398 form must be filled out. A new sanitary permit card and sanitary permit number will need to be issued. The third example, where a sanitary permit is renewed within the first year of its life, should be handled exactly as described for the first example where a sanitary permit is being renewed within its two-year life.

Regardless of at what time renewal of a sanitary permit is sought; the permit must conform and be based on the regulations in force at the time that a particular renewal is sought. Any change in the *Wisconsin Administrative Code* or *Wisconsin Statutes* dealing with POWTS, will need to be conformed to when the permit is renewed. Remember that renewal of sanitary permits should not be confused with the transfer of a sanitary permit. Note: A transfer, renewal or revision may take place at the same time.

REVISION OF SANITARY PERMITS

When a revision is made, s. SPS 383.22 (4), *Wisconsin Administrative Code*, requires that revised plans be submitted to you. A revision is necessary if there is a change in the master plumber or master plumber restricted service responsible for the installation or if the proposed modification to the POWTS involves any of the following:

1. The replacement or addition of a treatment component.

2. The replacement or addition of a holding component.

3. The replacement or addition of a dispersal component.

4. A change in one or more dispersal components involving the location outside of suitable evaluated areas, or the size, orientation, or type of dispersal component.

Note: A change in location of a treatment component doesn't necessarily require the submission of a revised plan.

REVOKING PERMITS

There will be times, even if you are carefully following the requirements of the code and statutes, when a bad or "invalid" permit is issued. Should a permit be issued based on false or incorrect data, it is not a "valid" sanitary permit within the meaning of the statutes. Likewise, if after issuing a permit, the site is altered and the system area is destroyed, the permit is invalid and must be revoked (ref. s. SPS 383.21(7) *Wisconsin Administrative Code*), unless a revision is possible. The permit application, soil and site evaluation report, (SBD-6398 and/or SBD-8330), and plan may also need to be voided and such actions must be clearly noted in the permit file.

A letter must be sent to the owner and installing plumber indicating why the permit was revoked. A copy of the letter must be placed in the permit file.

If the revocation of the permit is due to a CST or plumber error or violation, a second copy of the letter revoking the permit should be sent to the district Wastewater Specialist for the Division of Industry Services for review of a possible license action. If continued problems occur, this information is necessary to establish a complete complaint record.

DO NOT destroy these revoked or voided permits or the correspondence files. If you were to lose this information and then be challenged in court for revoking the permit, you could be in an embarrassing (not to mention legal) predicament.

Remember that permit issuance is the key to a strong healthy program. Make sure you are given complete information that is readable before issuing a sanitary permit.

In summary, a new sanitary permit card and number is needed under any of the following conditions:

- New or replacement POWTS installations
- Modifications, or alterations to a POWTS treatment, holding, or dispersal component
- Renewal of a valid permit
- Transfer of a permit to a different owner
- Revision of a permit due to a change of plumbers
- Reapplication associated with a revoked sanitary permit

SELF-CHECK

1. The minimum charge for a sanitary permit is:

   a. $20.00
   b. $75.00
   c. $141.00
   d. $91.00

2. Regardless of how much the county charges for a permit, _____ must be forwarded to the state.

   a. $100.00
   b. $ 1.00
   c. $50.00
   d. $91.00

3. The state's copy of the permit application must be sent to the Division of Industry Services within _____ days of issuance.

   a. 30
   b. 90
   c. 120
   d. 1 year

4. Soil test reports must be reviewed by _____ employed by the county.

   a. The secretary
   b. The health commission
   c. A CST
   d. The administrator
   e. All of the above

5. The only time a permit application is not signed by a plumber is:

   a. If the owner is doing the work
   b. An engineer signs the permit
   c. A privy is being installed
   d. None of the above

6. A complete set of plans that accompanies the permit application must:

   a. Be drawn on a separate sheet of paper
   b. Show a cross-section view
   c. Show a vertical and horizontal reference point
   d. Show piping detail and cell spacing
   e. All of the above
   f. a, c, and d

7. A sanitary permit can be revised if:

   a. The owner decides to build a four-bedroom home instead of a three-bedroom home as on the permit
   b. The owner builds too close to the system area and the system must be moved away from the soil test sites
   c. The location of the house and tanks changes but the dispersal system stays the same
   d. A larger septic tank or multiple tanks are used, but the number of bedrooms and system location is the same
   e. a and d
   f. a, c and d
   g. All of the above

8. If a permit is being renewed on February 20, 2012, and was issued originally on March 17, 2010, the permit application must conform to _____, *Wisconsin Administrative Code*.

   a. Chapter SPS 383
   b. Chapter SPS 385
   c. Chapter Comm 83
   d. a and b

9. In Question No. 8, can a fee be charged for the renewal?

   a. Yes
   b. No

10. A person comes into the office on November 30, 2012, and has just purchased a lot in Happy Valley Estates where the seller obtained a permit on December 7, 2010. The new owner wants to renew the sanitary permit. This is a:

    a. Transfer
    b. Renewal
    c. Reissuance
    d. New permit
    e. a and b

11. An owner has an original permit that was issued on July 22, 2010. The owner comes in on August 1, 2012, and the plans show no changes. This action is a:

    a. Renewal
    b. Reissue
    c. Transfer
    d. Revision
    e. a and c
    f. a and d

12. The original permit was issued on June 19, 2010, and a new owner comes in on January 30, 2012, and there are no changes to the plans. This is a:

    a. Renewal
    b. Reissue
    c. Transfer
    d. Revision
    e. a and c
    f. c and d

13. The original permit was issued on January 14, 2011, for a three-bedroom, conventional system. The owner now has approved plans for a four-bedroom, pressure distribution system and comes in on December 17, 2012. This is a:

    a. Renewal
    b. Reissue
    c. Transfer
    d. Revision
    e. b and c
    f. a and d

14. The original permit issuance was July 28, 2010, and the owner comes in on September 24, 2012. The permit would need to be:

    a. Renewed
    b. Reissued
    c. Transferred
    d. Revised
    e. b and c
    f. a and b

15. The original permit issuance was July 28, 2010, and a new owner comes in on September 24, 2012. The permit would need to be:

    a. Renewed
    b. Reissued
    c. Transferred
    d. Revised
    e. a and b
    f. b and d

16. A new owner comes in with a permit for a three-bedroom home, conventional system. The permit was issued on February 27, 2010, and the date is May 14, 2012. The permit must be:

    a. Renewed
    b. Reissued
    c. Transferred
    d. Revised
    e. a and c
    f. d and c

17. The original permit was issued on August 1, 2012, for a four-bedroom, conventional system. Two months later, the owner wants to move the home further away from the dispersal system and change plumbers. The action needed is:

    a. Renewal
    b. Reissuance
    c. Transfer
    d. Revision
    e. c and d
    f. a and d

18. To issue a sanitary permit for a conventional system, the permit application must include:

a. SBD-6398 (application form)
b. Complete plans on a separate sheet
c. A complete soil and site evaluation report
d. The permit fee
e. All of the above

19. If a permit is found to be based on false or incorrect data, it:

a. Is an invalid permit
b. Must be revised
c. Must be revoked
d. Is valid for two years
e. a and c

In the statements below, circle T if the statement is TRUE and F if the statement is FALSE.

T F 20. A state level sanitary permit is needed to "rod out" a building sewer?

T F 21. A state level sanitary permit is needed to replace a septic tank?

T F 22. A state level sanitary permit is needed to excavate and repair a distribution pipe?

T F 23. A state level sanitary permit is needed if an outlet filter is proposed to be installed in an existing septic tank?

T F 24. State level plans signed by one plumber may be transferred to another plumber because the owner owns the plans?

T F 25. A state level sanitary permit is issued for a privy?

T F 26. Only the Division of Industry Services will issue a sanitary permit for a POWTS on state owned land?

T F 27. A state level sanitary permit is required for a holding tank serving the repair bay of an automotive garage?

POWTS INSPECTOR – CHAPTER 10

INSPECTIONS

INTRODUCTION

A challenging part of any regulatory/enforcement program is the inspection process. The inspection process is also the typical time when public contact occurs. Inspectors must be able to explain what they are doing, why they are doing it, and what, if anything, is wrong with whatever they are inspecting and why it needs correction. This guidance document will discuss the different inspections and authorization for these inspections that are a part of the private onsite wastewater treatment system (POWTS) program.

OBJECTIVES:

UNDERSTAND the basic principles that apply to the inspection process.

LEARNING ACTIVITIES:

READ the applicable sections of Chapter 145, Wis. Stats., and Chapter SPS 383-385, Wis. Adm. Code cited in this chapter.

COMPLETE the Self-Check.

DEFINITION AND IMPORTANCE

A state level sanitary permit is a regulatory device that provides assurance that a proposed POWTS installation complies with applicable administrative codes and statutes. However, what looks good on paper must be installed under diverse field conditions. The inspection process required by s. 145.20 (3)(d), *Wisconsin Statutes*, is to make sure that what was envisioned by the permit is indeed installed. The word "inspection" is generally defined as a "checking or testing of an individual or object against established standards." In our case, we check what's in the ground against what was shown on the plan and what is in the code. The word "inspect" also means to "view closely in critical appraisal, to examine officially."

The importance of the inspection process cannot be overstated. It is a consumer and environmental protection quality assurance program, and it is during inspections that we usually have the most contact with property owners. To be a good and effective inspector, you need to not only know the code, but also must know how to relate to the licensed people and the public. Often it's not whether you have to say "no," but rather how you say it that affects your sanitary program effectiveness.

Inspections not only have to be thorough in the field, but also must be well documented in your files. There are essentially five major types of inspections envisioned by the statutes and administrative codes. These inspections are:

1. Soil and site inspections,
2. Installation inspections,
3. Maintenance inspections,
4. Existing system inspections, and
5. Failing systems inspections.

SOIL AND SITE INSPECTIONS

In conducting a soil and site inspection, it is important not to "redo" or "perform" the complete work of the certified soil tester (CST). If, in conducting an onsite verification, it ends up that the CST is in error, make sure that a new, accurate soil test is filed by the CST. The inspector conducting the soil verification must be a CST. An accurate, detailed description of the soil profile should be written by the inspector. The inspector's soil evaluation should be conducted in a similar manner to the CST's. Only on rare occasions should a soil verification be conducted without first having a soil test filed with your office. Even for replacement systems or nonconforming sites, it is preferable that a completed soil and site evaluation report or preliminary report be on file with your office prior to conducting any onsite verifications.

Regardless of how many soil borings you verify, or even if no borings are verified, every site you inspect should have a site plan diagram accurately locating the following:

1. Proposed system or system areas.
2. Well or proposed well location.
3. Test hole locations and test holes you actually observed.
4. Buildings or proposed building areas.
5. Lot lines.
6. Direction and percent of land slope.
7. A reference point.

Be sure you make accurate and adequate measurements when documenting all your inspections. You should also document who was with you on the site when the inspection was performed and who requested the inspection.

Even though you are not redoing or performing the CST's work, you should write a full profile description for the soil borings you observe. It is the site where you do not do complete sufficient or detailed enough work that will usually cause a problem in the future.

From your previous training and experiences, you should know what is needed to prepare a complete morphological soil profile description. If you are not sure how to write complete profile descriptions, then you should refer to Chapters 2 and 6 in the *Soil and Site Evaluation Handbook*.

The profile descriptions you prepare will form the basis for your inspection report. A report should be written and filed for every soil verification you conduct. The report should refer to the appropriate sections of the administrative code in discussing any limitations found on the site. Many counties have a standard format for their inspection report letters. A well-written inspection report can prevent problems with the property owner. However, do not use a SBD-8330 form to report your findings since it may be confused with reports filed by private CSTs. All onsite verification reports should, as a minimum, include:

1. Legal description of the property.

2. Date of verification.

3. Persons present during the inspection.

4. Results of inspection.

5. Soil profile description.

6. Type of system(s) the code would allow.

7. Next step in the sanitary permit process, (e.g. complete permit application, more testing, investigation of new areas).

8. For most sites, your report can be written as a letter to the owner or person requesting the verification. Regardless of who requests the verification, you should send a copy to the owner, the CST involved, and the master plumber or master plumber restricted service if a sanitary permit has been applied for. If the verification revealed serious errors or falsification by the CST, make sure a copy of your letter is sent to the District Wastewater Specialist for the Division of Industry Services.

A copy of all your onsite verification reports must be kept in your files. Many counties file their verifications and soil and site evaluation reports by township, section, and then owner's name.

Still other counties keep their verifications separate, filing by owner's name, or in chronological order. Your filing system should provide a simple means of retrieving the information from the verifications. Make sure that the other staff in your office know how the filing system works.

INITIAL INSTALLATION INSPECTIONS

Section 145.20 (2)(d), *Wisconsin Statutes*, requires that all POWTS must be inspected "after construction but before backfilling."

As with all other aspects of the POWTS program, uniformity of system inspection techniques is extremely important. This section will discuss procedures for initial system inspections.

Section SPS 383.26 (2)(b), *Wisconsin Administrative Code*, "Inspections and Testing," establishes that the master plumber or master plumber restricted service in charge must notify you when the installation is ready for an inspection. Section SPS 383.26(2)(d), *Wisconsin Administrative Code*, states that the plumber must provide all the necessary equipment to inspect the system at the site. A leveling instrument, shovel, and measuring tapes are essential tools for conducting a system inspection. Many inspectors have a standard checklist available for installers that describes their inspection procedures. You should be consistent in what and who you require to be present when you conduct an inspection.

When you first arrive at the site, three items must be checked before beginning your inspection. These three items are:

1. That the sanitary permit is properly posted.

2. That a set of the approved plans and completed permit application form are available.

3. That the persons installing the system are properly licensed.

The inspection of a system is based on the plans and permit approved and issued by your office. Complete and accurate plans make the system inspection much easier to conduct. Remember that a system cannot be moved from one area to a completely different area of a parcel without revising plans. So, your first step in the inspection is to make sure the location of the tank(s) and dispersal system(s) are correct.

Many inspectors find it to be easiest to inspect a system by starting at the building and proceeding in order through the different components of the system. Essentially you are taking a "wastewater view" of the system. Starting at the building is the "BUILDING SEWER." Building sewer is actually covered by s. SPS 382.30 (11)(c), *Wisconsin Administrative Code*. If you are inspecting in a municipality that has interior plumbing inspection, then the building sewer inspection is the responsibility of the interior inspector.

Where the system being inspected is not in a municipality with interior plumbing inspection, the POWTS inspector is responsible for inspecting the building sewer. Building sewers must be checked for:

1. Correct materials [s. SPS 384.30 (2)(c)],
2. Bedding under the pipe [s. SPS 382.30 (11)(e)],
3. Gradient [s. SPS 382.30 (5)(b) 2.],
4. Cover to be placed over the pipe [s. SPS 382.30 (11)(e)],
5. Insulation [s. SPS 382.30 (11)(c)], and
6. Location [s. SPS 382.30 (11)(d)].

SEPTIC TANKS

Regardless of who inspects the building sewer, a POWTS inspector must inspect the inlet of the septic tank and the joint at the building sewer/inlet connection. In general, this connection will be a push-on adapter or flexible coupling. The joint must be checked for proper materials and installation. Incomplete insertion of piping into an opening, cut or rolled couplings, or gaps between the pipe and coupling or push-on adapter are defects and may cause leaks between the tank and external environment.

The septic tank itself must be checked for cracks or other indications of shipping or structural damage. The tank portion of the inspection involves checking:

1. Bedding [as per product approval or plan approval].
2. Water tightness [s. SPS 384.25 (2)(a)].
3. Septic tank baffles and/or outlet filter. Or method to prevent particles of > 1/8 inch from reaching the dispersal system [s. SPS 383.44 (2)(c)]
4. Manufacturer's label and capacity [s. SPS 384.25(11)].
5. Access cover warning label [s. SPS 384.25 (8)].
6. Depth at which the access opening will terminate. A locking device must be provided if the cover is larger than 8 inches in diameter and is not buried [s. SPS 384.25 (7)].
7. Inspection opening and air-tight cap [s. SPS 384.25 (7)(e)].

8. Capacity conforms to permit. Minimum septic tank capacity for a 3-year service cycle may be calculated by multiplying the design flow by a factor of 2.088.

9. Where more than one tank is installed, the piping and joints between tanks must be checked.

10. The outlet piping and joints must be checked (in the same manner as for inlet piping).

11. The backfill material must be checked. When a new tank or tank manufacturer is involved, you should check the *Wisconsin Plumbing Product Register* to make sure the tank is an approved tank. If the tank in question is not in the product register, or you are unsure as to whether it is approved, contact the district Wastewater Specialist or ask to see the manufacturer's approval. All tanks installed in this state must have product approval.

SITE-CONSTRUCTED TANKS

On a system where a site-constructed tank is to be built, state or designated agent plan approval is required and a separate inspection should be performed. An inspection is best made after all the forms have been set up, and the floor and sidewall construction joints have been poured. Items to be inspected are:

1. The tank's inside dimensions to make sure the right size tank is being formed.

2. Tank wall thickness.

3. Type of wall ties being used in forming.

4. Construction joints and the type of water stop approved for these plans.

5. The keyway or equal to make sure the depth and width are acceptable.

6. Inlet and outlet location and size, and the type of pipe openings to be used for inlet, outlet, and vent piping.

7. Materials used to backplaster the wall ties.

8. Tank cover forms if poured on site or precast covers before installation. Make sure the forms provide a proper seal between the cover and sidewall (shiplap, tongue and groove, and a proper waterstop).

If the tank is being monolithically poured, the forms should be checked prior to any pouring of concrete.

Note that there are several companies that have Department product approval for site constructed tanks. These approved products are constructed the same way each time and thus it is not necessary to submit detailed construction details for each installation. However, the installer must have detailed construction plans for the product available for inspection. The inspector should ask to see a copy of the tank construction plans during the inspection to ensure the tank is properly constructed. Counties with holding tank review authority may review preapproved site constructed tanks as if they were precast concrete tanks.

DOSE CHAMBERS

On systems that have a dose chamber, the inspector must again refer to the plans and permit to find the information on size, location, and elevation of the tank. The review of the permit application and plans must take into account the required storage capacity and/or number of pumps. Dose chambers that have a siphon or duplex pumping controls installed in them do not need a one-day storage capacity.

The inspection of the chamber itself is generally the same as for a septic tank. No holes may be cut or chiseled into a tank or riser unless approved by the tank manufacturer. If a siphon is installed in a prefabricated tank, make sure the siphon discharge line exits the tank through an approved opening. Make sure the siphon has been completely installed and tested according to the manufacturer's instructions. Check the joint that connects the siphon discharge to the force main, and make sure this conforms to the material approval in the material bulletin.

Where the dose chamber houses a pump, the following must be checked:

1. Elevation of the inside bottom of the tank (not top of pump pad).

2. Elevation of pump off switch.

3. Pump model and manufacturer is the same as on plans.

4. Are the pump controls in place and set for the correct dose [Pressure Distribution Component Manual Version 2.0 Table 3].

5. Is the high water alarm installed 2 inches above the pump on control [Pressure Distribution Component Manual Version 2.0 Table 3].

6. Are the electrical connections appropriate [s. SPS 316.300 and NEC 300].

7. Where is the alarm located and is it an audible, visual, or audible and visual alarm [s. SPS 383.43 (8)(e)1.b].

8. Vent is in place and will terminate 12 inches above final grade [Inground Soil Absorption Component Manual Version 2.0].

9. Vent is 10 feet from a fresh air inlet [s. SPS 382.31 (16)(d)].

10. Manhole risers will terminate 4 inches above final grade and have a locking cover [s. SPS 384.25 (7)(d)1].

After leaving the septic tank or dose chamber, the pipe running to the distribution system must be inspected. Check to make sure that:

1. Proper materials are used (they must be the same material as approved for building sewer) [s. SPS 384.30-3].

2. Check to see if different materials are mixed together; make sure proper joints are used between different materials.

3. Make sure pipes are properly connected (solvent/weld for most applications), aligned, and direction changes use proper fittings.

4. For gravity-fed systems, check the elevations at the tank outlet and distribution box or distribution header connection.

Where a distribution box or drop box is used, make sure that a box specifically manufactured for this purpose is used. Check the joints and connections to make sure they are watertight. Make sure the box is level.

POWTS DISPERSAL COMPONENT INSPECTION

As with the other parts of the initial system inspection, make sure the location of the POWTS dispersal component corresponds to the location covered by the permit. Measurements must be made to make sure the setbacks in SPS Table 383.43-1, *Wisconsin Administrative Code*, are maintained and to clearly document where the system is in relation to permanent reference points. Again, if the permit application and plans are complete, this will be a very simple task. Measure the size of the system and check this against the permit. Next, check the depth of the system by comparing the elevation of the bottom of the distribution cell with the system elevation shown on the approved plans. If the system is installed too deep, construction must be stopped. In some cases, additional soil borings may be needed before the system can be completed or put into use. If the system was installed deeper than the original soil borings would allow, but additional soil borings confirmed that the soil was still suitable a revised permit will be needed.

You must check the system elevation (bottom of the distribution cell) at more than one location to make sure it is level. You should pay attention to the spoil pile and system sidewalls to check for smearing of the soil. If the spoil pile or system excavation appear to have been rained on, or if you suspect the bottom area has been smeared or compacted, have a section of the distribution cell bottom uncovered and check the bottom of the system. The POWTS dispersal system may not be installed when the soil is wet enough to promote compaction or smearing of the

infiltrative surfaces. Section SPS 383.45 (4), *Wisconsin Administrative Code* states that when the soil can be rolled into a ¼ inch diameter "soil wire" it is too moist for installation. After you are satisfied that the excavation is at the right depth and construction activity has not damaged the infiltrative capacity of the soil, the following should be checked:

1. If aggregate is used in the dispersal component, at least 6 inches of aggregate that is clean, hard rock, 1/2 to 2 1/2 inches in diameter, has been placed below the distribution pipes.

2. The pipe material for the header and perforated pipe should be checked. The pipe material used must be approved by the Department.

3. The installation and separation of distribution pipes, leaching chambers, or other approved distribution technology.

4. The joints and connections between pipes must be checked. With the exception of a gravity distribution cell using large diameter perforated pipe, solvent/weld joints will be most often made between pipes.

5. Check for the correct the pitch on distribution laterals, if any. Or as in the case of leaching chambers or other approved dispersal components that they are level.

6. Check the observation/vent pipe and make sure that the pipe above the system is approved material and the observation pipes are perforated or slotted as per the appropriate component manual specification. The "observation" purposes of these pipes are more important than the "vent" purposes. However, all POWTS must be properly vented and must provide for a free flow of air throughout the plumbing system.

7. Check the geotextile cover material used for preventing soil material from filling the distribution area.

8. Make sure the system is backfilled with at least 12 inches of soil over the geotextile material covering the cell.

Checking materials used and noting the pipe marking is an essential part of any inspection. Make sure you document that proper materials were used and note the ASTM number or other markings.

On rare occasion, the construction inspection reveals that the site is NOT SUITABLE for the system being installed. Your responsibility at such a time is clear. You must stop construction on the project and have conditions reevaluated.

Chapter 145, *Wisconsin Statutes*, places a great deal of responsibility on the inspector to make sure the system that was installed is code-compliant. If you knowingly allow a noncompliant

system to be backfilled, the county and the inspector could be held liable if it fails or causes a human health hazard or environmental damage.

If distribution components such as leaching chambers and other approved products are used, many of the steps for the installation inspection from above are also relevant. Care must be taken that during installation the structural integrity of the product is not compromised and that the manufacturer's installation instructions and recommendations are followed.

MOUND AND OTHER SYSTEM INSPECTIONS

Different inspection procedures are needed for other types of POWTS installations. Inspections of some systems are more complex and thus take more time, and possibly more trips to the site will be needed to adequately complete the construction inspection.

Mound systems must be inspected, as do all other systems, after construction but before backfilling [s. 145.20 (2)(d) *Wisconsin Statutes*]. The county sanitary ordinance may require more than one inspection for mound systems and these requirements need to be clearly communicated to the installer. Mound inspections commonly take place at the following times:

1. At the start of plowing to check the soil moisture and contour elevation,

2. At the time the sand fill is being placed,

3. After the distribution piping has been installed, and

4. After all work is completed.

The first two inspections cited above can be performed at the same time. When you first arrive at the site, the mound area should be staked out. Using the approved plans, locate where the controlling contour line is located below the up slope edge of the distribution cell. Check to see that sufficient ASTM Standard C-33 sand is in place to the proper depth. The sand fill depth is often listed as the D dimension on the plan. Several other points in the distribution cell can now be checked to make sure it is level and at the correct elevation. The inspector also must check the sand fill (and more than one truckload) to make sure the fill meets ASTM C-33 standards. A written statement from the supplier is sufficient for this purpose.

After the fill has been placed, the inspector can leave the site, returning after the aggregate and distribution piping has been placed. Several elevations must be measured at this time. Measure the elevation at the manifold and make sure the vertical lift is correct between the pump off switch and manifold. Now measure the elevation at the ends of the manifold to make sure it is level. Measure elevations at the ends and at several spots between the manifold and the ends of the laterals. It is crucial that the distribution system be level (i.e. at the same elevation).

The final inspection for a mound is done after all work is completed. Make sure the dose chamber cover is above grade and has a locking device. Make sure adequate backfill was placed

on the mound. Make sure the mound has been sodded or seeded and mulched. If you chose to conduct only one inspection of a mound or other type of system it should be when the system is nearly complete and is ready to be back filled.

As with all inspections, you must keep a report in your files. If the county chooses to make more than one inspection at a mound site this should be noted on the inspection report form. The note should include steps of the installation you witnessed and the results.

Pretreatment device inspections may be conducted independently or in conjunction with other POWTS component inspections and usually require additional time. Two important items to remember when inspecting the pretreatment components are:

1. Section SPS 383.04(1)(a), *Wisconsin Administrative Code,* states: that a Sanitary Permit cannot be issued by the county unless an inspector that has had training on the technologies listed in Table 383.04-1 is available. If you are that inspector you should be familiar with the product and manufacturer's installation instructions before visiting the site for an inspection.

2. Section SPS 383.21(2)(c)4, *Wisconsin Administrative Code*, requires documentation that the installer has received training on the restricted technologies listed in Table 383.04-1. This training must be obtained by the installer prior to Sanitary Permit issuance.

Very often with new technologies a representative for the manufacturer will be onsite to assist with any concerns. This is especially true for first time installations by an individual installer.

ORDERING CORRECTIONS TO A SYSTEM

The whole reason for the inspection program is to help guarantee that systems are properly installed with the correct materials. Several times every year, you probably will find an error in an installation. Section 145.20 (2)(f), *Wisconsin Statutes*, gives you the authority to make sure these errors are corrected. The Department has found that intermediate steps short of a formal order can be taken to gain correction of a violation.

A field order is nothing more than a handwritten note on the inspection report that is given to the plumber in charge describing the violation(s) and the date by which correction must be made. A county or department order should be a formal letter describing the violation(s), the code sections that apply, and a date by which correction must be completed. Even the smallest violation should be noted on your inspection report and given to the installer. Of course, when violations are noted and orders are issued, you will have to perform a REINSPECTION to make sure the corrections are made. A complete record of all field and formal orders must be kept separately in your files, along with a record of re-inspections and compliance.

If a field order is not complied with, then a formal ORDER must be issued. Orders can be enforced in court.

MAINTENANCE INSPECTIONS

Traditionally, the maintenance of POWTS has been the sole responsibility of the owner. This approach does not always work well, mainly due to a lack of knowledge on the owners' part. This lack of knowledge usually revolves around what type of maintenance is required or what the consequences are of ignoring the maintenance that should be performed. In 1977, with the creation of the Wisconsin Fund program for POWTS, the legislature attached requirements to the county's eligibility to receive grants that required establishment of a maintenance program at the county level. Section 145.245 (3), *Wisconsin Statutes*, establishes a maintenance requirement for septic tanks. Maintenance inspections are rarely performed by the county, but may be performed on citizen request or as a service to the public.

A maintenance inspection should include:

1. A check of the septic tank to determine depth of accumulated solids and scum.

2. A check of the baffle plates, filter, and outlet opening.

3. A check of the observation/vent pipe in the distribution cell for ponding of wastewater.

4. Visual observation of any possible ponding or signs of seepage at the ground surface.

5. Assessment of safety concerns such as missing or inappropriate locking devices.

6. Discussion with the owner regarding any problems they may have experienced with the system.

To check the level of solids in a septic tank, use a tool specifically manufactured for this purpose. When one-third of the tank's liquid volume is occupied by the sludge and any scum accumulation on top, the tank must be pumped. If a dose chamber is a part of the system, the chamber also must be inspected. If solids have carried over into the tank, they must be removed.

While inspecting the dispersal/distribution system, it is important to remember that ponding in a dispersal system is a natural part of the anaerobic wastewater distribution life cycle. It is the depth to which the wastewater is ponded that tells us how much longer the system will probably function. Ponding, in and of itself, is NOT evidence of failure. When a large amount of wastewater is ponded, the site should be checked carefully for signs of surfacing. The owner should be made aware of the impending "old age failure" of the system. Drying out the distribution cell for three to four months can help rejuvenate the system by allowing breakdown of the bio-mat. This several-month resting period is not usually possible.

If a properly sited and designed system is near the end of its life span, then the owner may choose to install a new distribution cell. In this case, the old distribution cell should not be abandoned. A method of alternating between the two cells on a yearly basis after a two to three year resting period should be provided. However, make sure that at least one suitable soil boring

has been documented near the existing cell and 3 feet below the infiltrative surface to verify suitable soil conditions exist. The owner by this time is better informed as to the need for maintenance and usually will be more careful in the future.

At the end of your maintenance inspection, you should take time to explain what you have done and what the results are with the owner. Make sure you take advantage of this opportunity to help educate the owner about the requirements of this program (i.e. diversion of clear water, are the plumbing fixtures in good repair, diversion of run-off water, and unnecessary water consumption).

There are additional management requirements for many systems. If a management plan exists for a system, it should be reviewed to determine the exact requirements of a particular system. You can refer to s. SPS 383.54(1), *Wisconsin Administrative Code*, for additional information on management plans.

EXISTING SYSTEM INSPECTIONS

There are essentially three cases where the statutes or codes require inspection of an existing system other than the cases already discussed.

They are:

1. When a building permit is required.

2. When an existing system is found to be failing and is not being corrected.

3. When construction is planned that will affect flows or loads.

When a building permit is applied for, an evaluation must be made of whether or not a code compliant system would be destroyed or encroached upon by the new building or building addition. The building permit issuing agent should not allow a new building or building addition to be constructed on a site that is obviously served by a failing system (i.e. pipe to ditch, ponding on soil surface, obviously unsuitable soils). Section SPS 383.32, *Wisconsin Administrative Code*, is clear on the retroactivity of prohibited activities or conditions. This section as well as s. 254.59, *Wisconsin Statutes*, is used to order correction to failing systems.

Some of the prohibited activities or conditions listed under SPS 383.32 (1) that are retroactive include:

- Use of a cesspool [SPS 383.32 (1)(d)].
- Discharge of domestic wastewater or effluent to surface waters [SPS 383.32 (1)(e)].
- Discharge of domestic wastewater or effluent to the ground surface [SPS 383.32 (1)(f)].
- Discharge to the infiltrative soil surface of a treatment or dispersal component existing prior to December 1, 1969, that is installed in bedrock or groundwater.

Section SPS 383.25 (2), *Wisconsin Administrative Code*, also deals with issuing building permits for existing structures. Section 145.20 (2)(e), *Wisconsin Statutes*, requires that you conduct inspections as required by the county or the Department. Existing system inspections should answer the following questions:

1. Will the new building or addition encroach on a POWTS area [s. 145.95 (1) and (2), *Wisconsin Statutes*]?

2. Is the existing system failing by creating a human health hazard [s. 254.59, *Wisconsin Statutes*] or by discharging to the ground surface [s. 145.245 (4), *Wisconsin Statutes*]?

3. Is the surrounding landscape so wet or obviously outcropped by bedrock that the system may be non-compliant or failing [s. 145.245 (4), *Wisconsin Statutes*]?

4. Is there room for a replacement system when the system does fail?

5. Is a complete soil and site evaluation going to be necessary?

Remember that there are many different alternatives available to an owner who has a non-compliant existing system. When your existing system evaluation turns into a failing or non-compliant system evaluation, you should stop and inform the owner of your findings and have them contact a CST to do a site evaluation.

Any addition or alteration to a building may result in a change to the wastewater flow or contaminant load or both. It is up to you to document existing capabilities and determine if additional flows or loads can be accepted. If accepted, what if any changes to the system may result. You may want to refer to SPS 383.25 (2) for more information.

FAILING SYSTEM INSPECTIONS

The last type of system inspection we will discuss is the inspection of FAILING SYSTEMS.

"Failing system" is a term defined in s. 145.245 (4), *Wisconsin Statutes*. Briefly, a "failing system" is a system that:

1. Has a discharge of sewage into surface water or groundwater.

2. Introduces sewage into zones of saturation that adversely affects the operation of a POWTS.

3. Discharges sewage to a drain tile or into zones of bedrock.

4. Discharges sewage to the surface of the ground.

5. Fails to accept sewage discharges and causes back-ups of sewage into the structure served by the POWTS.

It is important to fully explain what type of failure the system is suffering from in your inspection report. How you approach this type of inspection is dictated by how you find out the system is failing. If a third party reports the failing system, your first step should be to contact the owner. In many cases, it is the owner who contacts you about a failure. POWTS too close to groundwater, bedrock, or zones of soil saturation are "failing" but may be difficult to detect. These non-compliant sites may be suitable for options other than complete replacement of the system. An attempt must be made to secure the owner's cooperation. This can be done by explaining what constitutes a failing system. Your inspection should be performed with the intent of determining:

1. Is this a code-compliant POWTS exhibiting signs of age?

2. Is the POWTS hydraulically overloaded?

3. Has the use of the POWTS changed?

4. How long has the POWTS been in use?

5. If the POWTS is new (less than 1-2 years old), was the POWTS properly installed (your files should contain the permit and inspection reports).

6. Is the POWTS affected by carryover of solids or grease (traditionally cited as a major cause of problems)?

7. Was the POWTS installed in unsuitable soils?

If the dispersal area appears to have failed due to old age, a replacement POWTS may be needed. If hydraulically overloaded, then some modification should be attempted and/or the dispersal area will have to be dried out or replaced with a properly sized area. If the dispersal area is a victim of solids carryover, poor construction, or poor soils, a more detailed evaluation (i.e., digging into the area) will probably be needed. If soils are questionable, a CST should do the preliminary work before you review the site.

On occasion you will have to take legal action to get a POWTS corrected. Section 145.20 (2)(f), *Wisconsin Statutes*, gives the county the authority to order correction. Section 145.20 (2)(g), *Wisconsin Statutes*, requires the county perform duties as required by the rules of the department.

In addition, Section 145.20 (2)(f), *Wisconsin Statutes*, includes the ability and responsibility of the county to investigate violations of their sanitary ordinance and the human health hazard abatement statute [s. 254.59]. The most typical health hazard you will encounter that is covered by this statute section is the use of an outfall pipe or overflow to a road ditch. Such conditions

are prohibited by ss. SPS 383.32 (1)(e) and (f), *Wisconsin Administrative Code*. Almost all human health hazard inspections will be prompted by:

1. Your observation of an outfall;

2. A complaint from a neighbor or other third party.

This makes human health hazard inspections quite a delicate situation.

In all cases, you should find out who the owner of the property is. You should contact the owner and let them know that you have been informed that their system appears to be creating a human health hazard. Ask to be allowed to meet with the owner and to inspect the source of the alleged hazard. Hopefully, the owner will agree to cooperate. Remember that once a hazard is identified, some action must be taken.

If the owner of the property is totally uncooperative, then you should contact your legal counsel and secure an inspection warrant. If the nuisance is confirmed (discharge to roadway, the ground surface, or into surface waters or a drainage ditch), then an order requiring correction must be issued. At this point, an evaluation of the soil and site conditions must be conducted and a determination made as to whether the system can be repaired or if a new system will be needed.

Because of the delicate nature of these inspections, and the clear statutory mandate to pursue these investigations, it is extremely important to fully document all steps of the investigation. This means times, dates, persons contacted, and how contact was made. If you can show your actions were reasonable and prudent, then enforcement of human health hazard violations becomes much easier.

Your initial contacts with the property owner also are of utmost importance. Do not be belligerent or overzealous with the owner. You are in a position that allows for formal enforcement action, but do not threaten the owner. Give the owner a chance to cooperate. It is only natural for many of these owners to be defensive and protective of their property. Try and explain the threat to the health of the owner, his family, and public. If cooperation from the property owner cannot be secured, then you will have to consult with your legal counsel for guidance on further enforcement actions.

SELF-CHECK

1. After a soil verification is done, a complete plot plan showing the location of soil test sites the county inspector observed should also include:

   a. Proposed system area(s)
   b. Building or proposed building locations
   c. Lot lines
   d. Percent and direction of land slope
   e. All of the above

2. The report of a soil verification should include:

   a. Persons present during the verification
   b. Who requested the verification
   c. A soil profile description(s) completed by the inspector who is also a CST
   d. a and b
   e. a, b, and c

3. The county filing system must include:

   a. Copies of all soil verifications
   b. A method of retrieving all soil test reports
   c. Copies of permit applications that were denied
   d. All of the above

4. When a CST makes serious errors or falsifies data, a copy of the county's verification report should be sent to:

   a. The Division of Safety & Buildings
   b. The county board chairperson
   c. The Department of Natural Resources
   d. The Governor
   e. All of the above

5. The person responsible for inspection of the building sewer is:

   a. Always a POWTS inspector
   b. Always an interior plumbing inspector
   c. The interior plumbing inspector or the exterior plumbing inspector when there is no interior inspector
   d. None of the above

6. When inspecting the piping from a septic tank to the distribution system, you must check:
   a. The type of materials used
   b. That more than two mechanical joints are used
   c. That the pipes are loosely fit together
   d. None of the above

7. Which of the following items are the same when checking either septic tanks or dose chambers?

   a. Vents are in place and 10 feet from a fresh air inlet
   b. Warning label is in place on the cover
   c. Locking cover will terminate below ground
   d. a and c
   e. a and b

8. At least _____ inches of soil cover must be provided over the geotextile covering.

   a. 12
   b. 16
   c. 10
   d. 18

9. Regardless of the type of system installed (in-ground soil absorption, pressure distribution, mound, etc.), which of the following must always be checked?

   a. Pump and alarm controls if installed
   b. Distribution pipe material used and marking
   c. Septic tank baffles are in place
   d. Distribution pipe gradient
   e. All of the above

10. An in-ground system using pressure distribution that is being constructed should be inspected:

    a. When the system excavation is complete and gravel is being placed
    b. While the distribution piping is being installed
    c. After installation is complete but prior to backfilling
    d. All of the above
    e. None of the above

11. The required inspection for a mound should be done:

    a. When the tanks are installed
    b. When the sand fill in being formed into distribution cell
    c. At the start of plowing
    d. When the site is staked out
    e. None of the above

12. When a human health hazard complaint is received by your office, you should:

    a. Have the sheriff serve an inspection warrant
    b. Issue an order for correction
    c. Go immediately to the site for a surprise visit
    d. Contact the property owner

13. Existing system inspections are usually done when:

    a. An addition to a building is planned and a building permit is applied for.
    b. There is nothing else to do
    c. Requested by the owner
    d. A system is a year old
    e. a and c

14. Once a failing system is identified, its use must be corrected:

    a. Within 30 days
    b. Within one year
    c. Within the time period ordered
    d. When the house is sold

In the following statements, circle T if the statement is TRUE; circle F is the statement is FALSE.

T F 15. A soil verification should not be conducted until a SBD-8330 form is filed for the site.

T F 16. Any county employee can do a soil verification.

T F 17. It is not necessary to keep soil verifications on file.

T F 18. It is the POWTS inspector's responsibility to inspect the joint at the septic tank inlet.

T F 19. If a septic tank you are inspecting is not listed in *the Wisconsin Plumbing Product Register*, contact the Wastewater Specialist.

T F 20. For a system where a site-constructed tank is being used, separate plan approval for the tank by the department is always required.

T F 21. Pressure distribution systems can only use Schedule 40 PVC or ABS.

T F 22. The opening for a dose chamber outlet may be chiseled into any tank.

T F 23. Only one mechanical joint may be used on the piping after the septic tank but before the distribution system on nonpressure systems.

T F 24. A mechanical joint may be used anywhere on a pressure distribution system as long as it is rated for pressure.

POWTS INSPECTOR CHAPTER 11
OPTIONS FOR EXISTING SYSTEMS

INTRODUCTION

Wisconsin has had a strong POWTS program for many years. Consequently, most POWTS installed may be considered code compliant. However, there are many existing properties that had onsite sewage systems installed prior to the advent of "modern" regulations. Probably the most challenging situation that may confront a POWTS Inspector is evaluating existing systems for code compliance. Not all existing systems may be non-compliant to today's requirements. There are many options available to the property owner who has a system that appears to be non-compliant or failing. This chapter will discuss those options and how the county (and POWTS Inspector) is involved in advising the owner about the status of the system.

OBJECTIVES:

EXPLAIN the county's role in evaluating failing systems and non-compliant sites.

KNOW the options for a failing system or non-compliant site.

LIST the information needed for a Petition for Variance.

DETERMINE when affidavits on a deed or other legal agreements must be executed by an owner.

EXPLAIN when a Petition for Variance will most likely be denied.

IDENTIFY when a permit can be issued for a replacement system on a previously non-compliant site.

LEARNING ACTIVITIES:

READ the attached material.

READ or **REVIEW** Sections SPS 383.22 (2), 383.24, 383.27 and 383.41, *Wisconsin Administrative Code*.

READ or **REVIEW** Sections SPS 383.42, 383.44 and 383.70, *Wisconsin Administrative Code*.

READ or **REVIEW** the procedures for Petitions for Variance.

STUDY the petition for variance form, SBD-9890X.

COMPLETE the Self-Check.

In the chapter on inspections, the POWTS Inspector's role in soil and site evaluation was discussed. There is no other time when a finer line is drawn between the inspection or verification of a site and a complete site evaluation as in the case of a potential *non-compliant site*. The soil tester that the property owner hired may be confused by the soil and site conditions on the site. However, the soil tester should be involved in the preliminary evaluation. The inspector in evaluating a potential non-compliant site, is expected to offer assistance to the property owner and the soil tester. The inspector may offer recommendations of what other soil and site features or system components must be evaluated in greater detail in order to be able to make a decision on the acceptability of the existing system.

The basics of the site evaluation should be performed by a certified soil tester. The certified soil tester should determine what type of code-compliant system is allowable based on the soil and site conditions identified. The certified soil tester also should be an adviser to the owner, as their client, to recommend whether a Petition for Variance is a viable option that could be pursued.

Remembering that the definition of inspection is "a critical appraisal of a person's work", the POWTS Inspector's first action on a site (after greeting the owner) is to review the certified soil tester's work and agree or disagree with the findings. If your inspection shows different soil conditions, make sure your report is complete and well documented to back up your evaluation.

The POWTS Inspector must be prepared to explain the non-compliant aspects of a site and how this could affect the status of the system. The inspector is expected to advise the owner as to what options can be realistically pursued. The options for existing systems were greatly expanded when chapter Comm 83 (now known as SPS 383) was revised on July 01, 2000. Options may include:

1. File a Petition for Variance with a proposal that includes an equivalence that provides the same level of protection as the code and continue use of the system.

2. Individual site designs utilizing a combination of new and existing technologies.

3. Install a code-compliant system.

The petition procedure recognizes that there may be options other than those listed in the code that provide an equivalent degree of compliance.

The POWTS Inspector must advise property owners of what their options are. If after seeing the site, you feel the existing system or proposed repair or replacement will not be acceptable, you should advice the property owner of your decision and reason(s) for it.

A Petition for Variance should not be filed on a site that is a human health hazard as defined in s. 254.59, *Wisconsin Statutes*.

PETITION FIELD PROCEDURES

When an owner decides to investigate filing a Petition for Variance request, the following steps may be taken:

1. If a complete soil test has not been performed on the site, the owner must contact a certified soil tester and have a site evaluation performed.

2. A certified soil tester, with assistance from the POWTS Inspector and/or licensed installer, attempts to determine whether or not the existing system is failing or has failed hydraulically. The owner will need to be asked whether sewage has ever backed up into the structure or onto the ground surface.

3. Site limitations and types of code-compliant systems that can be installed, are reported to the owner and county (certified soil tester files a soil report).

4. The POWTS Inspector may evaluate the site, including observing soil borings, and agrees or disagrees with the findings/recommendations of the certified soil tester.

5. The POWTS Inspector writes a soil verification report and makes recommendations.

MEETING WITH THE OWNER

Meeting with the owner of the property to discuss options for their site is a critical part of the POWTS Inspector's responsibilities. As previously discussed, the broad options are:

1. File a Petition for Variance with a proposal that includes an equivalence that provides the same level of protection as the code and continue use of the system.

2. Individual site designs utilizing a combination of new and existing technologies.

3. Install a code-compliant system.

In the submission of petitions, the burden of proof (that the approach is equivalent to the code and safe) is on the owner. When meeting with the property owner, you should:

1. Review the certified soil tester's report with the owner.

2. Review your soil verification with the owner (does it agree or disagree with the certified soil tester's report).

3. Discuss the current system's history with the owner (have there been problems, what kind, etc.).

4. Explain what makes the site and/or existing system unsuitable.

5. Explain what type of code-compliant system will match the site.

6. If the Wisconsin Fund is available, explain this program to the owner.

7. Ask the owner for a proposal for leaving the system in use or replacing the system (if failing) with a similar but compliant system.

8. Based on your evaluation, discuss how the existing system could fail hydraulically. What other problems could be expected.

9. Discuss the use of ultra-low-flow plumbing fixtures (water closets, showers, suds savers, etc.) with the owner. Make sure they check for all sources of unnecessary water input (leaky fixtures, clear water discharges).

10. At the conclusion of your meeting, recommend to the owner what next steps may be taken (plans submitted for the repair or replacement of the existing system, filing the petition for variance with the Department, preparing legal documents, etc.).

If the owner desires to file a petition, mention to the owner that it is a good idea for you to see the completed petition form, plans, agreements, and supporting data to make sure all required information is there, before the owner sends it to one of the Department's full service offices for review.

COMPLIANT SOILS - UNDERSIZED SYSTEMS

Where an addition to a building is planned and the existing system meets the code criteria (as far as suitable soils, etc.), but now will be undersized, the following options are available:

1. Additions to the system to make it code compliant.

2. System sizing may be based on occupancy, which requires an attachment to the deed of the property indicating this sizing method. (See s. SPS 383.25 (2)(e), *Wisconsin Administrative Code*.)

This does not mean that if no bedrooms are being added, that no evaluation is required. You may also become involved to make sure the existing system is not destroyed during the construction of the building addition. You may also have to determine that the property does not contain an obviously failing system or a system in need of evaluation.

PERMIT REQUIREMENTS

On sites where no work is performed on the system, no state Sanitary Permit is required to be issued. A state Sanitary Permit is required for the:

1. Addition or modification of any POWTS treatment components.

2. Addition or modification of any POWTS holding components.

3. Addition or modification of any POWTS dispersal components.

If a Petition for Variance is granted and no changes are made to the system (it is simply allowed to continue in use), no state Sanitary Permit issuance is required. If affidavits and pumping agreements were filed as part of the petition process and no changes were made to the system, no state Sanitary Permit issuance is required.

Many counties charge an inspection or site evaluation fee. Your county can establish a separate fee in your ordinance to help offset the costs of county involvement in this procedure.

Remember that this process simply realizes the diversity of soil and site conditions and the variety of systems that the current code addresses. The procedures outlined in this chapter while intended primarily for existing systems can also be a tool for other problem areas and/or difficult sites. Remember, that there are a variety of ways to approach treatment and dispersal of domestic wastewater. Just because a system was installed many years ago does not mean that it cannot continue to adequately function. The goal of an existing system inspection is to evaluate the condition of the site where the system is located and the operational status of the system. The decision to allow the existing system; to remain as is, to modify the system or to have it replaced will be based on a variety of factors. But the end result must be the same. The system must be protective of public health and safety and the environment.

SELF-CHECK

1. Before the county gets involved in evaluating an existing system site, a _____ should have evaluated the site.

   a. Certified soil tester
   b. Excavator
   c. County board member
   d. State employee

2. On a site with an existing system, the certified soil tester should:

   a. Determine what type of system is compliant
   b. Advise the owner on how to proceed
   c. Not file a report
   d. All of the above
   e. a and b

3. When a non-compliant site is identified, two possible options available are:

   a. Install a code-compliant system
   b. Do nothing
   c. File a Petition for Variance
   d. a and c
   e. a and b
   f. b and c

4. Petitions will not be granted on sites that could:

   a. Cause sewage to surface once or twice a year
   b. Contaminate surface water
   c. Cause sewage to back up into basement
   d. Contaminate groundwater supplies
   e. All of the above

5. On sites that have a petition approved but where no physical work on the system is needed:

   a. No state sanitary permit is issued
   b. A state sanitary permit must be issued

6. On sites where a building addition will make the existing compliant system undersized:

   a. A Petition for Variance must be filed
   b. A new system may be installed.
   c. An affidavit must be filed indicating when the system fails a code-complying system will be installed.
   d. An addition may be made to the system to make it compliant
   e. b and d

7. The county inspector or administrator should meet with the _____ before submission of the Petition for Variance to discuss their options.

   a. Owner
   b. Certified soil tester
   c. Wastewater Specialist
   d. Licensed plumber
   e. None of the above

In the following TRUE-FALSE statements, circle T if the statement is TRUE; circle F if the statement is FALSE.

T	F	8.	Petitions for Variance requests are limited to existing systems.
T	F	9.	Petitions will be granted for systems that constantly cause sewage to pond on the surface.
T	F	10.	As an outcome of the county's soil and site verification, the POWTS Inspector should provide the owner with a copy of the report and explain what it means.

POWTS INSPECTOR - CHAPTER 12

PROSECUTIONS AND LEGAL ACTIONS

INTRODUCTION

Occasionally a POWTS Inspector will have to take legal action to make sure the code is complied with. Prosecution of a plumber, soil tester, or owner is not easy and should not be taken lightly. It requires detailed documentation of all steps taken and can be very time consuming. This chapter will discuss the different types of legal actions that may be available to you and to the Department. The information provided is meant as a general overview. It is not intended as a specific guide that must be followed. Whenever legal action of any kind is contemplated, the proposed course of action should first be discussed with the legal counsel that will represent you and your agency.

Note: This chapter will use the terms “Private Sewage”, “Private Sewage System” and “POWTS” interchangeably. This is necessary because statutory references have not been revised to reflect terminology used in the current administrative codes.

OBJECTIVES:

KNOW the statutory authority for a county to issue orders.

KNOW the difference between a directive and an order.

IDENTIFY the information needed to prepare a license revocation action.

DETERMINE when an inspection warrant can be obtained.

IDENTIFY the difference between the way the Department issues orders and how counties can issue orders.

DESCRIBE the steps in a license revocation action.

EXPLAIN injunctive relief.

LEARNING ACTIVITIES:

READ the attached materials.

REVIEW Section 145.20, *Wisconsin Statutes*.

COMPLETE the Self-Check.

The POWTS (a.k.a. private sewage system) program is a regulatory and enforcement program. Webster's defines "regulate" as "to govern or direct according to rule; to bring under the control of law or constituted authority." As a regulator, certified as a POWTS Inspector you have been given the tools to enforce and bring under the law those persons or groups who are unwilling to conform to the mandate described by the Legislature.

The county (governmental unit) responsible for regulations of POWTS also has the right to issue orders under Chapter 145, *Wisconsin Statutes*. Section 145.20 (2)(f), *Wisconsin Statutes*, states that the county must:

> Investigate violations of the private sewage system ordinance and issue orders to abate the violations and submit orders to the district attorney, corporation counsel, or Attorney General for enforcement.

The county was given authority to issue orders requiring compliance with the private sewage system ordinance they have adopted under s. 59.70(5), *Wisconsin Statutes*. Section 59.70(5), *Wisconsin Statutes*, requires that the administrative rules the county enforces must be the rules promulgated as the state plumbing code.

Section 254.59, *Wisconsin Statutes*, describes a method a town, city, or village can use in taking action to abate a human health hazard.

The Department and the county have authority to investigate human health hazards under s. 254.59(2), *Wisconsin Statutes* and order abatement of the human health hazards when warranted.

When the Department issues an order, it issues this legal action under s. 145.02, *Wisconsin Statutes*. This section of the statutes has been used many times by the Department to require compliance with the provisions of the uniform state plumbing code.

It is important to note the following distinctions. If the county were to issue an order, the order would be issued under s. 145.20, *Wisconsin Statutes*; the Department issues its orders under s. 145.02, *Wisconsin Statutes*. The county is expected to assist the Department in documenting violations of the statutes and administrative code by licensed people. Only the Department can hold hearings to revoke or suspend a soil tester's or plumber's license. These license actions are taken for soil testers under s. 145.045, *Wisconsin Statutes*, and for plumbers under s. 145.10, *Wisconsin Statutes*. Any license revocation action or suspension action can only be taken after a hearing is held to consider the complaints filed against a licensed person.

The county is a full partner in the regulation of POWTS based on the provisions of Chapter 145, *Wisconsin Statutes*. The county is viewed as the front line in the enforcement and regulation of the POWTS program. The county has the authority to issue orders against persons to require compliance with the rules and statutes dealing with POWTS.

The county is also a partner in the regulation and supervision of certified soil testers and licensed plumbers. The chapter on inspections made clear what type of information is needed to document your work on an individual site. This type of documentation is required before the Department can file an action against an individual's license certification or registration. The hearing examiners expect the Department and county to prove beyond a reasonable doubt that the person is not worthy of carrying that credential.

STATUTORY AUTHORITY FOR ORDERS

TYPE OF NON-COMPLIANCE (Examples)	SECTION OF STATUTES STATE	SECTION OF STATUTES COUNTY
Non-compliant System	145.02(3)(f)	145.20(2)(f)
Human Health Hazard	145.02(3)(f)	145.20(2)(f)
Surface Discharge	145.02(3)(f)	145.20(2)(f)
Unlicensed Installer	145.02(3)(f) 145.07	
No Permit	145.02(3)(f) 145.19(1)*	145.135* 145.19(1)* 145.20(2)(b)* 145.20(2)(f)
CST License Revocation	145.045	145.20(2)(a)* 145.20(2)(e)*
Plumbing License Revocation	145.10	145.20(2)(d)*
Plumbing Error on System Installation	145.02(3) 145.10	145.20(2)(d)* 145.20(2)(f)*
CST to Complete or Re-conduct Tests	145.02(3) 145.10	145.20(2)(a)* 145.20(2)(f)

*Linked to the non-compliance. Can be used to file complaints and/or oversee work. Not used to issue order.

REVIEW OF STATUTORY AUTHORITY

Before proceeding with the discussion of how and what format may be used to issue orders requiring compliance with the rules and statutes dealing with POWTS, please note the preceding chart showing the statutory authority for the county versus the Department regarding the issuance of orders. It is important that you contact your corporation counsel or district attorney to discuss how they would prefer to handle issuing orders.

The statutes make clear that there is a chain of command involved regarding who will enforce an order. Many counties have assigned this duty to the corporation counsel and you should do your best to work through that person to determine a method for issuing orders. The district attorney, as a constitutional officer of the county, can also enforce orders issued by you. Finally, should the county corporation counsel or district attorney not wish to enforce an order for one reason or another, the statutes do provide that the Attorney General's office can enforce those orders in your circuit court. In general, all efforts should be made to work with your local legal counsel.

COUNTY ORDINANCE

There are several specific items that should be considered in your county private sewage ordinance required by s. 59.70(5), *Wisconsin Statutes.* This ordinance must reference at a minimum the following:

1. The ordinance must specify that it is in agreement with the rules promulgated as the state plumbing code.

2. The ordinance must state that it applies to the entire area of the county.

3. The ordinance must make clear that the county will administer the ordinance in accord with s. 145.20, *Wisconsin Statutes*.

4. The ordinance must establish the fees that will be charged by the county for sanitary permits.

5. The ordinance must establish who has been assigned the duties of administering the private sewage system program.

6. Finally, the ordinance should make clear who will sign orders for the county.

The question of who may sign orders may seem like a trivial one, but in reality when it comes time to enforce an order in court, this could be an extremely crucial and important question. You should find out from your governing committee or the county board who they intend to have sign orders. In some counties, the corporation counsel is expected not only to enforce the orders, but also to sign them. Still, in other counties, the person who has been assigned the administration of the POWTS program signs and issues orders requiring compliance. Finally, it would not be unrealistic for the committee chairperson or county board chairperson to vest that action of

issuing orders in themselves. What is important is that somewhere along the line, you, as the POWTS Inspector in the field, find out who will issue and sign orders.

CITATION ORDINANCE

Section 66.0113, *Wisconsin Statutes*, deals with citations for certain ordinance violations. Your program, should the county board determine it is needed, can be enhanced by the adoption of a citation ordinance. This citation ordinance should be referenced in your private sewage system ordinance and establishment must be made of what violations may be cited. The ordinance also should include a list of fines for each type of violation and make clear whether each day of an offense constitutes a separate violation. Several counties have citation ordinances for their POWTS program. A citation is a legal claim against a person's property. A citation ordinance could be useful in making sure that POWTS are maintained and that deed affidavits related to the maintenance or operation of a POWTS are complied with.

INSPECTION WARRANTS

On rare occasions, you may find that an inspection warrant is the only method through which you can gain access to a property where an outstanding violation or threat to public health is occurring. The section of the statutes dealing with inspection warrants is s. 66.0119, *Wisconsin Statutes*. This section, makes clear that since you are a local official charged under the statute with the powers or duties involving inspection of real property, that you have the option of securing and executing a special inspection warrant. Section 66.0119(2), *Wisconsin Statutes*, also makes very clear that you can only obtain an inspection warrant if you have been denied entry onto the property. You cannot ask for an inspection warrant merely because you expect trouble. Section 66.0119(3), *Wisconsin Statutes*, deals with the form that should be used in the issuance of a special inspection warrant. The corporation counsel or district attorney will be familiar with the procedures for obtaining a special inspection warrant. Please note that the special inspection warrant must be signed by a judge. This again is a full legal action and should not be entered into lightly. It may be necessary to obtain special inspection warrants for any of the following:

1. An initial soil investigation where you have requested verification under s. 145.20 (2)(a), *Wisconsin Statutes*,

2. For an inspection relating to a failing private sewage system as defined in s. 145.245 (4), *Wisconsin Statutes*, and Chapter SPS 383 of the *Wisconsin Administrative Code*.

3. For the determination of whether a licensed master plumber who secured the sanitary permit for a site is indeed in charge of the installation as required by Chapter 145, *Wisconsin Statutes*.

4. If a system was installed without permits.

Special inspection warrants are not usually necessary to gain access to a property. The statutes make it very clear that you are involved in the inspection of real property. While legally, you cannot be denied access to a property in the execution of your statutorily assigned duties, it is wise never to visit a property unannounced or to push the issue when standing on a site with the landowner who is not interested in letting you inspect their POWTS. In general, it is best to allow that person time to think over your request to gain access to the property. At some point you have to make clear to that person that your job duties require you to inspect their installation, or proposed installation. You may try to explain that you have been assigned these duties and are merely trying to follow the legal requirements of the State of Wisconsin. It may be worthwhile to advise the property owner that perhaps they should consult with their own legal counsel regarding their refusal to let you on their property.

INJUNCTIVE RELIEF

The method of final enforcement of any order is injunctive relief. The entire procedure of issuing field directives, orders, and going to court for injunctive relief is aimed only at one thing—compliance with the uniform state plumbing code and state statutes. When an order is issued against a specific licensed person and correction of the violation is made, the Department will usually cease enforcement of the order. The procedure of enforcing the order is aimed at obtaining compliance with the rules and statutes governing private sewage systems.

The chapter of the statutes that deals with injunctions is Chapter 813, *Wisconsin Statutes*. This section deals with the procedures to be followed in asking a court to enjoin an individual to perform or not to perform a certain act. When you get to the point of filing a motion for injunctive relief with the circuit court, the POWTS Inspector or regulator will gain a partner in their legal counsel for enforcing the order. It is now up to the county's legal staff or, in the case of the state, the District Attorney's or Attorney General's staff, to obtain enforcement of the order and correction of the violation. If you did your job correctly as an inspector and did a good job of documenting the violations that occurred and the steps taken to secure compliance, the case should be fairly easy to win. The final decision is at the discretion of the judge as to what type of action they will follow to try and enforce your order.

COUNTY PROCEDURES

You should establish within your own administration, and through consultation with your committee and the county board, a procedure by which the county can issue orders. You could follow substantially the same format as the Department in the issuance of orders and then seek enforcement in circuit court. Additionally, the county has the right to enforce their orders using injunctive relief.

If you decide to use the Department's format in issuing orders, you must make clear that the order issued by the county is issued under s. 145.20 (2)(f), *Wisconsin Statutes*. You should also consult with the legal counsel assigned to you by the county board. We urge you to meet with either your corporation counsel or the district attorney and discuss a proposed format for the

issuance and enforcement of orders. Remember that the entire procedure is in place only to gain compliance with the rules and statutes of Wisconsin. Order writing should not be performed to secure a fine or penalty from the violating individual. If the individual who has violated the code and statutes is shown through your ongoing inspection of their work to periodically and with malice violate the statutes dealing with private sewage systems, you may find the district attorney or corporation counsel very willing to ask for a fine for violation of Chapter 145, *Wisconsin Statutes*, as set forth in s. 145.12, *Wisconsin Statutes.*

LICENSE REVOCATION

License revocations are entirely separate actions from the issuance of orders requiring correction of violations. Section 145.10 (1), *Wisconsin Statutes*, states that a master or journeyman plumber can, after a hearing, have their license revoked or suspended for committing gross negligence, misconduct, or incompetence in the practice of plumbing.

We will discuss soil tester license revocation and the country's role in such actions first. Again, the county is the first line of defense in the regulation of private sewage systems and the overseeing of the work of licensed soil testers. The county is required by s. 145.20, *Wisconsin Statutes*, to review all certified soil tester reports and verify them in the field if the county feels this is necessary. When the soil tester is found to be having continuing problems, it is important that your inspection reports document fully the soil tester's evaluation of the site, your evaluation of the site, and the discrepancies between the two.

A copy of inspection reports dealing with soil verifications where a certified soil tester did not do a good job of evaluating the site should be submitted to the Wastewater Specialist. These inspection reports, in showing an ongoing problem with the certified soil tester, are necessary to build a case for license revocation. Additionally, should you desire a warning letter to be sent to the certified soil tester, the county should include that request in the cover letter that accompanies the inspection report that is sent to the Wastewater Specialist.

You must realize that you will be expected to testify and give evidence at a license revocation action against a soil tester on whom you have filed these "problem reports." Having a record of continued problems is extremely important in building a case that can be taken to a hearing for license revocation. It simply is not sufficient to file a license action or a complaint against a licensee where good documentation of a continuing problem cannot be shown.

A county also will be expected to document continuing problems that may occur with a plumbing firm or master plumber. Again, it is critical, just as with soil testers, to build a good case to show a continuing problem with this plumbing firm.

As with certified soil tester actions, the hearing must show a clear and continuing record of problems and violations. With plumbers however, another avenue exists for license action. Section 145.10(1)(b), *Wisconsin Statutes*, provides that a plumbing license revocation action may be commenced for failure to follow a DEPARTMENT order for correction. This does not,

however, cover orders issued by the county. If a county issues an order against a plumber and the order is not followed, the county may:

1. Contact the Department to see if a companion Department order can be issued (which if not followed, could lead to a license action).

2. File a complaint alleging misconduct and gross negligence in not following the order, asking the Department for license revocation.

3. Enforce the county order in court and not file a license action.

JUDICIAL REVIEW

All actions of the Department (issuance of orders, license revocation) are subject to judicial review. Chapter 227, *Wisconsin Statutes*, "Administrative Procedure," contains the requirements for promulgation of rules, review of rules, and conduct of hearings. Although Chapter 227, *Wisconsin Statutes*, is not explicit, after an order is issued by the Department, the person the order is issued against has the right to request a hearing to review the basis for issuance of the order. This points up again the importance of having complete records and adequate documentation of violations prior to the issuance of an order.

Once the Department determines that a hearing will be held, Chapter 227, *Wisconsin Statutes*, dictates how to conduct this hearing. At the outcome of the hearing, the Department can decide either to continue to enforce the order, to modify the order, or set aside the order. If the Department refuses to hold a hearing in the matter of the order, the person the order is issued against can take this decision directly to court before the Department begins enforcement of the order. Judicial review also can occur after holding a hearing and issuing a decision to revoke or suspend a soil tester's or plumber's license. Judicial review of agency decisions is set out in ss. 227.52 and 227.53, *Wisconsin Statutes*. It is important to understand that the hearings and actions of the Department are subject to judicial review. The Attorney General's office, makes clear that the Department should expect to receive requests for hearings on many of the orders and actions it issues and takes. Even a plan review action may result in the filing of a petition to hold a hearing with the Department to review the plan review decision. Additionally, after a license revocation hearing is held and a decision is issued, s. 227.49, *Wisconsin Statutes*, even establishes a process of petition for rehearing. A petition for rehearing usually must relate only to the conduct of the hearing that was held and allege some error of law or error of fact. All the hearings requested under Chapter 227, *Wisconsin Statutes*, except for judicial review, require the consent of the Department to hold a hearing and such requests may be denied.

It has been stated repeatedly that it is extremely important to fully and completely document your actions or inspections on any and all sites. Once an enforcement process begins, it is usually too late to go back and try to re-document the results of an inspection or meeting. The creation of a record that can be relied upon in a legal action will make the difference between winning and losing most prosecutions or legal actions.

SELF-CHECK

1. The county was given the authority to issue orders by _____ as it became effective on July 1, 1980.

   a. s. 145.02, *Wisconsin Statutes*
   b. s. 146.13, *Wisconsin Statutes*
   c. s. 145.20, *Wisconsin Statutes*
   d. All of the above

2. The county can issue orders to abate a human health hazard if the hazard is created by discharge of sewage into:

   a. Road ditches
   b. A ponded POWTS
   c. Surface waters
   d. All of the above
   e. a & c

3. The county can participate in a license action by:

   a. Revoking a license
   b. Filing a complaint with the Department
   c. Suspending a license
   d. All of the above

4. A license may be revoked or suspended:

   a. Anytime
   b. After a formal complaint is filed
   c. By a circuit court
   d. Only after a Department hearing

5. A complaint against a soil tester is investigated under:

   a. s. 145.01, *Wisconsin Statutes*
   b. s. 145.10, *Wisconsin Statutes*
   c. s. 145.045, *Wisconsin Statutes*
   d. s. 145.02, *Wisconsin Statutes*

6. A complaint against a plumber is investigated under:

   a. s. 145.01, *Wisconsin Statutes*
   b. s. 145.10, *Wisconsin Statutes*
   c. s. 145.045, *Wisconsin Statutes*
   d. s. 145.02, *Wisconsin Statutes*

7. A citation ordinance under _____ may be established by the county board for a county POWTS program.

   a. s. 59.065, *Wisconsin Statutes*
   b. s. 145.20, *Wisconsin Statutes*
   c. s. 144.24, *Wisconsin Statutes*
   d. s. 66.0113, *Wisconsin Statutes*

8. An inspection warrant can be obtained:

   a. Anytime a problem might occur
   b. If access to property is denied
   c. When you are ready for a construction inspection
   d. All of the above

9. When a violation is found by Department field staff, the first action usually is that:

   a. An order is issued
   b. A field directive is issued
   c. A criminal complaint is filed
   d. All of the above

10. Department orders are delivered by:

   a. The sheriff
   b. Certified mail
   c. Affidavit of mailing
   d. b. & c.

11. A directive or order must include:

   a. The violation
   b. Date of inspection
   c. Name of inspector
   d. Date by which correction must be made
   e. All of the above

12. The objective of an order is to:
    a. Obtain a fine
    b. Obtain a jail sentence
    c. Suspend a license
    d. Obtain compliance

13. Departmental orders can be enforced by the:

    a. District attorney
    b. Attorney General
    c. Corporation counsel
    d. a. & b.

14. A complaint against a soil tester must include:

    a. A letter of complaint
    b. A soil verification by the county
    c. The SBD-8330 that was not properly filled out
    d. All of the above

15. A plumber's license can be revoked for:

    a. Misconduct
    b. Failure to follow a Department order
    c. Gross negligence
    d. Incompetence
    e. All of the above

In the statements below, circle T if the statement is TRUE and F if the statement is FALSE.

T	F	16.	Department orders are not subject to judicial review.
T	F	17.	An order is enforced by injunctive relief.
T	F	18.	License hearings are conducted by the county.
T	F	19.	A soil tester's license may be revoked for not obeying an order.
T	F	20.	A human health hazard under s. 254.59, *Wisconsin Statutes*, can be abated by the Department.
T	F	21.	Counties can file complaints against soil testers and plumbers.
T	F	22.	A license revocation can be appealed to a circuit court.
T	F	23.	An order is enforced in the circuit court of Dane County only.
T	F	24.	A plumber's license can be revoked by the county for not following the county's orders.
T	F	25.	A county can issue an order requiring a soil tester to do new soil tests.

POWTS INSPECTOR

ANSWERS FOR SELF-CHECKS

Chapter 1 – Basic Principles of Private Onsite Waste Treatment Systems

1. b, c, d, e, g, i
2. Public, POWTS, ground surface, groundwater
3. Soil and physical characteristics of the site
4. d.
5. Provides partial treatment of wastewater and acts as a settling chamber
6. c.
7. a, b, c, d, e, f
8. bacteria viruses, some chemical substances
9. 6, 3, 0
10. D, C, A B & E, A, A & B, E, D, E, F

Chapter 2 – Basic Soils

1. Parent material, climate, biological activity, relief (landscape), time

2. c

3. Initial unweathered material from which soil forms. Transported material that may have been deposited by glaciers, wind, water, gravity or an interaction of these processes. Residual parent material is derived from the underlying bedrock.

4. D, E, C, A, F, B

5. B

6. C

7. C, B, A

8. e

9. c

SECTION B

1. a, d, f

2. b, e, h

3. b

4. a

5. B, G, D, A, C, E, F

6. b, d, g

7. c

8. b

9. c

10. The combining of primary soil particles to form aggregates. These aggregates or soil peds are separated by surfaces of weakness.

11. D, B, A, C

12. F, D, C, E, C, B, A

SECTION C

1. E, D, B, H, A, C, G, F

2. e

3. size, abundance, contrast

4. Color and shape

5. c

6. e

7. True
   False
   True
   True
   True

8. a

9. d

10. False
    False
    False
    False
    False
    False
    False
    False

SECTION D

1. C, A, B, A, D

2. b, d

3. B, B, A, B, A, B

4. d

5. An area of soil not like the soil described as a map unit. Usually 2-3 acres in size.

Chapter 3 – Legal Land Descriptions of Wisconsin Real Estate

1. U.S. Public

2. 6-mile

3. 36, 640, 23,040

4. Smallest, largest

5. 37

6. SE1/4, SE1/4, Sec. 36, T37N, R9E

7. S1/2, SE1/4, SW1/4, Sec. 36, T37N, R9E

8. Metes, bounds

9. N45°W

10. A system of triangulation (mapped and marked by the U.S. Coast and Geodetic Survey)

11. 2, 1, 3

12. b

13. False
    False
    True
    False
    False

Chapter 4 – Site Requirements

1. True
   False
   True

2. d

3. True
   False
   False
   True
   False

4. False
   False
   True
   True
   True
   False
   False

5. a

6. A point or object of permanent elevation which is known and cannot be easily changed

7. e

8. False
   True
   True
   False
   False
   True
   True
   False
   True

Chapter 5 – Sizing, Design, and Construction of Conventional, (Inground), Systems

1. c.
2. 5, 25, 25
3. 1500, gravity, dosing
4. pump, siphon
5. 6, bottom
6. solid, shall not
7. 3
8. 4
9. 6, ½ - 2 ½, 2
10. siphon, dosing
11. frozen
12. backfill, 12
13. distribution cell, backfill
14. e.
15. one, more, size, inspection, maintenance, servicing, 6, means, deleterious
16. locking device, locked
17. 8”, 4”, 5”
18. 3
19. ½”
20. 4” x 5”, department, danger/hazard

21. 1/3

22. anchoring

23. department

24. municipal treatment plant, Department of Natural Resources

25. 1,000

26. ≥5, 2000

27. 5

28. holding

29. welded steel, monolithic concrete, fiberglass

30. 25

31. warning device, audible, visual

32. 4

33. s. SPS 382.31(16)

34. mercury filled, prohibited

35. 2

36. Yes, 3,000 divided by 0.7 = 4,285.7 sq. ft.

37. 450 gal. divided by 0.5 = 900.0 sq .ft.

38. 1,052.5 sq. ft.

39. 4,698 gal.

40. 0.8, 750 sq. ft.

41. pressure distribution

42. c.

43. 5

44. restrictive soil horizons, treatment, dispersal

45. 1994

Chapter 6 – Pressure Distribution Design

1. Biological or progressive clogging
2. 1/8”, 1/4”
3. 34’
4. 2.5’, throughout
5. 36
6. 25%, system must be level or a complicated multi level design must be used
7. CST
8. 5
9. feet
10. spacing
11. 72’ X 2
12. 6’ X 2
13. 3’
14. 4/cell, total of 8
15. 1/4”, 4’ spacing
16. 1 1/4”
17. 10.53 gpm
18. 12’
19. 3”
20. 84.24

21. 3”

22. TDH = 13.81’, 2.5 X 1.3 + 140’ X 1.83/100’ + 8’ = 13.81’

23. 120, 171.38

Chapter 7 – Mound Systems: Principles, Design and Construction

1. a

2. b

3. 0.2, 4.5

4. 6

5. 6

6. 3

7. 25

8. Site A: Yes
   Site B: Yes

9. Site A: Greater than 6" to HGW, 6% slope, 0.4 gal/sq.ft./day loading rate
   Site B: Greater than 6" to HGW, meets A+ 4" criteria, 3% slope, 0.6 gal/sq.ft./day loading rate

10. Site A: Long and narrow with a minimum 12" sand fill
    Site B: Long and narrow with a minimum of 22' sand fill

Chapter 8 – Initial Adverse Determination

1. False
   False
   False
   True
   False
   True

2. a

3. d

4. e

5. Soil Saturation Determination

6. 3

7. d

8. property owner, Sanitary Permit, county

9. Chapter 68

10. 30

11. 3

Chapter 9 – Sanitary Permits

1. c
2. a
3. b
4. c
5. d
6. e
7. g
8. d
9. a
10. e
11. b
12. e
13. f
14. b
15. b
16. b
17. d
18. e
19. e
20. False
21. True

22. False

23. True

24. False

25. False

26. True

27. False

Chapter 10 – Inspections

1. e
2. e
3. d
4. a
5. c
6. a
7. e
8. a
9. e
10. c
11. e
12. d
13. e
14. c
15. True
16. False
17. False
18. True
19. True
20. False

21. True

22. False

23. False

24. True

Chapter 11 – Options for Failing and Existing Noncompliant Systems

1. a
2. e
3. d
4. e
5. a
6. e
7. a
8. False
9. False
10. True

Chapter 12 – Prosecutions and Legal Actions

1. c
2. e
3. b
4. d
5. c
6. b
7. d
8. b
9. b
10. d
11. e
12. d
13. d
14. d
15. e
16. False
17. True
18. False
19. True
20. True

21. True

22. True

23. False

24. False

25. True