

*Registration form*

**Onsite 101 CEU Training Course \$200.00**  
**48 HOUR RUSH ORDER PROCESSING FEE ADDITIONAL \$50.00**

**Start and finish dates:** \_\_\_\_\_

*You will have 90 days from this date in order to complete this course*

List number of hours worked on assignment must match State requirement. \_\_\_\_\_

**Name** \_\_\_\_\_ **Signature** \_\_\_\_\_

*I have read and understood the disclaimer notice on page 2. Digitally sign XXX*

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*Please circle/check which certification you are applying the course CEU's/PDH's.*

Wastewater Collection \_\_\_\_\_ Wastewater Treatment \_\_\_\_\_ Onsite Installer \_\_\_\_\_

Other \_\_\_\_\_ Oregon CCB (\$50 additional fee) \_\_\_\_\_

***Your certificate will be e-mailed to you in about two weeks.***

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*You can obtain a printed version of the course manual from TLC for an additional \$69.95 plus shipping charges.*

## **AFFIDAVIT OF EXAM COMPLETION**

I affirm that I personally completed the entire text of the course. I also affirm that I completed the exam without assistance from any outside source. I understand that it is my responsibility to file or maintain my certificate of completion as required by the state or by the designation organization.

## **Grading Information**

In order to maintain the integrity of our courses we do not distribute test scores, percentages or questions missed. Our exams are based upon pass/fail criteria with the benchmark for successful completion set at 70%. Once you pass the exam, your record will reflect a successful completion and a certificate will be issued to you.

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## Onsite 101 Answer Key

Name \_\_\_\_\_

Phone# \_\_\_\_\_

You are solely responsible in ensuring that this course is accepted for credit by your State. **No refunds.** Did you check with your State agency to ensure this course is accepted for credit?

**Method of Course acceptance confirmation. Please fill this section**  
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What is the course approval number, if applicable? \_\_\_\_\_

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***Please circle, underline, bold or X only one correct answer***

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**Please fax the answer key to TLC  
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**Always call to confirm that we've received your paperwork.**

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**ONSITE 101  
CEU TRAINING COURSE**

**CUSTOMER SERVICE RESPONSE CARD**

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1. Please rate the difficulty of your course.  
Very Easy    0       1       2       3       4       5    Very Difficult

2. Please rate the difficulty of the testing process.  
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3. Please rate the subject matter on the exam to your actual field or work.  
Very Similar 0       1       2       3       4       5    Very Different

4. How did you hear about this Course? \_\_\_\_\_

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Poor \_\_\_\_\_ Fair \_\_\_\_\_ Average \_\_\_\_\_ Good \_\_\_\_\_ Great \_\_\_\_\_

How was your customer service?

Poor \_\_\_\_\_ Fair \_\_\_\_\_ Average \_\_\_\_\_ Good \_\_\_\_\_ Great \_\_\_\_\_

Any other concerns or comments.  
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# Onsite 101 CEU Training Course Assignment

*The Assignment (Exam) is also available in Word on the Internet for your Convenience, please visit [www.ABCTLC.com](http://www.ABCTLC.com) and download the assignment and e-mail it back to TLC.*

You'll have 90 days from the start of this course to complete in order to receive your Professional Development Hours (**PDHs**) or Continuing Education Unit (**CEU**). A score of 70 % is necessary to pass this course. We prefer if this exam is proctored. No intentional trick questions. If you should need any assistance, please email all concerns and the completed manual to [info@tlch2o.com](mailto:info@tlch2o.com).

We would prefer that you utilize the enclosed answer sheet in the front, but if you are unable to do so, type out your own answer key. Please include your name and address on your manual and make copy for yourself. You can e-mail or fax your Answer Key along with the Registration Form to TLC. **(S) Means answer may be plural or singular. Multiple Choice Section, One answer per question and please use the answer key.**

## Basic Onsite Treatment Processes

1. Which of the following terms - and clustered wastewater systems are designed to accomplish the same thing—the treatment of wastewater?
- A. Individual
  - B. Septic tank effluent filters
  - C. Secondary effluent
  - D. Enhanced organic matter removal
  - E. Phosphorus precipitation
  - F. None of the Above

## Primary Treatment

2. Physical treatment processes involving capture of solids and fats/oils/grease in an enclosed vessel, typically by settling and flotation, such as provided in a septic tank or?
- A. Septic tank
  - B. Tertiary effluent
  - C. Grease interceptor tank
  - D. Combining primary and secondary treatment
  - E. An aerated vessel or chamber
  - F. None of the Above
3. This process also includes trapping of solids via septic tank effluent filters or screens prior to discharge of the?
- A. Tank effluent
  - B. Septic tank effluent filters
  - C. Secondary effluent
  - D. Enhanced organic matter removal
  - E. Phosphorus precipitation
  - F. None of the Above
4. Which of the following terms - designed to remove organic matter, mostly through digestion and decomposition, often aided by introduction of or exposure to atmospheric oxygen?
- A. Septic tank
  - B. Tertiary effluent
  - C. Conventional systems
  - D. Combining primary and secondary treatment
  - E. Biological and chemical processes
  - F. None of the Above
5. A typical standard for \_\_\_\_\_ is biochemical oxygen demand and total suspended solids concentrations less than or equal to 20 mg/L each on a 30-day average basis.
- A. Clustered wastewater
  - B. Septic tank effluent filters
  - C. Secondary effluent
  - D. Enhanced organic matter removal
  - E. Phosphorus precipitation
  - F. None of the Above

6. These standards can be achieved via flow through unsaturated soil or other media or within?

- A. Septic tank
- B. Tertiary effluent
- C. Conventional systems
- D. Combining primary and secondary treatment
- E. An aerated vessel or chamber
- F. None of the Above

### **Tertiary (Advanced) Treatment**

7. Which of the following terms - of wastewater includes enhanced organic matter removal, pathogen reduction, and nutrient removal?

- A. Advanced treatment
- B. Septic tank effluent filters
- C. Secondary effluent
- D. Enhanced organic matter removal
- E. Phosphorus precipitation
- F. None of the Above

8. Standards for \_\_\_\_\_ vary according to regulatory requirements.

- A. Septic tank
- B. Advanced or tertiary effluent
- C. Conventional systems
- D. Combining primary and secondary treatment
- E. An aerated vessel or chamber
- F. None of the Above

9. Which of the following terms - can occur via process controls or through exposure to additives or media designed to cause chemical or other reactions?

- A. Advanced treatment
- B. Septic tank effluent filters
- C. Secondary effluent
- D. Enhanced organic matter removal
- E. Phosphorus precipitation
- F. None of the Above

### **Conventional Systems**

10. Which of the following terms - are the most commonly used wastewater treatment technologies, combining primary and secondary treatment?

- A. Septic tank
- B. Tertiary effluent
- C. Conventional systems
- D. Conventional treatment systems
- E. An aerated vessel or chamber
- F. None of the Above

11. These systems are the least expensive in terms of total cost but \_\_\_\_\_ (e.g., at least 24-36 inches of unsaturated soil) and maintenance to perform adequately.

- A. Require specific conditions
- B. Septic tank effluent filters
- C. Secondary effluent
- D. Enhanced organic matter removal
- E. Phosphorus precipitation
- F. None of the Above

12. A conventional wastewater treatment system consists of a septic tank and \_\_\_\_\_ that allows primary treatment effluent to infiltrate into unsaturated soil.

- A. Septic tank
- B. Tertiary effluent
- C. Conventional systems
- D. A soil absorption field
- E. An aerated vessel or chamber
- F. None of the Above

13. Flow through the system usually occurs \_\_\_\_\_ but can be aided by a pump, if necessary, operated by a float switch or timer.

- A. Clustered wastewater
- B. Septic tank effluent filters
- C. Secondary effluent
- D. Enhanced pumping
- E. Via gravity
- F. None of the Above

14. Which of the following terms - of effluent to the soil can be configured to optimize treatment via pressurized time-dosing of preset volumes of treated wastewater, which facilitates oxygenation of the soil matrix?

- A. Advanced system(s)
- B. Dose/rest cycle
- C. Effluent
- D. Advanced technologie(s)
- E. Subsurface discharge
- F. None of the Above

15. Which of the following terms - must be covered by an approved NPDES permit. Individual systems require periodic pumping of the tank and inspection of the dispersal field for signs of problems, such as wastewater surfacing, soggy soil, and odor?

- A. Infiltrative surface
- B. Treatment system components
- C. Surface water discharges
- D. Advanced treatment processes
- E. Uptake of nutrients by plants
- F. None of the Above

16. Annual operation, inspection, and \_\_\_\_\_ costs vary, but average about \$30 to \$100 per year, depending on state or local requirements.

- A. Advanced system(s)
- B. Dose/rest cycle
- C. Maintenance
- D. Advanced technologie(s)
- E. State or local requirement(s)
- F. None of the Above

17. When functioning properly, individual or \_\_\_\_\_ are effective in treating or removing pollutants.

- A. Infiltrative surface
- B. Treatment system components
- C. High organic strength
- D. Advanced treatment processes
- E. Clustered conventional systems
- F. None of the Above

18. Which of the following terms - has two principal parts—the tank and soil absorption field?

- A. Septic tank
- B. Tertiary effluent
- C. Conventional system
- D. Combining primary and secondary treatment
- E. An aerated vessel or chamber
- F. None of the Above

19. The septic tank treats wastewater by allowing floatable materials to rise to the surface, forming a scum layer, and the heavier solids to sink to the bottom, creating a?

- A. Layer of sludge
- B. Septic tank effluent filters
- C. Secondary effluent
- D. Enhanced organic matter removal
- E. Phosphorus precipitation
- F. None of the Above

20. Which of the following terms - is similar to that of primary sedimentation in larger treatment facilities, except that it is generally devoid of oxygen?

- A. Septic tank
- B. Tertiary effluent
- C. Tank effluent
- D. Combining primary and secondary treatment
- E. An aerated vessel or chamber
- F. None of the Above

21. Which of the following terms - facilitates aerobic treatment and filtration of the remaining contaminants?

- A. Infiltrative surface
- B. Treatment system components
- C. High organic strength
- D. Advanced treatment processes
- E. Soil absorption system
- F. None of the Above

22. There are also many advanced technologies that have been developed for situations where \_\_\_\_\_ are not appropriate.

- A. Advanced system(s)
- B. Dose/rest cycle
- C. Effluent
- D. Conventional systems
- E. State or local requirement(s)
- F. None of the Above

### Advanced Systems

23. Treatment system components designed to pretreat septic tank effluent before discharge to the soil dispersal field are often called?

- A. Infiltrative surface
- B. Treatment system components
- C. High organic strength
- D. Advanced treatment processes
- E. Alternative, enhanced, or advanced systems
- F. None of the Above

24. When the aerated soil depth below the infiltrative surface in the drainfield is less than the minimum required, advanced treatment processes or components can be added to increase?

- A. Infiltrative surface
- B. Treatment system components
- C. High organic strength
- D. Pollutant removal prior to soil discharge
- E. Uptake of nutrients by plants
- F. None of the Above

25. In environmentally sensitive areas, advanced systems can be used to meet effluent standards for \_\_\_\_\_, bacteria, nitrogen, and phosphorus.

- A. Advanced system(s)
- B. Oxygen-demanding wastes
- C. Effluent
- D. Advanced technologie(s)
- E. State or local requirement(s)
- F. None of the Above

26. If a soil dispersal area malfunctions hydraulically due to a buildup of the biomat at the infiltrative surface, it may be restored, and treatment may be enhanced, by improving \_\_\_\_\_ through timed dosing of septic tank effluent to the dispersal field.

- A. Infiltrative surface
- B. Soil oxidation
- C. High organic strength
- D. Advanced treatment processes
- E. Uptake of nutrients by plants
- F. None of the Above

27. The dose/rest cycle allows the soil to drain between doses, improving?

- A. Advanced system(s)
- B. Soil oxygen transfer
- C. Effluent
- D. Advanced technologie(s)
- E. State or local requirement(s)
- F. None of the Above

28. Wastewater with high organic strength can employ advanced treatment units/processes to improve aeration, \_\_\_\_\_, and treatment of organic wastes.

- A. Infiltrative surface
- B. Treatment system components
- C. Biological decomposition
- D. Advanced treatment processes
- E. Uptake of nutrients by plants
- F. None of the Above

29. Which of the following terms - that provide timed dosing of septic tank or treatment unit effluent to the soil can sometimes be used where soil infiltration areas are limited, except in cases of high-clay content soils?

- A. Advanced system(s)
- B. Dose/rest cycle
- C. Effluent
- D. Advanced technologie(s)
- E. State or local requirement(s)
- F. None of the Above

30. Which of the following terms - that employ pressure drip dispersal of the effluent can reduce bacteria and nutrient loading to groundwater by applying wastewater high in the soil profile?

- A. Advanced system(s)
- B. Treatment system components
- C. High organic strength
- D. Advanced treatment processes
- E. Uptake of nutrients by plants
- F. None of the Above

31. Which of the following terms - require management, but advanced systems, due to their use of pumps, switches, and other electromechanical components?

- A. Advanced system(s)
- B. All treatment systems
- C. Effluent
- D. Advanced technologie(s)
- E. State or local requirement(s)
- F. None of the Above

32. Permanent maintenance contracts with qualified service providers should be required by state or county code for systems with these?

- A. Infiltrative surface
- B. Treatment system components
- C. Components
- D. Advanced treatment processes
- E. Uptake of nutrients by plants
- F. None of the Above

### Onsite Introduction

33. Onsite sewage treatment systems provide septic system owners with best management practices to keep their \_\_\_\_\_ functioning properly.

- A. Onsite systems
- B. Wastewater collection
- C. Wastewater
- D. Treatment system
- E. Septic systems
- F. None of the Above

34. These practices are really about recycling water: \_\_\_\_\_ and returning safe water to the water cycle.

- A. Onsite systems
- B. Treatment options
- C. Septic system maintenance
- D. Full spectrum of treatment facilities
- E. Cleaning wastewater
- F. None of the Above

35. If a septic system is not functioning properly, clean water is not returned to our?

- A. Onsite systems
- B. Wastewater collection
- C. Groundwater systems
- D. Treatment system
- E. Septic system
- F. None of the Above

36. The high cost of \_\_\_\_\_ and the advances made in individual and cluster system technologies have expanded the array of available treatment options and supported development of a more tailored approach to wastewater management services.

- A. Onsite systems
- B. Treatment options
- C. Septic system maintenance
- D. Full spectrum of treatment facilities
- E. Centralized wastewater treatment plants
- F. None of the Above

37. Today, wastewater collection and treatment can be closely matched to the types and quantities of \_\_\_\_\_ generated through a "just in time" modular approach financed via a "user pays" cost structure.

- A. Onsite systems
- B. Wastewater collection
- C. Sewage
- D. Treatment system
- E. Septic system
- F. None of the Above

38. Options now exist that span the full spectrum of treatment facilities, from large centralized plants, to large and \_\_\_\_\_, to individual treatment systems providing conventional or enhanced service.

- A. Onsite systems
- B. Treatment options
- C. Septic system maintenance
- D. Small soil-discharging clustered facilities
- E. Small community cluster system
- F. None of the Above

### Key Considerations

39. Wastewater flow and strength, site and \_\_\_\_\_, and performance requirements for the dispersed or discharged effluent are all key considerations in deciding what type of wastewater collection and treatment system is needed and how it should be designed.

- A. Onsite systems
- B. Wastewater collection
- C. Local infrastructure conditions
- D. Treatment system
- E. Septic system
- F. None of the Above

40. Which of the following terms - treat wastewater and disperse it on the property where it is generated?

- A. Onsite systems
- B. Treatment options
- C. Septic system maintenance
- D. Full spectrum of treatment facilities
- E. Small community cluster system
- F. None of the Above

41. Factors that affect the proper functioning of \_\_\_\_\_ include the site and soil conditions, design, installation, operation and maintenance.

- A. Onsite systems
- B. Wastewater collection
- C. Wastewater
- D. Treatment system
- E. Septic system
- F. None of the Above

### Report to Congress

42. Nearly one in four households in the United States depends on an individual septic system or \_\_\_\_\_ to treat wastewater.

- A. Onsite systems
- B. Treatment options
- C. Septic system maintenance
- D. Full spectrum of treatment facilities
- E. Small community cluster system
- F. None of the Above

### Septic System Failures

43. Which of the following terms - are effective, cost efficient, and easy to maintain?

- A. Onsite systems
- B. Wastewater collection
- C. Wastewater
- D. Treatment system
- E. Septic systems
- F. None of the Above

44. There are many different types of \_\_\_\_\_ and treatment technologies. Systems can treat individual homes, clusters of buildings, or whole subdivisions and/or commercial establishments.

- A. Onsite systems
- B. Treatment options
- C. Septic system maintenance
- D. Wastewater collection
- E. Cluster systems
- F. None of the Above



45. Which of the following terms - are a major source of groundwater pollution?

- A. Onsite systems
- B. Wastewater collection
- C. Wastewater
- D. Septic system failures
- E. Septic system
- F. None of the Above

46. Which of the following terms - is like automobile maintenance; a little effort on a regular basis can save you a lot of money and significantly prolong the life of the system?

- A. Onsite systems
- B. Treatment options
- C. Septic system maintenance
- D. Septic system maintenance
- E. Small community cluster system
- F. None of the Above

47. Which of the following terms - for clustered facilities can work by gravity or operate via vacuum or pressure pump?

- A. Onsite systems
- B. Wastewater collection
- C. Collection systems
- D. Treatment system
- E. Septic system
- F. None of the Above

48. Wastewater is typically treated through primary and \_\_\_\_\_(and sometimes tertiary or advanced "polishing" procedures) and can be disinfected prior to discharge.

- A. Onsite systems
- B. Wastewater collection
- C. Wastewater
- D. Treatment system
- E. Secondary processes
- F. None of the Above

#### **Elevated (Mound or At-Grade) Systems**

49. This system type includes a septic tank or prefabricated treatment unit to provide primary (and sometimes secondary) treatment prior to discharging the?

- A. ATU(s)
- B. Effluent
- C. Septic tank effluent
- D. Effluent to a modified drainfield
- E. Enhance biochemical treatment processes
- F. None of the Above

50. Which of the following terms - or treatment unit to a pump tank and periodically dosed to the modified dispersal area, which is typically constructed of a layer of clean, uniformly graded sand on a plowed or roughened natural soil surface?

- A. Submerged-flow wetlands
- B. Colloidal particles
- C. Media filters
- D. Effluent flows from the tank
- E. Aerobic treatment
- F. None of the Above

51. The tank effluent is uniformly dosed onto the \_\_\_\_\_ within the mound, which may be 1-4 ft. above the natural grade.

- A. Infiltrative surface
- B. Effluent
- C. Septic tank effluent
- D. An oxygen rich environment
- E. Enhance biochemical treatment processes
- F. None of the Above

52. Sand within the mound compensates for \_\_\_\_\_ below the natural grade.

- A. Submerged-flow wetlands
- B. Colloidal particles
- C. Media filters
- D. Microbial activity
- E. Shallow unsaturated soil conditions
- F. None of the Above

53. After treatment through the sand, the effluent percolates directly into the soil under the mound. \_\_\_\_\_ feature effluent dispersal piping placed at natural grade, with the mound consisting mostly of cover soil for the piping.

- A. ATU(s)
- B. At-grade systems
- C. Septic tank effluent
- D. An oxygen rich environment
- E. Enhance biochemical treatment processes
- F. None of the Above

54. The mound should have inspection ports, so wastewater distribution across the infiltration area can be monitored. \_\_\_\_\_ should have cleanouts so they can be flushed at least twice a year.

- A. Distribution lines
- B. Colloidal particles
- C. Media filters
- D. Microbial activity
- E. Aerobic treatment
- F. None of the Above

### **Aerobic Treatment Units**

55. Aerobic treatment units (\_\_\_\_\_) consist of prefabricated units featuring consecutive or compartmentalized tanks, pumps, blowers, and internal piping, and are designed to treat wastewater via suspended or attached growth decomposition in an oxygen rich environment.

- A. ATU(s)
- B. Effluent
- C. Septic tank effluent
- D. An oxygen rich environment
- E. Enhance biochemical treatment processes
- F. None of the Above

56. Three processes are involved in most aerobic systems: physical separation, aerobic treatment, and \_\_\_\_\_ (final settling).

- A. Submerged-flow wetlands
- B. Colloidal particles
- C. Media filters
- D. Microbial activity
- E. Clarification
- F. None of the Above

57. Which of the following terms - vary in design and can consist of simple activated sludge variations, sequencing batch reactors, trickling filters, and combinations of two or more of these unit processes?

- A. ATU(s)
- B. Effluent
- C. Septic tank effluent
- D. An oxygen rich environment
- E. Enhance biochemical treatment processes
- F. None of the Above

58. Which of the following terms - require permanent, regularly scheduled inspections and maintenance attention?

- A. Submerged-flow wetlands
- B. ATU systems
- C. Media filters
- D. Microbial activity
- E. Aerobic treatment
- F. None of the Above

### **Media Filters**

59. Septic tank effluent can be applied to a layer of sand or gravel, a tank containing peat or plastic media, or compartments of hanging textile or other material to improve oxygen access and?

- A. ATU(s)
- B. Effluent
- C. Septic tank effluent
- D. An oxygen rich environment
- E. Enhance biochemical treatment processes
- F. None of the Above

60. Effluent that percolates through the \_\_\_\_\_ is discharged to the soil dispersal field.

- A. ATU(s)
- B. Effluent
- C. Septic tank effluent
- D. Media bed
- E. Enhance biochemical treatment processes
- F. None of the Above

61. A number of these so-called “\_\_\_\_\_” are available to treat wastewater.

- A. Submerged-flow wetlands
- B. Colloidal particles
- C. Media filters
- D. Microbial activity
- E. Aerobic treatment
- F. None of the Above

62. In single-pass or \_\_\_\_\_ design, septic tank effluent is pump-dosed uniformly onto the media at regular intervals 12 to 48 times per day.

- A. ATU(s)
- B. Effluent
- C. Septic tank effluent
- D. An oxygen rich environment
- E. Intermittent filter (ISF)
- F. None of the Above

63. As the effluent trickles through the media, suspended and some colloidal particles are filtered, and bacteria growing on the media aerobically treat?

- A. Submerged-flow wetlands
- B. Colloidal particles
- C. Organic wastewater
- D. Microbial activity
- E. Aerobic treatment
- F. None of the Above

### **Submerged-Flow Wetland or Vegetative Submerged-Bed (VSB)**

64. Vegetative submerged beds are also called submerged-flow wetlands. This system type treats \_\_\_\_\_ through a lined bed of unmulched gravel planted with wetland species.

- A. Septic tank effluent by horizontal flow
- B. Colloidal particles
- C. Media filters
- D. Microbial activity
- E. Aerobic treatment
- F. None of the Above

65. The plants fill in spaces between the rocks and provide aesthetic appeal. Wetland systems are extremely passive and require little management in producing a?

- A. ATU(s)
- B. Effluent
- C. Septic tank effluent
- D. Good quality effluent
- E. Enhance biochemical treatment processes
- F. None of the Above

66. Which of the following terms - in the system is mostly anaerobic, with some aerobic microsites on plant roots and near surface areas?

- A. Treatment environment
- B. Colloidal particles
- C. Media filters
- D. Microbial activity
- E. Aerobic treatment
- F. None of the Above

### **Cluster System Applications**

67. Which of the following terms - is designed to collect wastewater from two to several hundred homes?

- A. Septic tanks
- B. Advanced systems
- C. Wastewater
- D. Performance-based management approaches
- E. Cluster system
- F. None of the Above

68. The Cluster Wastewater Systems Planning Handbook lists a number of potential wastewater collection technologies for small and large cluster systems, including: grinder pump systems, which transport all sewage; effluent sewers, such as the septic tank effluent pump (\_\_\_\_\_); the septic tank effluent gravity (STEG) collection system; and vacuum systems.

- A. Septic tanks
- B. Advanced systems
- C. STEP
- D. Performance-based management approaches
- E. Clustered wastewater treatment systems
- F. None of the Above

69. Treatment facilities serving clustered buildings may range from a communal septic tank and soil dispersal system to a?

- A. Protocol
- B. Management services
- C. System components
- D. Wastewater system
- E. More advanced treatment system
- F. None of the Above

70. Advanced systems may facilitate local reuse of the \_\_\_\_\_ for toilet flushing, irrigation, industrial purposes, or to replenish aquifers.

- A. Septic tanks
- B. Advanced systems
- C. Treated effluent
- D. Performance-based management approaches
- E. Clustered wastewater treatment systems
- F. None of the Above

71. Which of the following terms - must be managed by an entity with the technical, financial, and managerial capacity to effectively and efficiently handle operation, maintenance, customer billing, repair/replacement, and other tasks?

- A. Protocol
- B. Management services
- C. System components
- D. Wastewater system
- E. Cluster systems
- F. None of the Above

### **System Design Standards and Practices**

72. Nearly all states and some local governments have regulatory or guidance documents detailing acceptable design approaches for individual and?

- A. Septic tanks
- B. Advanced systems
- C. STEG
- D. Performance-based management approaches
- E. Clustered wastewater treatment systems
- F. None of the Above

### **Performance-Based Standards**

73. Most state and local system design codes traditionally have been based on prescriptive approaches that \_\_\_\_\_, construction methods, and acceptable tank types and other components.

- A. Protocol
- B. Management services
- C. System components
- D. Specify minimum site requirements
- E. Installation and operation permits
- F. None of the Above

74. Performance-based management approaches have been proposed as a substitute for \_\_\_\_\_ or system design, siting, and operation.

- A. Septic tanks
- B. Advanced systems
- C. STEG
- D. Prescriptive requirements
- E. Clustered wastewater treatment systems
- F. None of the Above

### System Design Considerations

75. One of the more common reasons why some individual or cluster systems do not perform properly is?

- A. Protocol
- B. Management services
- C. System components
- D. Inappropriate system/technology selection
- E. Installation and operation permits
- F. None of the Above

76. A wastewater system should be matched to the volume and pollutant profile of wastewater, and the site, soil, and groundwater/surface water conditions must be known in detail in order to develop?

- A. Protocol
- B. Management services
- C. System components
- D. Wastewater system
- E. An appropriate system design
- F. None of the Above

77. State and local wastewater system permitting programs are expanding the options available for providing \_\_\_\_\_, especially for sites with limiting soil conditions and those with threatened or impaired water resources nearby.

- A. Septic tanks
- B. Treatment services
- C. Wastewater
- D. Performance-based management approaches
- E. Clustered wastewater treatment systems
- F. None of the Above

78. The protocol should include a pre-design meeting between the \_\_\_\_\_, the management entity, the designer, and the owner of the property.

- A. Permitting agency
- B. Management services
- C. System components
- D. Wastewater system
- E. Installation and operation permits
- F. None of the Above

79. All of these parties have a stake in the performance of the system, and such a meeting can assist in identifying?

- A. Septic tanks
- B. Advanced systems
- C. Wastewater
- D. Performance-based management approaches
- E. Potential problems and solutions
- F. None of the Above

80. The protocol should be as complete as possible and should feature a rational, defensible evaluation procedure for proposed designs and?

- A. Septic tanks
- B. Advanced systems
- C. Materials specifications
- D. Performance-based management approaches
- E. Clustered wastewater treatment systems
- F. None of the Above

### Management Considerations

81. All wastewater treatment systems require management. Management services can be provided by an outside contractor or responsible?

- A. Protocol
- B. Management services
- C. System components
- D. Wastewater system
- E. Management entity
- F. None of the Above

82. In general, individual gravity flow systems with septic tanks and subsurface drainfields require less \_\_\_\_\_; clustered facilities with collection system pumps.

- A. Septic tanks
- B. Advanced systems
- C. Wastewater
- D. Performance-based management approaches
- E. Management attention
- F. None of the Above

### Permitting and Approval Process

83. State and local governments vary considerably in their approach to? and components and issuing installation and operation permits.

- A. Protocol
- B. Management services
- C. System components
- D. Approving system types
- E. Installation and operation permits
- F. None of the Above

84. Consultation with state and local regulatory agencies is required in all cases to ensure that \_\_\_\_\_ are met.

- A. Minimum requirements
- B. Septic system(s)
- C. Environmental agency
- D. Various treatment technologies
- E. Complex alternative systems
- F. None of the Above

85. It is important that the \_\_\_\_\_ include system drawings, narratives, forms, calculations, catalog cuts, photos, and other data, including detailed equipment and installation specifications to make siting the system components easier.

- A. Septic system failures
- B. Application
- C. Previous certifications
- D. Household wastewater
- E. System maintenance contracts
- F. None of the Above

86. If the site has been developed, all structures, utilities, and ingress and \_\_\_\_\_ should be identified.

- A. Egress pathways
- B. Septic system(s)
- C. Environmental agency
- D. Various treatment technologies
- E. Complex alternative systems
- F. None of the Above

87. The source of potable water and \_\_\_\_\_ should be identified as well. If there is an existing wastewater treatment system, the condition of all components, including the reserve area, should be recorded and minimum setbacks met.

- A. Septic system failures
- B. Potable water
- C. Distribution lines
- D. Household wastewater
- E. System maintenance contracts
- F. None of the Above

### Regular Maintenance

88. Which of the following terms - is required for all systems?

- A. Regular maintenance
- B. Septic system(s)
- C. Environmental agency
- D. Various treatment technologies
- E. Complex alternative systems
- F. None of the Above

89. Verification of system maintenance contracts, operator expertise, and reporting requirements for system maintenance such as tank pumping and repairs should be included in the?

- A. Septic system failures
- B. Potable water
- C. Approval process
- D. Household wastewater
- E. System maintenance contracts
- F. None of the Above

**Check the Record**

90. Unlike the other parts of a house, the septic system is difficult to see! However, you can check the records on a \_\_\_\_\_ by contacting your local or state sewer or septic agency or environmental agency.

- A. Graywater
- B. Home's septic system
- C. Environmental agency
- D. Various treatment technologies
- E. Complex alternative systems
- F. None of the Above

**These records should reflect:**

91. The age of the system. If properly designed, installed, and maintained, a septic system can effectively treat household wastewater for up to 20 years or more. Look to see if the house has a system that is?

- A. Septic system failures
- B. Potable water
- C. Previous certifications
- D. Household wastewater
- E. Near the end of its life-span
- F. None of the Above

92. Size is important because graywater and \_\_\_\_\_ (toilet water) need to be retained in the tank for at least a day or more to allow solids to separate from the liquids and begin breaking down.

- A. Graywater
- B. Septic system(s)
- C. Blackwater
- D. Various treatment technologies
- E. Complex alternative systems
- F. None of the Above

93. If wastewater is pushed through without proper settling, the solids can clog the drainfield, stressing and?

- A. Septic system failures
- B. Potable water
- C. Previous certifications
- D. Household wastewater
- E. Possibly damaging the system
- F. None of the Above

94. Adequate tank size is 1,000 gallons for a home with up to \_\_\_\_\_ plus 250 gallons for each additional bedroom in the home.

- A. Graywater
- B. Septic system(s)
- C. Environmental agency
- D. Various treatment technologies
- E. Complex alternative systems
- F. None of the Above

95. The location of the system. Knowing where the tank and drainfield are will help you visually check the area for obvious signs of failure. In addition, poorly sited drainfields can result in?

- A. Septic system failures
- B. Potable water
- C. Previous certifications
- D. Household wastewater
- E. System maintenance contracts
- F. None of the Above

96. Location of the system in relation to wells, other septic systems, slope of the land, natural drainage patterns, underlying soil conditions, and lot boundaries may indicate potential problems with the \_\_\_\_\_ and should be reviewed by you or a professional.

- A. Graywater
- B. Septic system(s)
- C. Environmental agency
- D. Various treatment technologies
- E. Complex alternative systems
- F. None of the Above

97. Keep an eye out for previous certifications from your state sewer or septic agency or environmental agency; these should indicate that the system is in compliance with \_\_\_\_\_, or will indicate any waivers that were granted and why.

- A. Septic system failures
- B. Potable water
- C. Previous certifications
- D. Household wastewater
- E. Good septic system standards
- F. None of the Above

### Testing and Certification

98. Approving the use of \_\_\_\_\_ is under the purview of state and local governments. Some states individually test and validate treatment technologies and maintain a list of those approved in their state.

- A. Graywater
- B. Septic system(s)
- C. Environmental agency
- D. Various treatment technologies
- E. Complex alternative systems
- F. None of the Above

### Certification of System Designers

99. Most state wastewater management programs require an engineer to design a wastewater system or to certify that it meets the \_\_\_\_\_ once installed.

- A. Septic system failures
- B. Potable water
- C. Previous certifications
- D. Household wastewater
- E. System maintenance contracts
- F. None of the Above

### Construction Section

100. Appropriate wastewater treatment system construction and/or installation practices are critical to the performance of?

- A. Individual and clustered systems
- B. Septic system(s)
- C. Environmental agency
- D. Various treatment technologies
- E. Complex alternative systems
- F. None of the Above

101. Construction activities can affect short-term and long-term system performance by failing to adhere to material specifications, neglecting proper pipe slope requirements, inadvertently switching \_\_\_\_\_, or failing to protect infiltration area soils from equipment compaction.

- A. Control wiring
- B. Tank inlet/outlet orientation
- C. Gravity flow pipes
- D. Treatment system components
- E. Outlet piping stubs
- F. None of the Above

102. \_\_\_\_\_, a key component of good system installation practice, should be carefully considered during site preparation, construction equipment selection and use, and before and during construction.

- A. Building sewer line elevation
- B. Distribution pipe effluent
- C. Infiltration area protection
- D. Surface, install outlet filters/screens
- E. Site preparation
- F. None of the Above

103. The development of a \_\_\_\_\_ that includes drawings, narratives, forms, calculations, photos, and other data, including detailed equipment and installation specifications, will help ensure a successful outcome.

- A. Control wiring
- B. Final design plan
- C. Gravity flow pipes
- D. Treatment system components
- E. Outlet piping stubs
- F. None of the Above



**Construction Phases**

Construction/installation management of a wastewater system can be divided into the following four basic phases:

**Preparation Phase**

104. Conduct a \_\_\_\_\_ at the site to identify site component locations, verify setbacks and other site conditions, check surface elevations, and identify potential problems or safety concerns.

- A. Pre-construction conference
- B. Secure tank covers
- C. Gravity flow pipes
- D. Treatment system components
- E. Outlet piping stubs
- F. None of the Above

105. Assess changes in conditions that may have occurred since \_\_\_\_\_ was completed.

- A. Design work
- B. Distribution pipe effluent
- C. Secondary treatment units
- D. Surface, install outlet filters/screens
- E. Site preparation
- F. None of the Above

**Project Execution**

106. Verify designed treatment system \_\_\_\_\_, such as tank type, size, and material; piping; and gravel that is free of fines.

- A. Control wiring
- B. Secure tank covers
- C. Gravity flow pipes
- D. Treatment system components
- E. Components and materials
- F. None of the Above

107. Excavate areas for \_\_\_\_\_, the tank(s), secondary treatment units, and infiltration or soil dispersal components according to designated depths and required pipe slopes.

- A. Building sewer line elevation
- B. Distribution pipe effluent
- C. Secondary treatment units
- D. Conveyance piping
- E. Site preparation
- F. None of the Above

108. Use caution to avoid contact with \_\_\_\_\_ and excavation cave-ins!

- A. Control wiring
- B. Secure tank covers
- C. Gravity flow pipes
- D. Treatment system components
- E. Outlet piping stubs
- F. None of the Above

109. For \_\_\_\_\_, all elevations are tied to the building sewer line elevation. Ensure that the proper fall is available from the building to the tank, then to the distribution box(es), and to the infiltration area.

- A. Building sewer line elevation
- B. Distribution pipe effluent
- C. Gravity flow systems
- D. Surface, install outlet filters/screens
- E. Site preparation
- F. None of the Above

110. Ensure that the \_\_\_\_\_ is on solid tamped ground, installed level and at the proper elevation, and that inlet/outlet orientation is correct. Secure tank covers after hours to prevent accidents. Backfill tanks as soon as possible.

- A. Tank
- B. Secure tank covers
- C. Gravity flow pipes
- D. Treatment system components
- E. Outlet piping stubs
- F. None of the Above

111. Follow manufacturer's recommendations for installing tanks. \_\_\_\_\_ usually require special installation techniques.

- A. Building sewer line elevation
- B. Distribution pipe effluent
- C. Secondary treatment units
- D. Plastic and fiberglass tanks
- E. Site preparation
- F. None of the Above

112. Use proper \_\_\_\_\_ for plastic piping.

- A. Control wiring
- B. Secure tank covers
- C. Gravity flow pipes
- D. Treatment system components
- E. Outlet piping stubs
- F. None of the Above

113. Ensure that pumps are plumbed, wired, and installed to allow easy inspection, access, and removal (e.g., use quick-connect union and \_\_\_\_\_ between pump and uphill dispersal piping).

- A. Building sewer line elevation
- B. Distribution pipe effluent
- C. Secondary treatment units
- D. Surface, install outlet filters/screens
- E. Backflow prevention valve
- F. None of the Above

114. Ensure that trench bottoms for \_\_\_\_\_ are tamped and stable and free of rocks and roots, and that backfilled areas around pipes are tamped to prevent dips and rises that could impede flow.

- A. Control wiring
- B. Secure tank covers
- C. Gravity flow pipes
- D. Treatment system components
- E. Outlet piping stubs
- F. None of the Above

115. Ensure that distribution pipe effluent dispersal holes go on the?

- A. Building sewer line elevation
- B. Distribution pipe effluent
- C. Secondary treatment units
- D. Surface, install outlet filters/screens
- E. Site preparation
- F. None of the Above

116. Extend \_\_\_\_\_ below tank access ports, but do not block ports to ensure access for pumping and inspection. Use rubber boots or grout to completely seal around pipes and risers.

- A. Inlet and outlet piping stubs
- B. Secure tank covers
- C. Gravity flow pipes
- D. Treatment system components
- E. Outlet piping stubs
- F. None of the Above

117. Install \_\_\_\_\_ to the surface, install outlet filters/screens, and complete installation of pumps, wiring, control panels, and other components.

- A. Building sewer line elevation
- B. Distribution pipe effluent
- C. Secondary treatment units
- D. Surface, install outlet filters/screens
- E. Access port risers
- F. None of the Above

118. Install cleanouts and inspection ports in \_\_\_\_\_ this aids in operation/maintenance later on.

- A. Key locations
- B. Secure tank covers
- C. Gravity flow pipes
- D. Treatment system components
- E. Outlet piping stubs
- F. None of the Above

119. Conduct \_\_\_\_\_ of the system after installation, checking flows, pump discharge (if used), operation of float switches (if used), and controls.

- A. Building sewer line elevation
- B. Distribution pipe effluent
- C. Secondary treatment units
- D. Surface, install outlet filters/screens
- E. Site preparation
- F. None of the Above

120. Verify \_\_\_\_\_ finished conditions (e.g., tank type/capacity, riser covers, elevations, location of key components, drainage, landscaping)

- A. Control wiring
- B. Secure tank covers
- C. Gravity flow pipes
- D. Treatment system components
- E. Outlet piping stubs
- F. None of the Above

### Final Inspection

121. Observe system components prior to \_\_\_\_\_; determine consistency between design and actual installation; report inconsistencies

- A. Organic layer
- B. Construction
- C. Site access points
- D. Cover-up
- E. Trench cavity
- F. None of the Above

### Site Preparation and Excavation Practices

122. A brief preconstruction meeting can ensure that \_\_\_\_\_ and practices to eliminate, minimize, or respond to them are identified.

- A. Safety hazards
- B. Site excavation
- C. Infiltration area
- D. Construction practices
- E. Long-term system performance
- F. None of the Above

123. Site preparation requires a number of activities including clearing and surface preparation for filling. Use of lightweight tracked equipment will minimize?

- A. Organic layer
- B. Soil compaction
- C. Site access points
- D. Infiltration trenches
- E. Trench cavity
- F. None of the Above

124. Soil moisture should be determined to ensure that it is \_\_\_\_\_, and care should be taken to avoid soil disturbance as much as possible.

- A. Soil moisture
- B. Site excavation
- C. Infiltration area
- D. Construction practices
- E. Long-term system performance
- F. None of the Above

125. To avoid potential \_\_\_\_\_ during construction, the soil below the proposed infiltration surface elevation must be below its plastic limit during construction.

- A. Soil damage
- B. Construction
- C. Site access points
- D. Infiltration trenches
- E. Trench cavity
- F. None of the Above

126. Site excavation is conducted only when the infiltration surface can be covered the same day to avoid loss of soil permeability from?

- A. Soil moisture
- B. Site excavation
- C. Wind-blown silt or raindrop impact
- D. Construction practices
- E. Long-term system performance
- F. None of the Above

127. Which of the following terms - should be limited to mowing and raking with minimal disturbance to the surface?

- A. Organic layer
- B. Construction
- C. Clearing
- D. Infiltration trenches
- E. Trench cavity
- F. None of the Above

128. Grubbing of the site should be avoided. If the site is to be filled, the surface should be moldboard- or chisel-plowed parallel to the contour when the soil is sufficiently dry to ensure?

- A. Soil moisture
- B. Site excavation
- C. Infiltration area
- D. Maximum vertical permeability
- E. Long-term system performance
- F. None of the Above

129. Which of the following terms - should not be removed. Scarifying the surface with the teeth of a backhoe bucket is not sufficient?

- A. Organic layer
- B. Construction
- C. Site access points
- D. Infiltration trenches
- E. Trench cavity
- F. None of the Above

130. Which of the following terms - and areas for traffic lanes, material stockpiling, and equipment parking should be designated on the drawings for the contractor?

- A. Organic layer
- B. Construction
- C. Site access points
- D. Infiltration trenches
- E. Trench cavity
- F. None of the Above

131. Heavy equipment should be diverted from the \_\_\_\_\_ to avoid compaction and damage to the area.

- A. Soil moisture
- B. Site excavation
- C. Infiltration area
- D. Construction practices
- E. Absorption field
- F. None of the Above

132. Flagging off the \_\_\_\_\_ as early as possible is critical to ensure long-term function of the system.

- A. Soil moisture
- B. Site excavation
- C. Infiltration area
- D. Construction practices
- E. Long-term system performance
- F. None of the Above

### Field Construction Practices

133. Changes in construction practices over the past 25 years have led to improvements in the performance of?

- A. Soil moisture
- B. Site excavation
- C. Infiltration area
- D. Individual wastewater systems
- E. Long-term system performance
- F. None of the Above

134. Avoid work during wet conditions. \_\_\_\_\_ in infiltration trenches should be scarified and the surface gently raked prior to installing the gravel or gravel-less piping/chambers.

- A. Organic layer
- B. Construction
- C. Site access points
- D. Smearred soil surfaces
- E. Trench cavity
- F. None of the Above

135. If gravel or crushed rock is to be used for the system medium, the rock should be placed in the trench by using the \_\_\_\_\_ to long-term system performance.

- A. Soil moisture
- B. Site excavation
- C. Infiltration area
- D. Construction practices
- E. Backhoe bucket
- F. None of the Above

136. If soil compaction occurs during drainfield installation, it might be possible to restore the area, but only by removing the?

- A. Soil moisture
- B. Compacted layer
- C. Infiltration area
- D. Construction practices
- E. Long-term system performance
- F. None of the Above

137. It might be necessary to remove as much as four inches of soil to regain the \_\_\_\_\_ and permeability.

- A. Natural soil porosity
- B. Construction
- C. Site access points
- D. Infiltration trenches
- E. Trench cavity
- F. None of the Above

138. Consequences of the removal of this amount of soil over the entire infiltration surface can be significant. It will reduce the separation distance to the restrictive horizon and could place the infiltration surface in?

- A. Soil moisture
- B. Site excavation
- C. Infiltration area
- D. An unacceptable soil horizon
- E. Long-term system performance
- F. None of the Above

139. For gravel filled trenches, the \_\_\_\_\_ should be left rough and covered with six inches of clean rock.

- A. Trench bottom
- B. Construction
- C. Site access points
- D. Infiltration trenches
- E. Trench cavity
- F. None of the Above

140. Distribution pipes should be carefully placed over the \_\_\_\_\_, leveled, and bedded in on the sides.

- A. Soil moisture
- B. Site excavation
- C. Infiltration area
- D. Construction practices
- E. Long-term system performance
- F. None of the Above

141. Which of the following terms - should be carefully crowned to fill the trench cavity at a height to allow for settling?

- A. Soil backfill
- B. Construction
- C. Site access points
- D. Infiltration trenches
- E. Trench cavity
- F. None of the Above

142. Which of the following terms - over the system should be eliminated, and the area should be seeded and mulched?

- A. Soil moisture
- B. Site excavation
- C. Infiltration area
- D. Construction practices
- E. Soil depressions
- F. None of the Above

143. Post construction activities include accurate documentation of all of the system components and the?

- A. System location
- B. Construction
- C. Site access points
- D. Infiltration trenches
- E. Trench cavity
- F. None of the Above

144. Flag off the infiltration area to keep construction and?

- A. Soil moisture
- B. Site excavation
- C. Infiltration area
- D. Construction practices
- E. Long-term system performance
- F. None of the Above

### **Construction Practice and Examples**

145. Which of the following terms - provide guidance on siting a system and regulations that apply to system design and installation?

- A. Installation inspections
- B. Environmental analysis
- C. BMPs
- D. Sewage treatment system design
- E. Monitoring requirements
- F. None of the Above

146. Charlestown, Rhode Island, subdivision regulations and zoning ordinances establish special standards for \_\_\_\_\_, including policies for the protection of sensitive resources.

- A. Operation and maintenance tasks
- B. O&M maintenance activities
- C. Independent design professional
- D. An occupancy permit is issued
- E. Wastewater system siting and installation
- F. None of the Above

147. The required environmental analysis within the subdivision regulations incorporates the consideration of \_\_\_\_\_ into the soil and factors related to dispersal sites, such as soil type, slopes, and proximity to waterbodies and wetlands.

- A. Installation inspections
- B. Environmental analysis
- C. Effluent dispersal
- D. Sewage treatment system design
- E. Monitoring requirements
- F. None of the Above

### **Management Considerations**

148. All onsite management programs should carefully consider construction and installation elements to ensure the?

- A. Operation and maintenance tasks
- B. O&M maintenance activities
- C. Independent design professional
- D. Proper operation of onsite systems
- E. Consistent level of program performance
- F. None of the Above

### **Inspections**

149. Which of the following terms - should be conducted by trained and certified personnel at several stages during the system construction and installation process, if possible?

- A. Installation inspections
- B. Environmental analysis
- C. Soil-discharging systems
- D. Sewage treatment system design
- E. Monitoring requirements
- F. None of the Above

150. The National Sanitation Foundation developed a rigorous NSF Inspector Accreditation Program to test an applicant's knowledge on topics ranging from sewage treatment system design and operation to inspection procedures, safety, and?

- A. Installation inspections
- B. Environmental analysis
- C. Soil-discharging systems
- D. Sewage treatment system design
- E. Basic tank capacity and other calculations
- F. None of the Above

151. If there are \_\_\_\_\_ to conduct these inspections, an approved, independent design professional could be required to oversee installation and certify that it has been conducted and recorded properly.

- A. Operation and maintenance tasks
- B. O&M maintenance activities
- C. Independent design professional
- D. Insufficient management program resources
- E. Consistent level of program performance
- F. None of the Above

152. The construction process for \_\_\_\_\_ must be flexible to accommodate weather events, since construction during wet weather may compact soils at the infiltrative surface or otherwise alter soil structure and should be avoided.

- A. Installation inspections
- B. Environmental analysis
- C. Soil-discharging systems
- D. Sewage treatment system design
- E. Monitoring requirements
- F. None of the Above

153. Commonly, the local health department will provide a \_\_\_\_\_ prior to backfilling the system, after which an occupancy permit is issued.

- A. Operation and maintenance tasks
- B. O&M maintenance activities
- C. Independent design professional
- D. Field inspection
- E. Consistent level of program performance
- F. None of the Above

### **Operation and Maintenance (O&M) Section**

154. There are several different management approaches that can be used to \_\_\_\_\_, from mandatory inspection programs to permitting and monitoring requirements.

- A. Installation inspections
- B. Environmental analysis
- C. Support O&M
- D. Sewage treatment system design
- E. Monitoring requirements
- F. None of the Above

155. Which of the following terms - are tied directly to the system type, the wastewater being treated, and the receiving environment where effluent is discharged or dispersed?

- A. Operation and maintenance tasks
- B. O&M maintenance activities
- C. Independent design professional
- D. An occupancy permit is issued
- E. Consistent level of program performance
- F. None of the Above

### **System Operation and Maintenance Requirements**

156. There are distinct, ongoing \_\_\_\_\_ associated with the various individual and clustered wastewater collection and treatment systems and the technologies employed.

- A. Installation inspections
- B. Environmental analysis
- C. O&M requirements
- D. Sewage treatment system design
- E. Monitoring requirements
- F. None of the Above

157. Most technologies come with suggested \_\_\_\_\_ from the manufacturer. These requirements are crucial to the proper operation and performance of the system.
- A. Operation and maintenance tasks
  - B. O&M maintenance activities
  - C. Independent design professional
  - D. An occupancy permit is issued
  - E. Consistent level of program performance
  - F. None of the Above

### Individual Wastewater Systems

158. Which of the following terms - collect, treat, and disperse wastewater from an individual property and are associated with low-density communities and developments, such as rural residential?

- A. Installation inspections
- B. Environmental analysis
- C. Soil-discharging systems
- D. Sewage treatment system design
- E. Individual treatment systems
- F. None of the Above

159. Which of the following terms - of an individual system can vary greatly depending on the type of system?

- A. Operation and maintenance tasks
- B. O&M maintenance activities
- C. Independent design professional
- D. Operation and maintenance requirements
- E. Consistent level of program performance
- F. None of the Above

160. For example, mechanical systems, such as activated sludge-based units, require servicing three to four times a year, while \_\_\_\_\_ need service or pumping every three to seven years, depending on occupancy and use.

- A. Operation and maintenance tasks
- B. O&M maintenance activities
- C. Independent design professional
- D. Conventional systems
- E. Consistent level of program performance
- F. None of the Above

### Conventional Systems

161. Conventional "septic" systems are the most widely used?"

- A. Clustered system(s)
- B. O&M requirement(s)
- C. Conventional system
- D. Advanced or innovative technologies
- E. Wastewater treatment system
- F. None of the Above

162. Which of the following terms - is the responsibility of the homeowner?

- A. Alternative technologies
- B. Treatment performance
- C. Cluster systems
- D. Operation and maintenance of conventional systems
- E. Wastewater treatment and dispersal/reuse technologies
- F. None of the Above

163. Which of the following terms - require periodic pumping to remove the solids, fats, oils, and grease that accumulate in the septic tank?

- A. Clustered system(s)
- B. O&M requirement(s)
- C. Conventional systems
- D. Advanced or innovative technologies
- E. Pumping needs
- F. None of the Above

164. When a system is poorly maintained and not pumped out on a regular basis, sludge can build up inside the tank and may ultimately clog the \_\_\_\_\_, making the system unusable.

- A. Alternative technologies
- B. Treatment performance
- C. Absorption field
- D. Enhanced wastewater treatment systems
- E. Wastewater treatment and dispersal/reuse technologies
- F. None of the Above



165. A system owner should hire an experienced service provider to inspect the system at least once a year to determine pumping needs and to clean, repair, or replace any \_\_\_\_\_ as needed.

- A. Clustered system(s)
- B. O&M requirement(s)
- C. Components
- D. Advanced or innovative technologies
- E. Pumping needs
- F. None of the Above

166. Which of the following terms - now include risers that allow access to inspect tanks and determine pumping needs?

- A. Clustered system(s)
- B. O&M requirement(s)
- C. Conventional system
- D. Conventional system designs
- E. Pumping needs
- F. None of the Above

### **Enhanced Treatment Systems**

167. Several wastewater \_\_\_\_\_ have proven to be effective in situations where conventional systems are not appropriate.

- A. Alternative technologies
- B. Treatment performance
- C. Cluster systems
- D. Enhanced wastewater treatment systems
- E. Wastewater treatment and dispersal/reuse technologies
- F. None of the Above

### **Material Replacement**

168. These systems fall into three broad categories: Technologies that replace one component of the \_\_\_\_\_ with a component manufactured from a different material.

- A. Clustered system(s)
- B. O&M requirement(s)
- C. Conventional system
- D. Advanced or innovative technologies
- E. Pumping needs
- F. None of the Above

### **Conventional System Modification**

169. Technologies that enhance or otherwise improve?

- A. Alternative technologies
- B. Treatment performance
- C. Cluster systems
- D. Conventional operating or treatment performance
- E. Wastewater treatment and dispersal/reuse technologies
- F. None of the Above

### **Enhanced Wastewater Treatment**

170. Which of the following terms - that provide a higher level of treatment beyond conventional systems?

- A. Clustered system(s)
- B. O&M requirement(s)
- C. Conventional system
- D. Advanced or innovative technologies
- E. Pumping needs
- F. None of the Above

171. Which of the following terms - are more complex than conventional systems and require greater oversight to keep all aspects of the treatment process in balance?

- A. Alternative technologies
- B. Treatment performance
- C. Cluster systems
- D. Enhanced wastewater treatment systems
- E. Wastewater treatment and dispersal/reuse technologies
- F. None of the Above

### Clustered Treatment Systems

172. Which of the following terms - can serve from two to 200 or more homes and/or commercial facilities?

- A. Clustered system(s)
- B. O&M requirement(s)
- C. Conventional system
- D. Advanced or innovative technologies
- E. Pumping needs
- F. None of the Above

173. Which of the following terms - have become an attractive option for many locations, especially in areas like small lakeside communities where a higher level of treatment may be needed?

- A. Alternative technologies
- B. Treatment performance
- C. Cluster systems
- D. Enhanced wastewater treatment systems
- E. Wastewater treatment and dispersal/reuse technologies
- F. None of the Above

174. The operation and maintenance requirements of \_\_\_\_\_ will vary based on the size of the system, the wastewater being treated, and the types of technology used. Various technologies that can be implemented via a cluster system.

- A. Clustered system(s)
- B. O&M requirement(s)
- C. Conventional system
- D. Advanced or innovative technologies
- E. Pumping needs
- F. None of the Above

175. They range in scale from a \_\_\_\_\_ and soil dispersal system serving a dozen homes to a large alternative sewer system connected to a treatment plant that can treat large wastewater flows with a variety of wastewater treatment and dispersal/reuse technologies.

- A. Communal septic tank
- B. Treatment performance
- C. Cluster systems
- D. Enhanced wastewater treatment systems
- E. Wastewater treatment and dispersal/reuse technologies
- F. None of the Above

### Management Considerations

176. In the past, state and local wastewater management programs rarely specified \_\_\_\_\_ for conventional or enhanced wastewater systems.

- A. Clustered system(s)
- B. O&M requirement(s)
- C. Conventional system
- D. Advanced or innovative technologies
- E. Pumping needs
- F. None of the Above

177. The regulation of \_\_\_\_\_, construction, and operation was considered to be satisfactory community oversight.

- A. Alternative technologies
- B. System design
- C. Cluster systems
- D. Enhanced wastewater treatment systems
- E. Wastewater treatment and dispersal/reuse technologies
- F. None of the Above

178. As more and more systems malfunction and threaten waterways and as more systems include higher maintenance electrical and mechanical components, communities are recognizing the value of?

- A. Clustered system(s)
- B. O&M requirement(s)
- C. Conventional system
- D. Advanced or innovative technologies
- E. Pumping needs
- F. None of the Above

179. Many are strengthening programs with a number of tools, including requirements for homeowner service contracts, routine maintenance inspections, revocable operating permits, monitoring, and enhanced reporting and \_\_\_\_\_ that support proper system performance.

- A. Management tool
- B. Acceptable proof
- C. Operation and maintenance
- D. Data management
- E. Sewage management program
- F. None of the Above

### Training and Certification

180. Communities that require \_\_\_\_\_ (construction, operations, and maintenance) typically also require using only trained or certified inspectors and service providers.

- A. Acceptable proof
- B. Regulating agency
- C. Manage systems
- D. Inspections of wastewater systems
- E. Annual system inspections
- F. None of the Above

181. Several states have established \_\_\_\_\_ for inspectors, pumpers, haulers, and other service providers. In addition, some states and jurisdictions have created registries for certified providers to encourage the use of trained professionals.

- A. Management tool
- B. Acceptable proof
- C. Operation and maintenance
- D. Certification and licensing programs
- E. Sewage management program
- F. None of the Above

### Inspections and Maintenance Requirements

182. In many communities, local health officials often have \_\_\_\_\_ to monitor systems or enter private property unless they receive a complaint or have other evidence that there may be a problem with a system.

- A. Acceptable proof
- B. Regulating agency
- C. Manage systems
- D. Enhanced wastewater technologies
- E. Annual system inspections
- F. None of the Above

183. To prevent widespread problems with systems, some local jurisdictions have amended their codes to include routine maintenance inspections of individual wastewater treatment systems. These programs can be administered and regulated by special entities such as sanitary, sewer, or water districts; by local health agencies; or by other organizations, such as?

- A. Management tool
- B. Acceptable proof
- C. Operation and maintenance
- D. Town governments and homeowners' associations
- E. Sewage management program
- F. None of the Above

184. Enabling legislation must be passed at the state level to give these organizations the legal authority they need to?

- A. Acceptable proof
- B. Regulating agency
- C. Manage systems
- D. Enhanced wastewater technologies
- E. Annual system inspections
- F. None of the Above

185. Other communities and a few states have amended their \_\_\_\_\_ to require a system inspection and documentation of a system's condition when property is sold or transferred.

- A. Acceptable proof
- B. Regulating agency
- C. Wastewater codes
- D. Enhanced wastewater technologies
- E. Annual system inspections
- F. None of the Above

### Maintenance Inspections

186. Maintenance inspections are gaining appeal as a management tool to assess the condition of systems and determine pumping or?

- A. Management tool
- B. Acceptable proof
- C. Operation and maintenance
- D. Other O&M needs
- E. Sewage management program
- F. None of the Above

187. In some cases, this is a \_\_\_\_\_, while in other cases; communities have elected to mandate pumping based on third party inspections.

- A. Acceptable proof
- B. Regulating agency
- C. Manage systems
- D. Strictly voluntary program
- E. Annual system inspections
- F. None of the Above

188. Following inspection, the \_\_\_\_\_ should be notified of any needed corrections and assigned a deadline to furnish acceptable proof that the corrections have been made.

- A. Management tool
- B. System owner
- C. Operation and maintenance
- D. Town governments and homeowners' associations
- E. Sewage management program
- F. None of the Above

189. Which of the following terms - is usually a certification by the contractor listing the types and dates of corrections made and final inspection?

- A. Acceptable proof
- B. Regulating agency
- C. Manage systems
- D. Enhanced wastewater technologies
- E. Annual system inspections
- F. None of the Above

190. Some local agencies have adopted a \_\_\_\_\_ that requires the annual inspection of systems with newly issued or modified permits and proof of septic tank pumping for all systems (old and new).

- A. Management tool
- B. Acceptable proof
- C. Operation and maintenance
- D. Town governments and homeowners' associations
- E. Sewage management program
- F. None of the Above

191. Which of the following terms - have designated certain geographical areas as being subject to annual system inspections and/or routine tank pumping?

- A. Acceptable proof
- B. Regulating agency
- C. Other agencies
- D. Enhanced wastewater technologies
- E. Annual system inspections
- F. None of the Above

192. Which of the following terms - are usually coupled with a mandatory septic tank pumping program. The local agency notifies the system owner when pumping is due?

- A. Management tool
- B. Acceptable proof
- C. Operation and maintenance
- D. Operation and maintenance inspection programs
- E. Sewage management program
- F. None of the Above

193. Verification of pumping is provided to the?

- A. Acceptable proof
- B. Regulating agency
- C. Manage systems
- D. Enhanced wastewater technologies
- E. Annual system inspections
- F. None of the Above

194. Typical pumping requirements vary from three to five years or more based on the daily sewage flow and?

- A. Management tool
- B. Acceptable proof
- C. Operation and maintenance
- D. Individual household wastewater characteristics
- E. Sewage management program
- F. None of the Above

195. In states and communities where these systems are authorized, performance inspections are mandated in the state code or in the?

- A. Acceptable proof
- B. Regulating agency
- C. Manage systems
- D. Enhanced wastewater technologies
- E. System's operating permit
- F. None of the Above

196. For enhanced wastewater systems, a long-term maintenance contract is highly recommended and typically required in state or local regulations, or as a provision of a?

- A. Management tool
- B. Acceptable proof
- C. Operation and maintenance
- D. System's operating permit
- E. Sewage management program
- F. None of the Above

### **Maintenance of Systems**

197. Which of the following terms - are a viable option to better manage enhanced systems, they must be supplemented with adequate reporting and tracking to monitor their use?

- A. O&M program
- B. O&M rules
- C. Compliance measures
- D. O&M management responsibilities
- E. Maintenance contracts
- F. None of the Above

198. Which of the following terms - may also require an increased frequency of inspections to determine if they are performing as required?

- A. Operating permits
- B. O&M management
- C. Individual or cluster system
- D. Performance-based system
- E. Enhanced systems
- F. None of the Above

199. A key part of an \_\_\_\_\_ is to track the maintenance of systems.

- A. O&M program
- B. O&M rules
- C. Compliance measures
- D. O&M management responsibilities
- E. Proper maintenance
- F. None of the Above

200. Service providers should report maintenance events and any lapses in maintenance contracts to the management or regulatory authority. This information should be managed in a database to monitor \_\_\_\_\_ and provide a system of accountability.

- A. Operating permits
- B. O&M management
- C. Individual or cluster system
- D. O&M activities
- E. Enhanced systems and cluster systems
- F. None of the Above

201. Advances in technology via Web-based remote monitoring or \_\_\_\_\_ can also allow multiple system operating parameters to be monitored from remote locations around the clock.

- A. O&M program
- B. O&M rules
- C. Compliance measures
- D. O&M management responsibilities
- E. Proper maintenance
- F. None of the Above

## Operating Permits

202. Which of the following terms - require: Increased levels of management related to risk conditions associated with higher sewage treatment system density, complexity, and reliability?

- A. O&M program
- B. O&M rules
- C. Compliance measures
- D. O&M management responsibilities
- E. Proper maintenance
- F. None of the Above

203. Recording of operating permit conditions, service contract requirements, or other \_\_\_\_\_ information on property deeds as a means to provide notification upon transfer of property.

- A. Operating permits
- B. O&M management
- C. Individual or cluster system
- D. Performance-based system
- E. Enhanced systems and cluster systems
- F. None of the Above

204. Utilization of private sector professionals or responsible management entities, or designation of qualified agents to conduct monitoring or other?

- A. O&M program
- B. O&M rules
- C. Compliance measures
- D. O&M management responsibilities
- E. Proper maintenance
- F. None of the Above

205. Inclusion of enhanced \_\_\_\_\_ mechanisms such as Web-based reporting, remote telemetry, and use of publicly and privately available database programs to support O&M tracking requirements.

- A. Operating permits
- B. O&M management
- C. Individual or cluster system
- D. Performance-based system
- E. Enhanced systems and cluster systems
- F. None of the Above

206. In areas where \_\_\_\_\_ are issued to conventional systems, the permit may specify routine septic tank pumping.

- A. Operating permits
- B. O&M management
- C. Individual or cluster system
- D. Performance-based system
- E. Enhanced systems and cluster systems
- F. None of the Above

207. More complex systems, however, often include maintenance inspections, maintenance contracts, and?

- A. O&M program
- B. O&M rules
- C. Compliance measures
- D. O&M management responsibilities
- E. Proper maintenance
- F. None of the Above

208. In the case of a \_\_\_\_\_, the operating permit may include specific standards that must be maintained along with monitoring and reporting requirements.

- A. Operating permits
- B. O&M management
- C. Individual or cluster system
- D. Performance-based system
- E. Enhanced systems and cluster systems
- F. None of the Above

### Public and Private Management Entities

209. Enhanced systems and \_\_\_\_\_ can pose greater risks of mechanical and performance failure than passive conventional systems.

- A. Operating permits
- B. O&M management
- C. Individual or cluster system
- D. Performance-based system
- E. Cluster systems
- F. None of the Above

210. Special districts, water/sewer authorities, and public utilities can be an effective option for managing these?

- A. O&M program
- B. O&M rules
- C. Compliance measures
- D. O&M management responsibilities
- E. Proper maintenance
- F. None of the Above

211. Private entities can also be authorized to own, operate, and/or maintain an?

- A. Operating permits
- B. O&M management
- C. Individual or cluster system
- D. Performance-based system
- E. Enhanced systems and cluster systems
- F. None of the Above

### Maintenance

212. Which of the following terms - can add years to an older system. Even well-designed and properly installed septic systems can fail earlier than expected if previous homeowners did not perform routine maintenance.

- A. O&M program
- B. O&M rules
- C. Compliance measures
- D. O&M management responsibilities
- E. Proper maintenance
- F. None of the Above

### Permit

213. Which of the following terms - must be obtained before starting construction or repair work?

- A. Permits
- B. O&M management
- C. Individual or cluster system
- D. Performance-based system
- E. Enhanced systems and cluster systems
- F. None of the Above

214. When authority is based on a \_\_\_\_\_, regulation can be more restrictive than the state standard; check with your local authority.

- A. O&M program
- B. O&M rules
- C. Compliance measures
- D. O&M management responsibilities
- E. Local ordinance
- F. None of the Above

215. In most counties, the local health department issues?

- A. Operating permits
- B. O&M management
- C. Individual or cluster system
- D. Performance-based system
- E. OWTS construction permits
- F. None of the Above

216. Several factors should be considered when choosing the type of onsite system for a site including: soil/site limitations, available space, operation and maintenance requirements, initial costs as well as \_\_\_\_\_, landscape disturbance, and the owners' preferences and ability to manage the system.

- A. O&M program
- B. O&M rules
- C. Compliance measures
- D. O&M management responsibilities
- E. O & M costs
- F. None of the Above

217. Of these considerations, often the most limiting is the soil resource or site and?

- A. Biological processes
- B. Gravity lateral trenches
- C. Soil infiltrative surface
- D. Digest organic matter
- E. Space limitations
- F. None of the Above

218. When the soil and site are suited to a lagoon or to a \_\_\_\_\_ and conventional soil absorption system, any registered OWTS installer can assist with the permitting and can install a basic onsite system.

- A. Liquid effluent
- B. Safety hazard
- C. Pressure manifolds
- D. System components
- E. Septic tank
- F. None of the Above

219. When site limitations or other factors lead to \_\_\_\_\_, the installer must be registered as an advanced OWTS installer.

- A. An advanced OWTS
- B. Gravity lateral trenches
- C. Soil infiltrative surface
- D. Digest organic matter
- E. A mechanical onsite treatment unit
- F. None of the Above

### **Basic Onsite Wastewater Treatment Systems and Components**

220. Building sewers and other sewer lines: watertight pipes, which carry waste by \_\_\_\_\_ from a building to the onsite system or carry effluent by gravity from sewage tanks to other system components.

- A. Liquid effluent
- B. Gravity
- C. Pressure manifolds
- D. System components
- E. Lateral trenches
- F. None of the Above

### **Septic Tanks**

221. Its function is to separate solids from liquid, digest organic matter, store liquids through a period of detention and allow the \_\_\_\_\_ to discharge to other components of an onsite system.

- A. Biological processes
- B. Gravity lateral trenches
- C. Clarified liquids
- D. Digest organic matter
- E. A mechanical onsite treatment unit
- F. None of the Above

### **Septic/Sewage Tank Removal**

222. Which of the following terms - need to be properly abandoned to prevent them from becoming a safety hazard?

- A. Liquid effluent
- B. Unused sewage tanks
- C. Pressure manifolds
- D. System components
- E. Lateral trenches
- F. None of the Above

### **Aerobic Treatment Units (ATUs)**

223. A mechanical onsite treatment unit that provides \_\_\_\_\_ by mixing air and aerobic and facultative microbes with the wastewater in a sewage tank.

- A. Biological processes
- B. Gravity lateral trenches
- C. Soil infiltrative surface
- D. Digest organic matter
- E. Secondary wastewater treatment
- F. None of the Above



### Gravity Effluent Distribution Devices

224. Divide and/or transport the liquid effluent from a septic tank or \_\_\_\_\_ to absorption trenches for dispersal into the soil.

- A. Liquid effluent
- B. ATU
- C. Pressure manifolds
- D. System components
- E. Lateral trenches
- F. None of the Above

### Gravity laterals

225. A system of trenches excavated along ground contours used to distribute effluent by gravity flow from a septic tank or \_\_\_\_\_ and apply the effluent to the soil infiltrative surface.

- A. Biological processes
- B. Gravity lateral trenches
- C. ATU
- D. Digest organic matter
- E. A mechanical onsite treatment unit
- F. None of the Above

226. Generally, 18-inch deep trenches are used; however, with \_\_\_\_\_ can be up to 30 inches deep.

- A. Liquid effluent
- B. Approval trenches
- C. Pressure manifolds
- D. System components
- E. Lateral trenches
- F. None of the Above

### Gravity lateral systems include:

227. 4-inch perforated distribution pipe in trenches filled with gravel or?

- A. Biological processes
- B. Gravity lateral trenches
- C. Soil infiltrative surface
- D. Digest organic matter
- E. A mechanical onsite treatment unit
- F. None of the Above

### Shallow Placed Gravity Laterals

228. Lateral trenches with the \_\_\_\_\_ 12 to 18 inches deep in natural soil with suitable soil fill material properly installed to provide adequate cover over the system.

- A. Liquid effluent
- B. Trench bottom
- C. Pressure manifolds
- D. System components
- E. Lateral trenches
- F. None of the Above

### Dosed Gravity Systems

229. Use siphons or pumps to dose into a \_\_\_\_\_ or through a pressure manifold into the ends of gravity lateral trenches.

- A. Biological processes
- B. Gravity distribution device
- C. Soil infiltrative surface
- D. Digest organic matter
- E. A mechanical onsite treatment unit
- F. None of the Above

230. Pressure manifolds can be used to more equally divide effluent between \_\_\_\_\_ or to proportion effluent to unequal length trenches; however, effluent is still moved along the length of a trench by gravity.

- A. Liquid effluent
- B. Gravity lateral trenches
- C. Pressure manifolds
- D. System components
- E. Lateral trenches
- F. None of the Above

### **Lagoons (wastewater stabilization ponds)**

231. Sealed earthen basins, which use \_\_\_\_\_ to treat wastewater.
- A. Biological processes
  - B. Gravity lateral trenches
  - C. Soil infiltrative surface
  - D. Natural unaided biological processes
  - E. A mechanical onsite treatment unit
  - F. None of the Above

### **Advanced Onsite Wastewater Treatment Systems and components include:**

#### **Sand filters**

232. A packed-bed filter of sand or other granular materials used to provide advanced secondary treatment of?

- A. Liquid effluent
- B. Septic tank effluent
- C. Pressure manifolds
- D. System components
- E. Lateral trenches
- F. None of the Above

233. Sand/media filters consist of a lined excavation or structure filled with uniform washed sand that is placed over?

- A. Biological processes
- B. Gravity lateral trenches
- C. Soil infiltrative surface
- D. An under-drain system
- E. A mechanical onsite treatment unit
- F. None of the Above

234. The wastewater is dosed onto the surface of the sand through a distribution network and allowed to percolate through the sand to the \_\_\_\_\_, which collects the filter effluent for further processing or discharge.

- A. Dispersal component
- B. Under-drain system
- C. Evapotranspiration
- D. Subsurface absorption systems
- E. Engineered distribution systems
- F. None of the Above

#### **Other Media Bio-filters**

235. Which of the following terms - \_using other more porous materials, to provide advanced secondary treatment of septic tank effluent?

- A. Packed-bed filters
- B. Sewage tank effluent
- C. Microorganisms
- D. A subsurface soil dispersal system
- E. Bacteria and other microorganisms
- F. None of the Above

#### **Constructed Wetlands**

236. An OWTS that incorporates \_\_\_\_\_ consisting of one or more lined basins which may be filled with a medium and where wastewater undergoes some combination of physical, chemical, and/or biological treatment and evapotranspiration.

- A. An aquatic treatment system
- B. Limit the loading of effluent
- C. Evapotranspiration
- D. Subsurface absorption systems
- E. Engineered distribution systems
- F. None of the Above

#### **Sand Mounds**

237. An above ground treatment system that incorporates at least 12 inches of clean sand above the \_\_\_\_\_ and disperses the treated wastewater into the original soil.

- A. Original soil surface
- B. Sewage tank effluent
- C. Microorganisms
- D. A subsurface soil dispersal system
- E. Bacteria and other microorganisms
- F. None of the Above

### Low-pressure Distribution Systems

238. An OWTS in which pressurized small diameter distribution lines are used for equal distribution of effluent within the \_\_\_\_\_ and dispersal component.

- A. Dispersal component
- B. Final treatment
- C. Evapotranspiration
- D. Subsurface absorption systems
- E. Engineered distribution systems
- F. None of the Above

### Drip Irrigation Systems

239. A subsurface soil dispersal system that distributes treated wastewater through?

- A. Original soil
- B. Sewage tank effluent
- C. Microorganisms
- D. Drip irrigations lines
- E. Bacteria and other microorganisms
- F. None of the Above

### Modified Shallow Placed Gravity Lateral Trenches

240. Six to 12 inches deep in natural soil and other engineered distribution systems using?

- A. Dispersal component
- B. Fill soil material
- C. Evapotranspiration
- D. Subsurface absorption systems
- E. Engineered distribution systems
- F. None of the Above

### Suitable Soil

241. Suitable soil is an effective treatment medium for sewage tank effluent because it contains a?

- A. Original soil
- B. Sewage tank effluent
- C. Microorganisms
- D. Complex biological community
- E. Bacteria and other microorganisms
- F. None of the Above

242. Which of the following terms - can contain over one million microscopic organisms, including bacteria, protozoa, fungi, molds, and other creatures?

- A. Dispersal component
- B. Limit the loading of effluent
- C. One tablespoon of soil
- D. Subsurface absorption systems
- E. Engineered distribution systems
- F. None of the Above

243. Which of the following terms - must pass through the soil slowly enough to provide adequate contact time with microorganisms?

- A. Wastewater
- B. Sewage tank effluent
- C. Microorganisms
- D. A subsurface soil dispersal system
- E. Bacteria and other microorganisms
- F. None of the Above

244. To provide adequate time for treatment of \_\_\_\_\_, it is necessary to have at least three feet of aerated or unsaturated soil and limit the loading of effluent.

- A. Dispersal component
- B. Limit the loading of effluent
- C. Septic tank effluent
- D. Subsurface absorption systems
- E. Engineered distribution systems
- F. None of the Above

245. Microorganisms in soil treat wastewater physically, chemically, and biologically before it reaches the groundwater, preventing pollution and?

- A. Public health hazards
- B. Sewage tank effluent
- C. Microorganisms
- D. A subsurface soil dispersal system
- E. Bacteria and other microorganisms
- F. None of the Above

246. Under some soil conditions, \_\_\_\_\_ may not accept the wastewater or may fail to properly treat the wastewater unless special modifications to system design are made.

- A. Dispersal component
- B. Limit the loading of effluent
- C. Evapotranspiration
- D. Subsurface absorption systems
- E. Engineered distribution systems
- F. None of the Above

247. Which of the following terms - is a major concern because domestic wastewaters contain many substances that are undesirable and potentially harmful, such as pathogenic bacteria?

- A. Public health
- B. Sewage tank effluent
- C. Microorganisms
- D. A subsurface soil dispersal system
- E. Bacteria and other microorganisms
- F. None of the Above

248. Which of the following terms - need the same basic conditions as humans do to live and grow: a place to live, food to eat, water, oxygen to breathe, suitable temperatures, and time to grow?

- A. Dispersal component
- B. Limit the loading of effluent
- C. Soil microorganisms
- D. Subsurface absorption systems
- E. Engineered distribution systems
- F. None of the Above

249. Which of the following terms - attach themselves to soil particles using microbial slimes and use the oxygen and water that are present in the soil pores?

- A. Dispersal zone
- B. Soil microorganisms
- C. Septic systems
- D. Treatable contaminant
- E. Effluent BOD
- F. None of the Above

250. The first component in an individual sewage treatment system is usually a septic tank, which removes?

- A. Fresh water
- B. Groundwater
- C. Source of pollution
- D. Dispersal media
- E. Some organic material and total suspended solids (TSS)
- F. None of the Above

251. Which of the following terms - removal is very important because it prevents excessive clogging of the soil infiltrative surface?

- A. Dispersal zone
- B. TSS and organic material
- C. Septic systems
- D. Treatable contaminant
- E. Effluent BOD
- F. None of the Above

### **Suitably-textured Soil**

252. Suitably-textured soil must be deep enough to allow adequate filtration and treatment of the effluent before it is released into the?

- A. Natural environment
- B. Groundwater
- C. Source of pollution
- D. Dispersal media
- E. Water percolates
- F. None of the Above

253. Usually this release is into groundwater. It has been determined that three feet of aerated soil will provide sufficient treatment of?

- A. Dispersal zone
- B. Septic tank effluent
- C. Septic systems
- D. Treatable contaminant
- E. Effluent BOD
- F. None of the Above

254. A three-foot separation distance is required from the bottom of the \_\_\_\_\_ to a limiting soil condition such as groundwater or bedrock.

- A. Fresh water
- B. Groundwater
- C. Source of pollution
- D. Dispersal media
- E. Water percolates
- F. None of the Above

255. This three-foot treatment zone provides sufficient detention time for final bacteria breakdown and sufficient distance for the filtration that is essential for the?

- A. Dispersal zone
- B. Safe treatment of effluent BOD
- C. Septic systems
- D. Treatable contaminant
- E. Effluent BOD
- F. None of the Above

### Impacts of Effluent on Groundwater

256. Groundwater represents the largest volume of fresh water on earth. Only three percent of the earth's fresh water resides in streams, lakes, and other?

- A. Fresh water
- B. Groundwater
- C. Source of pollution
- D. Surface water bodies
- E. Water percolates
- F. None of the Above

257. The other 97 percent is beneath the surface, flowing toward \_\_\_\_\_ such as streams, lakes, springs, and wetlands.

- A. Dispersal zone
- B. Points of discharge
- C. Septic systems
- D. Treatable contaminant
- E. Effluent BOD
- F. None of the Above

258. Groundwater becomes surface water at these?

- A. Fresh water
- B. Discharge points
- C. Source of pollution
- D. Dispersal media
- E. Water percolates
- F. None of the Above

259. Approximately 25 percent of households in North America utilize groundwater for consumption and other domestic uses. These same homes employ \_\_\_\_\_ as their means for wastewater treatment.

- A. Dispersal zone
- B. Ground or surface waters
- C. Septic systems
- D. Treatable contaminant
- E. Effluent BOD
- F. None of the Above

260. Which of the following terms - percolates through the soil, it is purified and in most cases requires no further treatment before being consumed.

- A. Fresh water
- B. Groundwater
- C. Source of pollution
- D. Water
- E. Water percolates
- F. None of the Above

261. However, when the soil is overloaded with a \_\_\_\_\_, or when the contaminant cannot be treated by the soil, the quality of the underlying groundwater may change significantly.

- A. Dispersal zone
- B. Ground or surface waters
- C. Septic systems
- D. Treatable contaminant
- E. Effluent BOD
- F. None of the Above

262. Which of the following terms - fails to effectively treat and disperse effluent, it can become a source of pollution. This type of failure can occur in three different ways.

- A. Septic system
- B. Groundwater
- C. Source of pollution
- D. Dispersal media
- E. Water percolates
- F. None of the Above

263. The first way is when effluent ponds on the soil surface, causing a wet seepy area. The second obvious way that \_\_\_\_\_ can fail is to have effluent backing up into the dwelling.

- A. Dispersal zone
- B. Ground or surface waters
- C. Septic system
- D. Treatable contaminant
- E. Effluent BOD
- F. None of the Above

264. \_\_\_\_\_ (with nitrogen, pathogens, bacteria, chemicals, etc.) is very difficult to clean up, since the only access to the water table is through wells, trenches, or natural discharge points such as springs?

- A. Pollution of groundwater
- B. Groundwater
- C. Source of pollution
- D. Dispersal media
- E. Water percolates
- F. None of the Above

265. An incident of \_\_\_\_\_ often becomes a problem that persists for many years.

- A. Fresh water
- B. Groundwater
- C. Source of pollution
- D. Dispersal media
- E. Groundwater pollution
- F. None of the Above

### Soil Treatment Processes

266. Which of the following terms - and dispersal zone provides for the final treatment and dispersal of septic tank effluent?

- A. Soil treatment
- B. Groundwater
- C. Source of pollution
- D. Dispersal media
- E. Water percolates
- F. None of the Above

267. To varying degrees, the soil treatment and dispersal zone treats the wastewater by acting as a filter, exchanger, or absorber by providing a surface area on which many?

- A. Dispersal zone
- B. Ground or surface waters
- C. Septic systems
- D. Treatable contaminant
- E. Chemical and biochemical processes occur
- F. None of the Above

268. The combination of these processes, acting on the \_\_\_\_\_ as it passes through the soil, and purifies the water.

- A. Effluent
- B. Groundwater
- C. Source of pollution
- D. Dispersal media
- E. Water percolates
- F. None of the Above

### Biomat

269. Which of the following terms - flows into a soil treatment trench, it moves vertically through the distribution media to the biomat where treatment begins?

- A. Aerobic bacteria
- B. Biomat
- C. Equilibrium
- D. Septic tank effluent
- E. Effluent from the system
- F. None of the Above

270. The biomat is a \_\_\_\_\_ formed by anaerobic bacteria, which secrete a sticky substance and anchor themselves to the soil, rock particles, or other available surfaces.

- A. Biomat
- B. Biological layer
- C. Septic tank
- D. Gravity-fed system
- E. Site evaluations
- F. None of the Above

271. Which of the following terms - develops first along the trench bottom, where effluent begins to pond?

- A. Aerobic bacteria
- B. Biomat
- C. Equilibrium
- D. Clustered wastewater systems
- E. Effluent from the system
- F. None of the Above

272. Flow through a \_\_\_\_\_ is considerably slower than flow through natural soil, allowing unsaturated conditions to exist in the soil beneath the soil treatment trench.

- A. Biomat
- B. Equilibrium
- C. Septic tank
- D. Gravity-fed system
- E. Site evaluations
- F. None of the Above

273. Unsaturated flow increases the travel time of effluent through the soil, ensuring that it has sufficient time to contact the surfaces of?

- A. Aerobic bacteria
- B. Biomat
- C. Soil particles and microorganisms
- D. Clustered wastewater systems
- E. Effluent from the system
- F. None of the Above

274. A properly functioning gravity-fed system will have wastewater ponded in the distribution media while the soil a few inches outside of and below the \_\_\_\_\_ will be unsaturated.

- A. Biomat
- B. Equilibrium
- C. Septic tank
- D. Gravity-fed system
- E. Distribution media
- F. None of the Above

275. Unsaturated soil has \_\_\_\_\_ containing both air and water so aerobic microorganisms living in the soil can effectively treat the wastewater as it travels through the soil system.

- A. Aerobic bacteria
- B. Biomat
- C. Pores
- D. Clustered wastewater systems
- E. Effluent from the system
- F. None of the Above

276. In unsaturated soil under a biomat, water movement is restricted. In order for the wastewater to move through the soil, it must be pulled or wicked through the fine pores by?

- A. Biomat
- B. Equilibrium
- C. Septic tank
- D. Gravity-fed system
- E. Capillary action
- F. None of the Above

### **Sewage Treatment Utilizing Soil**

277. A developed biomat reaches equilibrium over time, remaining at about the same thickness and the same \_\_\_\_\_ if effluent quality is maintained.

- A. Aerobic bacteria
- B. Biomat
- C. Equilibrium
- D. Clustered wastewater systems
- E. Permeability
- F. None of the Above

278. For this equilibrium to be maintained, the biomat and the effluent ponded within the trench must be in anaerobic conditions, the organic materials in the wastewater feed the \_\_\_\_\_, which grow and multiply, increasing the thickness and decreasing the permeability of the biomat.

- A. Biomat
- B. Equilibrium
- C. Septic tank
- D. Gravity-fed system
- E. Anaerobic microorganisms
- F. None of the Above

279. On the soil side of the biomat beneath the drainfield, oxygen is present so that conditions are allowing \_\_\_\_\_ to feed on and continuously break down the biomat.

- A. Aerobic bacteria
- B. Biomat
- C. Aerobic soil bacteria
- D. Clustered wastewater systems
- E. Effluent from the system
- F. None of the Above

280. If the quality of the effluent leaving the septic tank decreases because of failure to regularly pump out the septic tank, more food will be present for the \_\_\_\_\_, which will cause an increase in the thickness of the biomat and decrease its permeability.

- A. Biomat
- B. Equilibrium
- C. Septic tank
- D. Gravity-fed system
- E. Anaerobic bacteria
- F. None of the Above

281. If seasonally saturated conditions occur in the soil outside the trench, \_\_\_\_\_ will no longer exist, which will prevent aerobic bacteria from breaking down the biomat.

- A. Aerobic bacteria
- B. Biomat
- C. Aerobic conditions
- D. Clustered wastewater systems
- E. Effluent from the system
- F. None of the Above

282. Under these conditions the biomat will thicken, reducing its \_\_\_\_\_ and the effectiveness of effluent entering the soil.

- A. Biomat
- B. Equilibrium
- C. Septic tank
- D. Gravity-fed system
- E. Permeability
- F. None of the Above

### Site Evaluations

283. The success of any \_\_\_\_\_ depends on the appropriate match between wastewater flow/strength, the treatment system design, and the site that receives effluent from the system.

- A. Aerobic bacteria
- B. Biomat
- C. Equilibrium
- D. Soil-discharging wastewater treatment system
- E. Effluent from the system
- F. None of the Above

284. Which of the following terms - and characterization by a qualified, experienced professional is essential to understanding local site conditions and ensuring the proper operation of individual and clustered wastewater systems?

- A. Biomat
- B. Equilibrium
- C. Septic tank
- D. Gravity-fed system
- E. Site-specific observations
- F. None of the Above



### Ensure Compliance with Regulations

285. Nearly every state and most local, county, and city governments have developed written requirements governing the type of sites that can be permitted for \_\_\_\_\_ from individual and clustered wastewater systems.

- A. Aerobic bacteria
- B. Biomat
- C. Equilibrium
- D. Subsurface effluent discharges
- E. Effluent from the system
- F. None of the Above

286. Which of the following terms - include maximum slope angles acceptable for system components, appropriate soil types and depth, minimum depth-to-groundwater requirements, and mandatory setback distances?

- A. Biomat
- B. Equilibrium
- C. Septic tank
- D. Regulatory compliance parameters
- E. Site evaluations
- F. None of the Above

287. Site evaluators should be familiar with the regulatory requirements for soil-discharging individual and clustered systems and the procedures for accommodating variances to those requirements, in terms of both the legal process for \_\_\_\_\_ needed to ensure the desired treatment performance.

- A. Ponding
- B. Site-related causes
- C. Preliminary review
- D. Large-capacity septic systems
- E. Issuing variances and the system adaptations
- F. None of the Above

288. In most states, individual system regulations are \_\_\_\_\_ by the public health agency.

- A. Clustered
- B. Final treatment
- C. Underground tanks
- D. Site evaluation
- E. Soil survey data
- F. None of the Above

289. Which of the following terms - are regulated by EPA and the states through the Underground Injection Control Program of the Safe Drinking Water Act?

- A. Ponding
- B. Site-related causes
- C. Preliminary review
- D. Large-capacity septic systems
- E. Quadrangle maps
- F. None of the Above

### Assure System Performance

290. Wastewater systems depend on the soil for 1) final treatment of effluent from the tank or unit process components, and 2) dispersal of the \_\_\_\_\_ to the soil.

- A. Effluent
- B. Final treatment
- C. Underground tanks
- D. Site evaluation
- E. Soil survey data
- F. None of the Above

291. The subsurface "ponding" and slow release of effluent to the soil through the biomat facilitates treatment via chemical, physical, and biological processes such as \_\_\_\_\_, adsorption of potential pollutants, filtration of solids, and decomposition of organic constituents.

- A. Ponding
- B. Site-related causes
- C. Preliminary review
- D. Large-capacity septic systems
- E. Aerobic nitrification of ammonia
- F. None of the Above

292. Predicting the pollutant removal and overall treatment efficacy of the soil component of the system requires a fairly comprehensive understanding of how these processes work, how they are enhanced or impeded, and how the \_\_\_\_\_ in the treatment train can be adjusted or adapted to ensure that the soil can handle the flow and pollutant load delivered.

- A. Upstream processes
- B. Final treatment
- C. Underground tanks
- D. Site evaluation
- E. Soil survey data
- F. None of the Above

**Protect Public Health and Water Resources**

293. Individual and clustered wastewater systems can \_\_\_\_\_ due to soil or site-related causes.

- A. Pond
- B. Site-related causes
- C. Malfunction
- D. Large-capacity septic systems
- E. Quadrangle maps
- F. None of the Above

294. The site evaluation procedures summarized below are designed to identify site characteristics that might contribute to elevated health or environmental risks to ensure that they can be addressed in the selection, configuration, sizing, or operation of the?

- A. Cluster
- B. Treatment system
- C. Underground tanks
- D. Site evaluation
- E. Soil survey data
- F. None of the Above

295. The preliminary review is performed prior to any fieldwork. It is based on information available from the owner and local agencies and on?

- A. Ponding
- B. Site-related causes
- C. Preliminary review
- D. Large-capacity septic systems
- E. Quadrangle maps
- F. None of the Above

296. The objectives of the preliminary review are to identify potential \_\_\_\_\_, identify potential treatment system design boundaries, assess the ability of the soil to provide final treatment, and develop a conceptual plan for supplying the level of treatment required prior to soil discharge.

- A. Effluent infiltration sites
- B. Final treatment
- C. Underground tanks
- D. Site evaluation
- E. Soil survey data
- F. None of the Above

297. Preliminary screening of \_\_\_\_\_ is an important aspect of the site evaluator's role.

- A. Ponds
- B. Site-related causes
- C. Preliminary review
- D. Large-capacity septic systems
- E. Quadrangle maps
- F. None of the Above

298. More than one receiving environment might be feasible and available for use. In addition, the desktop review might suggest that treatment be provided via \_\_\_\_\_, rather than individual, facilities.

- A. Clustered
- B. Final treatment
- C. Underground tanks
- D. Site evaluation
- E. Soil survey data
- F. None of the Above

299. Focusing the effort on the most promising receiving environment and the most efficient and effective treatment works allows the evaluator to reasonably and methodically eliminate the least suitable sites early in the?

- A. Ponding
- B. Site-related causes
- C. Preliminary review
- D. Large-capacity septic systems
- E. Site evaluation process
- F. None of the Above

300. Basic knowledge of the local climate might eliminate evaporation or \_\_\_\_\_ as a potential receiving environment immediately.

- A. Evapotranspiration
- B. Final treatment
- C. Underground tanks
- D. Site evaluation
- E. Soil survey data
- F. None of the Above

301. Quadrangle maps provide general \_\_\_\_\_ about a site and surrounding landscape.

- A. Topographic information
- B. Site-related causes
- C. Preliminary review
- D. Large-capacity septic systems
- E. Quadrangle maps
- F. None of the Above

302. The maps provide information related to land use, public improvements, \_\_\_\_\_, landscape position and slope, vegetated areas, wetlands, surface drainage patterns, and watersheds.

- A. USGS benchmarks
- B. Final treatment
- C. Underground tanks
- D. Site evaluation
- E. Soil survey data
- F. None of the Above

303. Aerial photographs are available from several popular online mapping sites, many of which are free. \_\_\_\_\_ varies across the nation. Some rural areas do not have fine resolution coverage.

- A. An ideal soil profile
- B. Visual assessment
- C. Septic system complaints
- D. Pan evaporation rates
- E. Aerial photographs
- F. None of the Above

304. Also, the applicable local codes often prohibit direct or indirect discharges to surface waters (i.e., requiring an \_\_\_\_\_) from small systems.

- A. Pond
- B. NPDES permit
- C. Preliminary review
- D. Large-capacity septic systems
- E. Quadrangle maps
- F. None of the Above

305. Property information should include owner contact information, site legal description or address, plat map or boundary survey, description of \_\_\_\_\_ (e.g., existing onsite wastewater systems, underground tanks, utility lines).

- A. Existing site improvements
- B. Final treatment
- C. Underground tanks
- D. Site evaluation
- E. Soil survey data
- F. None of the Above

306. Which of the following terms - provide soil profile descriptions, identify soil limitations, estimate saturated soil conductivities and permeability values?

- A. Ponding
- B. Site-related causes
- C. Preliminary review
- D. Detailed soil surveys
- E. Quadrangle maps
- F. None of the Above

307. Soil survey data should be supplemented with \_\_\_\_\_ at the site. The NRCS publication Field Book for Describing and Sampling Soils is an excellent manual for use in site evaluation.

- A. Detailed soil sampling
- B. Final treatment
- C. Underground tanks
- D. Site evaluation
- E. Soil survey data
- F. None of the Above

308. If available, \_\_\_\_\_ can provide information regarding past and existing land use, drainage and vegetation patterns, surface water resources, and approximate location of property boundaries?

- A. Technology performance
- B. Evapotranspiration systems
- C. Aerial photographs
- D. Groundwater aquifers and depths
- E. Movement of pollutants
- F. None of the Above

309. Which of the following terms - may be available from a variety of other sources, such as county or regional planning offices, property valuation, and agricultural agencies?

- A. An ideal soil profile
- B. Visual assessment
- C. Septic system complaints
- D. Pan evaporation rates
- E. Aerial photographs
- F. None of the Above

310. Geology and basin maps are especially useful for providing general information regarding bedrock formations and depths, groundwater aquifers and depths, flow direction and velocities, ambient water quality, surface water quality, stream flow, and?

- A. Seasonal fluctuations
- B. Evapotranspiration systems
- C. Effluent treatment
- D. Groundwater aquifers and depths
- E. Movement of pollutants
- F. None of the Above

311. Interviews with agency permitting, planning, and field staff can often provide valuable information on regional, local, and even site-specific conditions, such as water quality data, septic system complaints, and future plans for provision of?

- A. An ideal soil profile
- B. Visual assessment
- C. Septic system complaints
- D. Pan evaporation rates
- E. Clustered or centralized treatment services
- F. None of the Above

312. Local installers and service providers can provide information on other sites in the vicinity, existing technology performance, and general knowledge of soils and other factors that inform both the site evaluation and the selection of?

- A. Technology performance
- B. Evapotranspiration systems
- C. Effluent treatment
- D. Groundwater aquifers and depths
- E. Appropriate treatment system components
- F. None of the Above

313. Which of the following terms -, such as temperature, precipitation, and pan evaporation rates can be obtained from the National Oceanic and Atmospheric Administration?

- A. An ideal soil profile
- B. Visual assessment
- C. Septic system complaints
- D. Climate data
- E. Aerial photographs
- F. None of the Above

314. Which of the following terms - must realize, however, that the data from the nearest weather station might not accurately represent the climate at the site being evaluated.

- A. Technology performance
- B. Evapotranspiration systems
- C. Effluent treatment
- D. Groundwater aquifers and depths
- E. Movement of pollutants
- F. None of the Above

315. After the visual assessment of surface conditions are assessed, the site evaluation proceeds to an investigation of subsurface conditions, especially?

- A. An ideal soil profile
- B. Visual assessment
- C. Septic system complaints
- D. Pan evaporation rates
- E. Soil conditions and groundwater characteristics
- F. None of the Above

316. Soils are one of the most important factors to consider during the field investigation, because soil-discharging systems depend on the \_\_\_\_\_ for a significant portion of effluent treatment.

- A. Technology performance
- B. Evapotranspiration systems
- C. Effluent treatment
- D. Groundwater aquifers and depths
- E. Soil matrix
- F. None of the Above

317. Which of the following terms - will affect the type of treatment system selected, the design loading rate, and the size of the dispersal field?

- A. An ideal soil profile
- B. Visual assessment
- C. Septic system complaints
- D. Soil properties
- E. Aerial photographs
- F. None of the Above

318. Groundwater proximity and movement is also important in considering effluent residence time in unsaturated soil and the movement of pollutants that enter the?

- A. Technology performance
- B. Water table
- C. Effluent treatment
- D. Groundwater aquifers and depths
- E. Movement of pollutants
- F. None of the Above

### **Field Investigation Parameters**

#### **Soil Profile**

319. A soil profile evaluation typically includes an analysis of soil texture, color, structure, consistence, and layers within the area of the?

- A. An ideal soil profile
- B. Visual assessment
- C. Septic system complaints
- D. Proposed dispersal field
- E. Movement of pollutants
- F. None of the Above

320. Soil borings and pits are used to assess \_\_\_\_\_ and identify any limiting or restrictive conditions such as rock layers, poor drainage, high water table, or saturated conditions.

- A. Technology performance
- B. Soil properties
- C. Effluent treatment
- D. Groundwater aquifers and depths
- E. Movement of pollutants
- F. None of the Above

321. An ideal soil profile for a \_\_\_\_\_ is at least four feet of well-drained, aerated soil above any limiting conditions such as bedrock, hardpan, or a water table.

- A. An ideal soil profile
- B. Visual assessment
- C. Septic system complaints
- D. Proximity and movement
- E. Dispersal field
- F. None of the Above

322. When soil limitations exist, adjustments to the upstream treatment train may be needed to reduce biochemical oxygen demand, \_\_\_\_\_, bacteria levels, nutrients, or other pollutants.

- A. Technology performance
- B. Evapotranspiration systems
- C. Effluent treatment
- D. Total suspended solids
- E. Movement of pollutants
- F. None of the Above

323. Adjustments could involve reducing \_\_\_\_\_ at the source applying the effluent at lower soil loading rates, or inserting a fixed film or suspended growth treatment unit between the septic tank and drainfield.

- A. Pollutant inputs
- B. Higher levels of treatment
- C. A percolation test
- D. Clustered wastewater treatment
- E. Various empirical formulae
- F. None of the Above

324. Rules differ among states regarding the depth and number of \_\_\_\_\_ required for each proposed drainfield site.

- A. Site evaluation
- B. Percolation test
- C. Design requirements
- D. Observation test holes
- E. Suspended growth advanced treatment systems
- F. None of the Above

### Sampling Soils

325. Percolation Tests. Local health departments have long used percolation or “perc” tests, to determine the loading rate and size of the \_\_\_\_\_, despite some significant shortcomings.

- A. Conventional treatment systems
- B. Higher levels of treatment
- C. A percolation test
- D. Soil dispersal area
- E. Various empirical formulae
- F. None of the Above

326. A percolation test consists of digging one or more holes in the soil of the proposed dispersal field to a specified depth, \_\_\_\_\_, then completing the test by filling the holes to a specific level.

- A. Site evaluation
- B. Percolation test
- C. Design requirements
- D. Unsaturated soil conditions
- E. Suspended growth advanced treatment systems
- F. None of the Above

327. Which of the following terms - for determining the required size of a drainfield based on the size of facility, the percolation test results, and other parameters.

- A. Conventional treatment systems
- B. Higher levels of treatment
- C. A percolation test
- D. Clustered wastewater treatment
- E. Various empirical formulae
- F. None of the Above

328. Maryland and a number of other states also require the use of \_\_\_\_\_ and site evaluations for repairs to existing septic systems that are malfunctioning.

- A. Site evaluation
- B. Percolation test
- C. Design requirements
- D. Unsaturated soil conditions
- E. Suspended growth advanced treatment systems
- F. None of the Above

329. Which of the following terms -, however, has limitations. The test does not reveal limiting conditions in the soil profile and can provide false readings during dry conditions, leading to an inappropriately high loading rate.

- A. Conventional treatment systems
- B. Higher levels of treatment
- C. A percolation test
- D. Clustered wastewater treatment
- E. Various empirical formulae
- F. None of the Above

330. States and communities once relied solely on these tests to determine?

- A. Site evaluation
- B. Percolation test
- C. Design requirements
- D. Unsaturated soil conditions
- E. Effluent application rates
- F. None of the Above

### **Site Limitations and Special Considerations**

331. In some cases, soil profile or other limitations create challenges for?

- A. Conventional treatment systems
- B. Higher levels of treatment
- C. A percolation test
- D. Individual and clustered wastewater treatment
- E. Various empirical formulae
- F. None of the Above

332. Most of these limitations are natural or induced restrictions to soil water and air movement, which limit the depth and duration of unsaturated soil conditions. Identifying these limiting conditions is a critical step in the?

- A. Site evaluation process
- B. Percolation test
- C. Design requirements
- D. Unsaturated soil conditions
- E. Suspended growth advanced treatment systems
- F. None of the Above

333. If a site does not demonstrate acceptable \_\_\_\_\_ or has other limiting factors that preclude the use of conventional treatment systems, some states and communities will allow the landowner to consult with an engineer to design an alternative or advanced system that can overcome a site's restrictive soil and site limitations.

- A. Conventional treatment systems
- B. Higher levels of treatment
- C. A percolation test
- D. Permeability
- E. Various empirical formulae
- F. None of the Above

### **Fixed Film and Suspended Growth Advanced Treatment Systems**

334. Fixed film and suspended growth advanced treatment systems provide an effluent of higher quality than?

- A. Site evaluation
- B. Percolation test
- C. Design requirements
- D. Unsaturated soil conditions
- E. Conventional septic tank discharges
- F. None of the Above

335. Which of the following terms - allow marginal soils to more easily absorb and treat wastewater?

- A. Conventional treatment systems
- B. Higher levels of treatment
- C. A percolation test
- D. Clustered wastewater treatment
- E. Various empirical formulae
- F. None of the Above

336. These systems require more attention to design requirements, \_\_\_\_\_, and construction detail.

- A. Site evaluation
- B. Material selection
- C. Design requirements
- D. Unsaturated soil conditions
- E. Suspended growth advanced treatment systems
- F. None of the Above

337. The site evaluator needs to understand and analyze all of these \_\_\_\_\_ when recommending an alternative or advanced treatment system.

- A. Conventional treatment systems
- B. Higher levels of treatment
- C. Critical factors
- D. Clustered wastewater treatment
- E. Various empirical formulae
- F. None of the Above

338. Several additional site evaluation factors may also need to be considered when planning large \_\_\_\_\_ or clustered facilities.

- A. Septage
- B. Wastewater treatment systems
- C. Anaerobic bacteria
- D. Other hydrogeologic conditions
- E. Municipal wastewater
- F. None of the Above

339. EPA defines a \_\_\_\_\_ as a system that has the capacity to serve 20 or more people per day.

- A. Systems
- B. Soil absorption systems
- C. Large capacity septic system
- D. Clustered wastewater systems
- E. Sewage treatment site
- F. None of the Above

340. Clustered wastewater systems, as discussed in the \_\_\_\_\_, can serve a small to large number of connections.

- A. Systems
- B. Soil absorption systems
- C. Methodologies
- D. Clustered wastewater systems
- E. Sewage treatment site
- F. None of the Above

341. Smaller cluster systems serving a few structures can be gravity flow facilities that resemble individual systems, while larger cluster systems serving hundreds of structures are often highly mechanized with extensive collection piping, and tend to resemble \_\_\_\_\_.

- A. Septage
- B. Centralized systems
- C. Anaerobic bacteria
- D. Other hydrogeologic conditions
- E. Municipal wastewater
- F. None of the Above

342. Regular, permanent operation and maintenance of these \_\_\_\_\_ is required by regulatory authorities.

- A. Systems
- B. Soil absorption systems
- C. Methodologies
- D. Clustered wastewater systems
- E. Sewage treatment site
- F. None of the Above

343. As with conventional systems, sites proposed for soil-discharging cluster systems must be evaluated for \_\_\_\_\_, shallow aquifers, land slope, soil texture, and permeability.

- A. Septage
- B. Water table elevations
- C. Anaerobic bacteria
- D. Other hydrogeologic conditions
- E. Municipal wastewater
- F. None of the Above

344. For example, road and sewer development needs to be coordinated with system siting and construction. The location of the \_\_\_\_\_ needs to fit with the overall physical plan of the development.

- A. Systems
- B. Soil absorption systems
- C. Methodologies
- D. Clustered wastewater systems
- E. Sewage treatment site
- F. None of the Above



345. Areas reserved for future development need to be clearly identified, and the proposed \_\_\_\_\_ needs to fit with existing plans for open space and buffers around a development.

- A. Septage
- B. Wastewater treatment
- C. Anaerobic bacteria
- D. Other hydrogeologic conditions
- E. Municipal wastewater
- F. None of the Above

### Soil Absorption Systems

346. In large cluster or \_\_\_\_\_ where increased quantities of wastewater will be dispersed, other factors must also be evaluated, such as the potential for groundwater mounding.

- A. Systems
- B. Soil absorption systems
- C. Methodologies
- D. Clustered wastewater systems
- E. Sewage treatment site
- F. None of the Above

347. These systems may experience \_\_\_\_\_ under the drainfield due to the large wastewater contribution, restrictive soil layers, and other hydrogeologic conditions.

- A. Septage
- B. Artificial groundwater mounding
- C. Anaerobic bacteria
- D. Other hydrogeologic conditions
- E. Municipal wastewater
- F. None of the Above

348. Methodologies to \_\_\_\_\_ and system design influences on the potential for groundwater mounding and lateral spreading can also be found in Guidance for Evaluation of Potential Groundwater Mounding Associated with Cluster and High-Density Wastewater Soil Absorption Systems.

- A. Systems
- B. Soil absorption systems
- C. Evaluate site conditions
- D. Clustered wastewater systems
- E. Sewage treatment site
- F. None of the Above

### Site Evaluator Qualifications

349. Conducting a \_\_\_\_\_ requires trained professionals. Training and certification requirements, however, differ from state to state.

- A. Septage
- B. Site evaluation
- C. Anaerobic bacteria
- D. Other hydrogeologic conditions
- E. Municipal wastewater
- F. None of the Above

### Residuals (Septage) Section

350. Which of the following terms - is commonly used to describe the liquids and solids that are pumped from a septic tank, port-a-potty, cesspool, or other locality?

- A. System
- B. Soil absorption systems
- C. Septage
- D. Clustered wastewater systems
- E. Sewage treatment site
- F. None of the Above

351. EPA regulates the management of \_\_\_\_\_ to ensure that this material is treated, used, and/or disposed of in an environmentally sound manner.

- A. Septage
- B. Site evaluation
- C. Anaerobic bacteria
- D. Other hydrogeologic conditions
- E. Municipal wastewater
- F. None of the Above

352. Which of the following terms - flows into the tank where the solids separate from the liquid?

- A. Systems
- B. Soil absorption systems
- C. Methodologies
- D. Untreated household waste
- E. Sewage
- F. None of the Above

353. Light solids, such as soap suds and fat, float to the top and form a scum layer. The liquid waste goes into the drainfield, while the heavier solids settle to the bottom of the tank where the \_\_\_\_\_ is partially decomposed by.

- A. Septage
- B. Organic matter
- C. Anaerobic bacteria
- D. Other hydrogeologic conditions
- E. Municipal wastewater
- F. None of the Above

354. Some \_\_\_\_\_ remain, forming a sludge layer that eventually must be pumped out.

- A. Systems
- B. Soil absorption systems
- C. Non-decomposed solids
- D. Clustered wastewater systems
- E. Sewage treatment site
- F. None of the Above

355. Because it is concentrated, the strength of septage is generally fifty to several hundred times greater than?

- A. Septage
- B. Site evaluation
- C. Anaerobic bacteria
- D. Other hydrogeologic conditions
- E. Municipal wastewater
- F. None of the Above

356. The physical characteristics of \_\_\_\_\_ vary depending upon the septic tank size, design, and pumping frequency; user habits; climatic conditions; water supply characteristics, and the use of garbage disposals, household chemicals, and water softeners.

- A. Systems
- B. Soil absorption systems
- C. Septage
- D. Clustered wastewater systems
- E. Sewage treatment site
- F. None of the Above

357. It is important that samples of \_\_\_\_\_ be collected and tested to determine local characteristics, since they can affect the proper management of these materials.

- A. Septage
- B. Site evaluation
- C. Anaerobic bacteria
- D. Other hydrogeologic conditions
- E. Municipal wastewater
- F. None of the Above

**In its Septage Treatment and Disposal Fact Sheet (EPA 832-F-99-068; September, 1999), EPA describes septage as:**

358. The liquids and solids pumped from a septic tank or cesspool have an offensive odor and appearance, a tendency to foam upon agitation, and \_\_\_\_\_.

- A. Volume of residuals
- B. Advanced treatment units
- C. Minimum requirements
- D. Disposal of sewage sludge
- E. A resistance to settling and dewatering
- F. None of the Above

359. Which of the following terms - is also a host for many disease-causing viruses, bacteria, and parasites?

- A. Septage
- B. Nitrogen
- C. Application
- D. Domestic septage
- E. Non-domestic sewage
- F. None of the Above

360. The volume of residuals generated by a \_\_\_\_\_ will vary based on the treatment method.

- A. Volume of residuals
- B. Advanced treatment units
- C. Minimum requirements
- D. Disposal of sewage sludge
- E. Wastewater system
- F. None of the Above

361. Some advanced treatment units, such as \_\_\_\_\_, can significantly increase the volume of residuals generated. In contrast, filtration technologies are often used to minimize the generation of residuals.

- A. Septage
- B. Nitrogen
- C. Application
- D. Domestic septage
- E. Activated sludge-based aerobic treatment unit (ATU) systems
- F. None of the Above

362. Which of the following terms - will significantly increase the volume of residuals generated?

- A. Volume of residuals
- B. Advanced treatment units
- C. Minimum requirements
- D. Disposal of sewage sludge
- E. Septage
- F. None of the Above

363. The method of residuals processing may also require some additional evaluation of \_\_\_\_\_ characteristics.

- A. Septage
- B. Nitrogen
- C. Application
- D. Domestic septage
- E. Non-domestic sewage
- F. None of the Above

### **Federal Septage Rules**

364. 40 CFR part 503 regulates \_\_\_\_\_ as a part of the requirements controlling the use and disposal of sewage sludge.

- A. Volume of residuals
- B. Domestic septage
- C. Minimum requirements
- D. Disposal of sewage sludge
- E. Septage
- F. None of the Above

365. The rule defines “\_\_\_\_\_” as liquid and solid material removed from a septic tank, cesspool, portable toilet.

- A. Septage
- B. Nitrogen
- C. Application
- D. Domestic septage
- E. Non-domestic sewage
- F. None of the Above

366. The 503 regulation includes minimum requirements for land application of \_\_\_\_\_ applied to non-public contact sites such as agricultural fields, forestland, and mine reclamation areas.

- A. Volume of residuals
- B. Advanced treatment units
- C. Minimum requirements
- D. Disposal of sewage sludge
- E. Domestic septage
- F. None of the Above

367. 40 CFR Part 257 governs the management of grease trap wastes and other types of residuals resulting from the treatment of \_\_\_\_\_ by individual and clustered commercial and industrial treatment systems.

- A. Septage
- B. Nitrogen
- C. Application
- D. Domestic septage
- E. Non-domestic sewage
- F. None of the Above

368. 40 CFR Part 258 governs the \_\_\_\_\_, sewage sludge, and other residuals into municipal solid waste landfills.

- A. Volume of residuals
- B. Advanced treatment units
- C. Minimum requirements
- D. Disposal of sewage sludge
- E. Disposal of septage
- F. None of the Above

**The Federal 503 Rule**

369. Most states build upon the federal 40 CFR part 503 regulation as the minimum requirements for managing \_\_\_\_\_, although states may and often do impose more stringent requirements.

- A. Septage
- B. Nitrogen
- C. Application
- D. Domestic septage
- E. Non-domestic sewage
- F. None of the Above

**Disposal Options**

370. Which of the following terms - can be processed through land application, at wastewater treatment plants, or at processing facilities specifically designed to treat septage. The following section describes these alternatives:

- A. Volume of residuals
- B. Advanced treatment units
- C. Minimum requirements
- D. Disposal of sewage sludge
- E. Septage
- F. None of the Above

**Land Application**

371. Which of the following terms - contains nutrients that can condition the soil and decrease reliance on chemical fertilizers for agriculture production?

- A. Septage
- B. Nitrogen
- C. Application
- D. Domestic septage
- E. Non-domestic sewage
- F. None of the Above

372. Adjusting \_\_\_\_\_ pH can also reduce or eliminate odors and disease-causing organisms before land application.

- A. Volume of residuals
- B. Advanced treatment units
- C. Minimum requirements
- D. Disposal of sewage sludge
- E. Septage
- F. None of the Above

**Subsurface Application**

373. Subsurface application, or surface application with subsequent incorporation, are the preferred methods for land application of \_\_\_\_\_ since they minimize odors, reduce vector attraction, minimize ammonia volatilization losses.

- A. Septage
- B. Nitrogen
- C. Application
- D. Domestic septage
- E. Non-domestic sewage
- F. None of the Above

374. State regulations for land application of \_\_\_\_\_ often require pre-approval from the regulating agency through permits and/or licenses, soil tests, and site management plans.

- A. Volume of residuals
- B. Advanced treatment units
- C. Minimum requirements
- D. Disposal of sewage sludge
- E. Septage
- F. None of the Above

375. A storage or transfer tank may be needed when land application sites are inaccessible due to weather conditions or if pre-application treatment of the \_\_\_\_\_ is required.

- A. Septage
- B. Nitrogen
- C. Application
- D. Domestic septage
- E. Non-domestic sewage
- F. None of the Above

**Pretreatment**

376. Pretreatment, such as screening and \_\_\_\_\_, may also be necessary prior to discharge into a tank or lagoon.

- A. Volume of residuals
- B. Grit removal
- C. Minimum requirements
- D. Disposal of sewage sludge
- E. Septage
- F. None of the Above

377. Which of the following terms - and stabilization can reduce minimize odors?

- A. Pretreatment
- B. Liquid
- C. Stabilization lagoons
- D. Surface disposal of septage
- E. Septage
- F. None of the Above

378. Which of the following terms - stabilization options include aerobic digestion, anaerobic digestion, and composting.

- A. Septage
- B. Disposal of septage
- C. Wastewater treatment plant(s)
- D. Soil absorption system(s)
- E. Capacity of the plant
- F. None of the Above

379. Relative to \_\_\_\_\_, these options have higher operating costs and require more skilled operating personnel.

- A. Pretreatment
- B. Liquid
- C. Stabilization lagoons
- D. Surface disposal of septage
- E. Alkaline stabilization
- F. None of the Above

380. A number of states require \_\_\_\_\_ be stabilized before it is applied to the land.

- A. Septage
- B. Disposal of septage
- C. Wastewater treatment plant(s)
- D. Soil absorption system(s)
- E. Capacity of the plant
- F. None of the Above

381. Surface disposal of septage is another alternative outlined under the federal rules, this includes disposal in holding lagoons, trenches, and \_\_\_\_\_. Some states, however, have more restrictive rules concerning burial.

- A. Pretreatment
- B. Sanitary landfills
- C. Stabilization lagoons
- D. Surface disposal of septage
- E. Septage
- F. None of the Above

**Publicly owned treatment works (POTWs)**

382. Septage can also be handled and processed at wastewater treatment plants. This process usually employs a septage receiving station, which pretreats the \_\_\_\_\_ by screening and other unit processes.

- A. Septage
- B. Disposal of septage
- C. Wastewater treatment plant(s)
- D. Soil absorption system(s)
- E. Capacity of the plant
- F. None of the Above

383. Some of these facilities separate the \_\_\_\_\_ from the solids, which are then processed by the POTW.

- A. Pretreatment
- B. Liquid
- C. Stabilization lagoons
- D. Surface disposal of septage
- E. Septage
- F. None of the Above

384. The allowable amount of \_\_\_\_\_ handled by a POTW is a function of the type and size of the treatment plant, capacity of the plant, and characteristics of the septage.

- A. Septage
- B. Disposal of septage
- C. Wastewater treatment plant(s)
- D. Soil absorption system(s)
- E. Capacity of the plant
- F. None of the Above

385. Smaller POTWs must be cognizant of how the higher-strength septage will affect overall wastewater organic loads and should control the feed rate. \_\_\_\_\_ may be required to prevent problems in the treatment system.

- A. Pretreatment
- B. Liquid
- C. Stabilization lagoons
- D. Surface disposal of septage
- E. Septage
- F. None of the Above

### **Independent Septage Treatment Facility (ISTF)**

386. When suitable land is unavailable and wastewater treatment facilities are too distant or do not have adequate capacity, independent \_\_\_\_\_ may be an option.

- A. Septage treatment plant(s)
- B. Disposal of septage
- C. Wastewater treatment plant(s)
- D. Soil absorption system(s)
- E. Capacity of the plant
- F. None of the Above

387. ISTFs vary from \_\_\_\_\_ to treatment plants that use aerobic digestion, anaerobic digestion, composting, and other biological and chemical treatment processes.

- A. Pretreatment
- B. Liquid
- C. Stabilization lagoons
- D. Surface disposal of septage
- E. Septage
- F. None of the Above

### **Management Considerations**

388. The safe, practical, and acceptable practices for the use or \_\_\_\_\_ should be a key goal of any wastewater management program.

- A. Septage treatment plant(s)
- B. Disposal of septage
- C. Wastewater treatment plant(s)
- D. Soil absorption system(s)
- E. Capacity of the plant
- F. None of the Above

389. Which of the following terms - must be developed within the context of state, local, and federal rules and the nature of residuals produced.

- A. Pretreatment
- B. Septage management plans
- C. Stabilization lagoons
- D. Surface disposal of septage
- E. Septage
- F. None of the Above

### **Operation and Maintenance**

390. The need to pump \_\_\_\_\_ from small wastewater systems cannot be overstated.

- A. Septage treatment plant(s)
- B. Septage
- C. Wastewater treatment plant(s)
- D. Soil absorption system(s)
- E. Capacity of the plant
- F. None of the Above

391. Some communities, however, have strengthened their \_\_\_\_\_ by conducting periodic inspections of individual treatment systems and maintaining pumping records to better monitor when pumping is needed.

- A. Pretreatment
- B. Wastewater programs
- C. Stabilization lagoons
- D. Surface disposal of septage
- E. Septage
- F. None of the Above

392. In these communities, the \_\_\_\_\_ is required to have his or her tank pumped by a locally approved hauler within a given time period and provide documentation.

- A. Septage treatment plant(s)
- B. System owner
- C. Wastewater treatment plant(s)
- D. Soil absorption system(s)
- E. Capacity of the plant
- F. None of the Above

393. The management program goal should be to pump, transport, treat, and use or dispose of the \_\_\_\_\_ in a manner that has the least impact on the system owners, the community, and the environment.

- A. Pretreatment
- B. Residuals
- C. Stabilization lagoons
- D. Surface disposal of septage
- E. Septage
- F. None of the Above

### **Training, Certification, and Licensing**

394. The National Association of Wastewater Transporters conducts a comprehensive training and certification program for?

- A. Proper septage management
- B. Pumpers and haulers
- C. O&M requirements
- D. Wastewater management programs
- E. Proper handling and disposal of septage.
- F. None of the Above

395. Several states have also established training centers to promote proper?

- A. Proper septage management
- B. Pumpers and haulers
- C. O&M requirements
- D. Wastewater management programs
- E. Proper handling and disposal of septage.
- F. None of the Above

396. Several management programs also provide system owners with access to a list of certified service providers to promote?

- A. Proper septage management
- B. Pumpers and haulers
- C. O&M requirements
- D. Wastewater management programs
- E. Proper handling and disposal of septage.
- F. None of the Above

### **State and Local Examples**

397. Septage operators in \_\_\_\_\_ are required to pass an exam to be certified. Two levels of certification are available for septage servicing and land application.

- A. Proper septage management
- B. Pumpers and haulers
- C. O&M requirements
- D. Wastewater management programs
- E. Proper handling and disposal of septage.
- F. None of the Above

398. State rules require continuing education credits to maintain?

- A. Proper septage management
- B. Pumpers and haulers
- C. O&M requirements
- D. Wastewater management programs
- E. Proper handling and disposal of septage.
- F. None of the Above

**Public Education**

399. Wastewater management programs require that community residents be informed about pumping and?

- A. Proper septage management
- B. Proper disposal of septage
- C. O&M requirements
- D. Wastewater management programs
- E. Proper handling and disposal of septage.
- F. None of the Above

400. Programs must reinforce \_\_\_\_\_ and proper septage handling and disposal procedures, especially targeting the pumpers and haulers.

- A. Proper septage management
- B. Pumpers and haulers
- C. O&M requirements
- D. Wastewater management programs
- E. Proper handling and disposal of septage.
- F. None of the Above

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