Registration Form

Onsite 202 - 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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Home (____) _____ **Work (____)** _____

Operator ID #_____**Exp. Date**_____

Class/Grade_____

Please circle/check which certification you are applying the course CEU's.
Wastewater Collection____ Wastewater Treatment____ Onsite Installer ____

Other _____ Oregon CCB ($50 additional fee) _____

Technical Learning College TLC PO Box 3060, Chino Valley, AZ 86323
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State Approval Listing Link, check to see if your State accepts or has pre-approved this course. Not all States are listed. Not all courses are listed. If the course is not accepted for CEU credit, we will give you the course free if you ask your State to accept it for credit.

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You can obtain a printed version of the course manual from TLC for an additional $1299.95 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.

For security purposes, please fax or e-mail a copy of your driver's license and always call us to confirm we've received your assignment and to confirm your identity.

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Onsite 202 Answer Key

Name _____ Phone_____

Did you check with your State agency to ensure this course is accepted for credit? No refunds.
Method of Course acceptance confirmation. Please fill this section

Website __ Telephone Call___ Email____ Spoke to_____

Did you receive the approval number, if applicable? _____

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You are responsible to ensure that TLC receives the Assignment and Registration Key. Please call us to ensure that we received it.

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

Please Circle, Bold, Underline or X, one answer per question. A **felt tipped pen** works best.

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336. A B C D	353. A B C D	370. A B C D	387. A B C D
337. A B C D	354. A B	371. A B C D	388. A B C D
338. A B C D	355. A B	372. A B C D	389. A B C D
339. A B C D	356. A B	373. A B C D	390. A B C D
340. A B C D	357. A B	374. A B C D	391. A B C D
341. A B C D	358. A B	375. A B C D	392. A B C D
342. A B C D	359. A B	376. A B C D	393. A B C D
343. A B	360. A B	377. A B C D	394. A B C D
344. A B	361. A B	378. A B C D	395. A B C D
345. A B	362. A B	379. A B C D	396. A B C D
346. A B C D	363. A B C D	380. A B C D	397. A B C D
347. A B C D	364. A B C D	381. A B C D	398. A B C D
348. A B C D	365. A B C D	382. A B C D	399. A B C D
349. A B C D	366. A B C D	383. A B C D	400. A B C D

I understand that I am 100 percent responsible to ensure that TLC receives the Assignment and Registration Key and that it is accepted for credit by my State or Providence. I understand that TLC has a zero tolerance towards not following their rules, cheating or hostility towards staff or instructors. I need to complete the entire assignment for credit. There is no credit for partial assignment completion. My exam was proctored. I will contact TLC if I do not hear back from them within 2 days of assignment submission. I will forfeit my purchase costs and will not receive credit or a refund if I do not abide with TLC's rules.

Please Sign that you understand and will abide with TLC's Rules.

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Signature

Please write down any questions you were not able to find the answers or that have errors.

Please e-mail or fax this survey along with your final exam

ONSITE 202 CEU TRAINING COURSE
CUSTOMER SERVICE RESPONSE CARD

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This course contains general EPA's CWA federal rule requirements. Please be aware that each state implements septic / wastewater / safety / environmental / building regulations that may be more stringent than EPA's regulations. Check with your state environmental/health agency for more information. These rules change frequently and are often difficult to interpret and follow. Be careful to not be in non-compliance and do not follow this course for proper compliance.

Please fax the answer key to TLC Western Campus
Fax (928) 272-0747.
Always call us to confirm we received the paperwork.

Rush Grading Service

If you need this assignment graded and the results mailed to you within a 48-hour period, prepare to pay an additional rush service handling fee of $50.00. This fee may not cover postage costs. If you need this service, simply write RUSH on the top of your Registration Form. We will place you in the front of the grading and processing line. *Thank you…*

Onsite 202 CEU Training Assignment

You will have 90 days from the start of this assignment to finish it. Only one answer per question. Please utilize the Answer Key. Please fax or e-mail your completed answer key and registration form to TLC.

You are expected to circle or mark the correct answer on the enclosed answer key. Please include your name and address on your exam. The answer key is in the front. There are no intentional trick questions. (s) means the answer may be plural or singular in nature.

You can e-mail or fax your Answer Key along with the Registration Form to TLC.

Please write down any questions you were not able to find the answers or that have errors.

Basic Wastewater Treatment Processes

1. In wastewater treatment, particles with which of the following terms, float to the top of water and can be removed?

A. Inorganic material C. Entrapped air
B. Activated Sludge D. None of the Above

Biological

2. Which of the following wastewater terms means a suspended growth process for removing organic matter from sewage by saturating it with air and microorganisms that can break down the organic matter?

A. Biosolid(s) C. Activated Sludge
B. Organic material D. None of the Above

3. Masses of microorganisms grow and rapidly metabolized organic pollutants because of the addition of which term to wastewater?

A. MLVSS C. Oxygen
B. Carbon dioxide D. None of the Above

Organic Matter

4. One of the measurements used to assess overall wastewater strength, the amount of oxygen organisms needed to break down wastes in wastewater is referred to as?

A. BOD C. COD
B. MLSS D. None of the Above

5. Some organic compounds are more stable than others are and cannot be quickly broken down by organisms; this is true of _____ developed for agriculture and industry.

A. Most inorganic substances C. Organic material(s)
B. Many synthetic organic compounds D. None of the Above

6. Two toxic _____ like benzene and toluene are found in some solvents, pesticides, and other products.

A. Nutrients from wastewater C. Organic compounds
B. Inorganic materials D. None of the Above

(s) means the answer may be plural or singular in nature.

Oil and Grease

7. Which of the following wastewater terms also adds to the septic tank scum layer, causing more frequent tank pumping to be required?

A. Nutrients from wastewater
B. Inorganic materials
C. Excessive grease
D. None of the Above

8. Which of the following wastewater terms used for motors and industry are considered hazardous waste and should be collected and disposed of separately from wastewater?

A. Nitrogen and phosphorus
B. Inorganic substances
C. Petroleum-based waste oil(s)
D. None of the Above

9. When large amounts of oils and greases are discharged, these increase _____and they may float to the surface and harden, causing aesthetically unpleasing conditions.

A. BOD
B. COD
C. Petroleum-based waste oil(s)
D. None of the Above

10. Fatty organic materials from animals, vegetables, and petroleum are quickly broken down by bacteria and can cause pollution in receiving environments.

A. True B. False

Inorganics

11. According to the text, heavy metals can be discharged with many types of industrial wastewaters are easy to remove by conventional treatment methods.

A. True B. False

Nutrients

12. Which of the following wastewater terms are essential to living organisms and are the chief nutrients present in natural water?

A. Oxygen
B. Carbon dioxide
C. Carbon, nitrogen, and phosphorus
D. Answers A,B and C

13. An excess of nutrients over-stimulates the growth of water plants, the result causes unsightly conditions, interferes with drinking water treatment processes, and causes unpleasant and disagreeable tastes and odors in drinking water.

A. True B. False

14. Primarily _____but occasionally nitrogen, causes nutrient enrichment which results in excessive growth of algae.

A. Phosphorus
B. Nitrifying Bacteria
C. Ammonia
D. Calcium Hydroxide

Inorganic and Synthetic Organic Chemicals

15. Inorganic and Synthetic Organic Chemicals can cause _____ problems, and many are not effectively removed by conventional wastewater treatment.

A. Toxic
B. Ecology
C. Excessive growth of aerobic bacteria
D. Taste and odor

(s) means the answer may be plural or singular in nature.

ONSITE SEWAGE FACILITIES (OSSF) ONSITE SYSTEMS SECTION

16. Onsite sewage treatment systems supply septic system owners with _____to keep their septic systems functioning properly.
A. The tank effluent C. Primary and secondary treatment
B. Best management practices D. None of the above

17. These practices are really about recycling water: cleaning wastewater and returning safe water to the water cycle. If a septic system is not functioning properly, clean water is not returned to our_____.
A. Groundwater system(s) C. Collection system
B. Septic system D. None of the above

18. Our goal as onsite operators is to ensure that wastewater is properly treated while protecting human and environmental health in a _____.
A. Onsite sewage manner C. Cost-effective manner
B. Enhanced organic matter removal manner D. None of the above

Onsite Sewage Facilities (OSSF)
19. Onsite/decentralized wastewater treatment systems, commonly called septic system(s), treat sewage from homes and businesses that are not connected to a_____.
A. Decentralized sewer system(s) C. Centralized wastewater treatment plant
B. Municipal wastewater treatment D. None of the above

20. Which of the following include individual onsite septic systems, cluster systems, and alternative wastewater treatment technologies like constructed wetlands, recirculating sand filters, mound systems, and ozone disinfection systems?
A. Decentralized treatment systems C. Centralized wastewater treatment plant
B. Municipal wastewater treatment D. None of the above

21. A septic tank and drainfield combination is the oldest and most common type of OSSF, although newer aerobic and biofilter units exist which represent scaled down versions of_____.
A. Groundwater system(s) C. Collection system
B. Municipal sewage treatments D. None of the above

22. OSSFs account for approximately _____% of all domestic wastewater treatment in the United States.
A. 25 C. 50
B. 15 D. None of the above

23. Acknowledgement of the impacts of onsite systems on ground water and _____(e.g., nitrate and bacteria contamination, nutrient inputs to surface waters) has increased interest in optimizing the systems' performance.
A. Surface water quality C. Water quality of receiving waters
B. Clustered wastewater system D. None of the above

24. Most current onsite regulatory programs focus on_____.
A. Septic system(s) C. Onsite wastewater management program(s)
B. Permitting and installation D. None of the above

25. Which of the following requires rigorous planning, design, installation, operation, maintenance, monitoring, and controls?
A. Effective management
B. Water quality of receiving waters
C. Effective management of onsite systems
D. None of the above

Types of Sewer Systems

26. Centralized sewer systems are generally broken out into three different categories: sanitary sewers, storm sewers, and_____.
A. Septic system(s)
B. Combined sewers
C. Onsite wastewater management program(s)
D. None of the above

27. Which of the following are designed to quickly get rainwater off the streets during rain events?
A. Septic system(s)
B. Combined sewers
C. Storm sewers
D. None of the above

28. Most _____do not connect with a treatment plant, but instead drain directly into nearby rivers, lakes, or oceans.
A. Septic system(s)
B. Combined sewers
C. Storm sewers
D. None of the above

29. Leaking, overflowing, and insufficient _____can release untreated wastewater into receiving waters.
A. Wastewater collection systems
B. Combined sewers
C. Storm sewers
D. None of the above

Key Terms

30. Which of following the means a sewage treatment plant that incorporates a means of introducing air and oxygen into the sewage to provide aerobic biochemical stabilization during a detention period?
A. Alternative System
B. Aerobic System
C. Aerobic Sewage Treatment Facility
D. None of the above

31. Which of following the means an alternative system that incorporates a septic tank or other treatment facility, an aerobic sewage treatment facility, and an absorption facility to provide treatment before dispersal?
A. Alternative System
B. Aerobic System
C. Aerobic Sewage Treatment Facility
D. None of the above

32. Which of following the means any onsite wastewater treatment system DEQ or the Commission approves for use in lieu of the standard subsurface system?
A. Alternative System
B. Aerobic System
C. Aerobic Sewage Treatment Facility
D. None of the above

33. Which of following the means may include anaerobic processes as part of the treatment system?
A. Alternative System
B. Aerobic System
C. Aerobic Sewage Treatment Facility
D. None of the above

Onsite Treatment Processes Options

34. The high cost of _____ and the advances made in individual and cluster (decentralized) system technologies have expanded the array of available treatment options and supported development of a more tailored approach to wastewater management services.

A. Sewage
B. Collection system
C. Centralized wastewater treatment plants
D. None of the above

Key Considerations

35. Wastewater flow and strength, site and local infrastructure conditions, and performance requirements for the _____are all key considerations in deciding what type of wastewater collection and treatment system is needed and how it should be designed.

A. Dispersed or discharged effluent
B. Septic system
C. Centralized wastewater treatment
D. None of the above

36. Onsite systems treat wastewater and disperse it on the property where it is generated.

A. True B. False

37. When functioning properly, onsite systems prevent human contact with sewage, and prevent contamination of surface and groundwater.

A. True B. False

38. Factors that affect the proper functioning of onsite systems include the site and soil conditions, design, installation, operation and maintenance.

A. True B. False

Basic Onsite Treatment Processes

39. Which of the following are designed to accomplish the same thing—the treatment of wastewater—but how this is accomplished is based on the type of treatment technology used?

A. Individual and clustered wastewater systems
B. Centralized wastewater system(s)
C. Collection system(s)
D. None of the above

Primary Treatment

40. 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 grease interceptor tank. This process also includes trapping of solids via _____or screens prior to discharge of the tank effluent.

A. Conventional system(s)
B. The tank effluent
C. Septic tank effluent filters
D. None of the above

Secondary Treatment

41. Which of the following designed to remove organic matter, mostly through digestion and decomposition, often aided by introduction of or exposure to atmospheric oxygen?

A. Wastewater
B. Onsite sewage treatment
C. Biological and chemical processes
D. None of the above

Key Septic Terms
Identify the missing term.

42. Means any onsite wastewater treatment system DEQ or the Commission approves for use in lieu of the standard subsurface system.
A. Alternative System C. Effective Seepage Area
B. Cesspool D. None of the above

43. Means the distribution of effluent to a set of absorption trenches in which each trench receives effluent in equivalent or proportional volumes.
A. Equal Distribution C. Intermittent Sand Filter
B. Holding Tank System D. None of the above

44. Means a structure used for disposal of human waste without the aid of water. It consists of a shelter built above a pit or vault in the ground into which human waste falls.
A. Septic tank C. Privy
B. Cesspool D. None of the above

45. Means a lined pit that receives raw sewage, allows separation of solids and liquids, retains the solids, and allows liquids to seep into the surrounding soil through perforations in the lining.
A. Black Waste C. Swamp
B. Cesspool D. None of the above

46. Means the sidewall area within an absorption trench or a seepage trench from the bottom of the trench to a level 2 inches above the distribution pipes, the sidewall area of any cesspool, seepage pit, unsealed earth pit privy, graywater waste absorption sump seepage chamber, or trench with drain media substitute, or the bottom area of a pressurized soil absorption facility installed in soil.
A. Alternative System C. Effective Seepage Area
B. Cesspool D. None of the above

47. Means a conventional sand filter.
A. Fast sand filter C. Intermittent Sand Filter
B. Slow sand filter D. None of the above

48. Means an alternative system consisting of the combination of a holding tank, service riser, and level indicator (alarm), designed to receive and store sewage for intermittent removal for treatment at another location.
A. Septic tank C. Intermittent septic tank
B. Holding Tank System D. None of the above

49. The absence of dissolved molecular oxygen.
A. Black Waste C. Anaerobic
B. Aerobic D. None of the above

50. Means human body wastes including feces, urine, other substances of body origin, and toilet paper.
A. Black Waste C. Grey water
B. Cesspool D. None of the above

51. Means the wastewater treatment that takes place prior to discharging to any component of an onsite wastewater treatment system, including but not limited to pH adjustment, oil and grease removal, BOD5 and TSS reduction, screening, and detoxification.
A. Pretreatment C. Post-treatment
B. Holding Tank System D. None of the above

Septic System Basics Described
52. Most tanks are split into two compartments and have pipe baffles and an outlet filter to ensure the _____ stay in the tank.
A. Solids C. Biologic process
B. Liquids D. None of the above

53. The _____ process begins in the tank where the effluent separates into layers and begins the process of decomposition.
A. Physical C. Biologic
B. Natural D. None of the above

54. Bacteria, which are naturally present in all septic systems, begin to digest the solids that have settled to the bottom of the tank, transforming a large percentage of these solids into liquids and_____.
A. Solids C. Gases
B. Liquids D. None of the above

55. When _____ within the tank rise to the level of the outflow pipe, they enter the next part of the treatment system (pre-treatment device, distribution box, pump chamber, etc., depending on the type of system).
A. Solids C. Gases
B. Liquids D. None of the above

56. Final treatment of the effluent always occurs in the soil where additional microbes break down the waste and the “clean” water is put back into the ground thereby recharging the aquifers.
A. True B. False

57. Wastewater contains several undesirable pollutants.
A. True B. False

58. Pathogens such as viruses or bacteria cannot enter drinking water supplies creating a potential health hazard.
A. True B. False

59. Nutrients and organic matter entering waterways can lead to tremendous death of aquatic microorganisms.
A. True B. False

60. Metabolic activity of these microbes can increase oxygen levels in the water causing aquatic life to thrive.
A. True B. False

61. Septic system regulations attempt to reduce the chance of these pollutants from having a positive impact on people and animals.
A. True B. False

Types of Systems – General

62. Standard gravity systems require _____ feet of "good" soil under the trenches while pressure distribution systems only require _____ feet.

A. 3 & 3 C. 3 & 2
B. 2 & 3 D. None of the above

63. Advanced Treatment systems are more complicated and treat the wastewater to a fairly high level before allowing it to reach the soil. Because of this treatment, they can be used where there is only _____ foot of "good" dirt beneath the trench bottom.

A. 1 C. 3
B. 2 D. None of the above

Conventional Septic Systems Typically have three Main Components.

64. Which of the following separates the solids from the liquids, and serves a storage area for the solids to decompose and if properly maintained will decompose the solids faster then they build up?

A. A gravity system C. A pressure distribution system
B. A septic tank D. None of the above

65. Which of the following allows the separated water to drain out of the system and to absorb into the leach field?

A. A gravity system C. A pressure distribution system
B. A drain field D. None of the above

66. Which of the following is the final treatment area for the effluent water to be treated; microorganisms in the soil will treat the drain water before it peculates out of the system?

A. A gravity system C. Soil
B. A drain field D. None of the above

67. If installed properly, the _____is environmentally safe, long lasting and almost maintenance free. This is why septic system design is so important.

A. Conventional system C. A pressure distribution system
B. Septic system design D. None of the above

Pressure Distribution

68. Pressure distribution systems are usually required when there is less than optimal soil depth available for complete treatment of the effluent by _____.

A. A gravity system C. A pressure distribution system
B. Septic system design D. None of the above

69. A minimum of _____ feet of properly drained soil is required under the trenches.

A. Three C. Five
B. Two D. None of the above

70. Which of the following are normally the same as a standard gravity system, but the method by which the effluent is distributed to the soil is different?

A. A gravity system C. A pressure distribution system
B. The tank and drainfield size D. None of the above

71. A pump is used to pressurize the effluent into a small underground pvc pipe which transports it to the_____.
A. A gravity system C. Drainfield
B. Septic system design D. None of the above

72. Unlike a standard gravity system, _____wets the entire length of the trench each time the pump turns on. This allows the effluent to be spread over a larger area and receive better treatment from the soil.
A. A gravity system C. A pressure distribution system
B. Septic system design D. None of the above

Conventional Septic Systems
73. Which of the following are the most commonly used wastewater treatment technologies, combining primary and secondary treatment?
A. The tank effluent C. Conventional treatment systems
B. The quantity of contaminants D. None of the above

74. Conventional treatment systems are the least expensive in terms of total cost but require specific conditions (e.g., at least _____ inches of unsaturated soil) and maintenance to perform adequately.
A. 12-24 C. 12-36
B. 24-36 D. None of the above

75. A conventional wastewater treatment system consists of a septic tank and _____that allows primary treatment effluent to infiltrate into unsaturated soil.
A. A gravity system C. Volumes of treated wastewater
B. A soil absorption field D. None of the above

76. Flow through the system usually occurs via gravity but can be aided by a pump, if necessary, operated by_____.
A. A gravity system C. A pressure distribution system
B. A float switch or timer D. None of the above

77. The conventional system has two principal parts—the tank and soil absorption field. The septic tank treats _____by allowing floatable materials (e.g., fats, oils, grease) to rise to the surface, forming a scum layer, and the heavier solids to sink to the bottom, creating a layer of sludge.
A. The tank effluent C. Wastewater
B. The soil absorption system D. None of the above

78. _____ is similar to that of primary sedimentation in larger treatment facilities, except that it is generally devoid of oxygen (i.e., anaerobic).
A. The tank effluent C. Wastewater
B. The soil absorption system D. None of the above

79. _____facilitates aerobic treatment and filtration of the remaining contaminants.
A. The tank effluent C. Effluent to the entire drainfield
B. The soil absorption system D. None of the above

80. Subsurface discharge 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 between doses, promotes film flow of wastewater over soil particles, and ensures a uniform and consistent application of_____.

A. The tank effluent
B. The soil absorption system
C. Effluent to the entire drainfield
D. None of the above

Basic Onsite Wastewater Treatment Systems and Components

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

A. Gravity
B. Pressure manifolds
C. Lateral trenches
D. None of the above

Septic Tanks

82. The septic tank's 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. Clarified liquids
C. Organic matter
D. None of the above

83. Which of the following are stored and periodically need to be pumped out and hauled to a point for further treatment?

A. Gases
B. Liquids
C. Solids
D. None of the above

Septic/Sewage Tank Removal

84. _____need to be properly abandoned to prevent them from becoming a safety hazard.

A. Unused sewage tanks
B. Pressure manifolds
C. Lateral trenches
D. None of the above

Septic Treatment

85. A septic tank removes many of the settleable solids, oils, greases, and floating debris in the raw wastewater, achieving _____ percent removal.

A. 50 to 80
B. 60 to 80
C. 60 to 90
D. None of the above

86. Which of the following removed are stored in sludge and scum layers, where they undergo liquefaction?

A. Gases
B. Liquids
C. Solids
D. None of the above

87. During liquefaction, the first step in the digestion process, acid forming bacteria partially digest the solids by hydrolyzing the proteins and converting them to _____, most of which are dissolved in the water phase.

A. Organic suspended solid(s)
B. Volatile fatty acid(s)
C. BOD
D. None of the above

88. Gases that form from the microbial action in the tank rise in the wastewater column. The rising gas bubbles disturb the_____, which can reduce the settling efficiency of the tank.
A. Organic suspended solid(s) C. Quiescent wastewater column
B. Volatile fatty acid(s) D. None of the above

89. Gases dislodge _____in the sludge blanket so they can escape in the water column.
A. Organic suspended solid(s) C. BOD
B. Colloidal particles D. None of the above

90. At the same time, however, they can carry active anaerobic and facultative microorganisms that might help to treat _____present in the wastewater column.
A. Organic suspended solid(s) C. Colloidal and dissolved solids
B. Volatile fatty acid(s) D. None of the above

91. Septic tank effluent varies naturally in quality depending on the characteristics of _____and condition of the tank.
A. Organic suspended solid(s) C. The wastewater
B. Volatile fatty acid(s) D. None of the above

92. Typical septic tank BOD removal efficiencies are _____percent.
A. 50 to 80 C. 60 to 90
B. 30 to 50 D. None of the above

Typical SWIS Performance
93. Results from numerous studies have shown that septic tanks (SWISs) achieve high removal rates of many pollutants of concerns with the notable exception of _____.
A. Nitrogen C. Phosphorous and metals
B. Nitrate(s) D. None of the above

94. Biochemical oxygen demand (BOD), suspended solids, fecal bacteria indicators and surfactants are effectively removed within _____ feet of unsaturated, aerobic soil.
A. 2-5 C. 2-6
B. 1-4 D. None of the above

95. Which of the following and metals are removed by adsorption, ion exchange and precipitation?
A. Nitrogen C. Phosphorous
B. Nitrate(s) D. None of the above

96. The retention capacity of the soil is finite and will vary with different types of soil mineralogy, _____, Redox potential and cation exchange capacity.
A. Nitrogen C. pH
B. Nitrate(s) D. None of the above

97. Fine textured soils, low hydraulic loadings, aerobic subsoils and high temperatures favor destruction of viruses and toxic organics. The most significant documented threat to our groundwater supply from SWISs are _____.
A. Nitrogen C. Phosphorous and metals
B. Nitrate(s) D. None of the above

Septic Pretreatment Components

98. Which of the following remove many of the contaminants from the wastewater to prepare the effluent for final treatment and dispersal into the environment? The level of treatment is selected to match the receiving environment and the intended use.

A. Pretreatment components C. Gravity flow systems
B. Advanced systems D. None of the above

99. Which of the following is reduced to a level the soil can accept and treat? Many options exist for treatment prior to release into the receiving environment.

A. Advanced system(s) C. The quantity of contaminants
B. Septic tank effluent D. None of the above

100. Which of the following include septic tanks, trash tanks, and processing tanks, while aerobic treatment units, media filters, and constructed wetlands are considered advanced pretreatment components?

A. Wastewater pretreatment components C. Final treatment and dispersal components
B. Gravity flow systems D. None of the above

101. Which of the following provide the final removal of contaminants and distribute the effluent for dispersal back into the environment? Several options are available for distributing wastewater in soil.

A. Wastewater pretreatment components C. Final treatment and dispersal components
B. Gravity flow systems D. None of the above

102. Which of the following are the most widely used dispersal systems? These systems will continue to be used in areas where the soil separation distances can be met, primarily because they are the least expensive alternative and require the least amount of operation and maintenance.

A. Wastewater pretreatment components C. Final treatment and dispersal components
B. Gravity flow systems D. None of the above

103. Which of the following overcome a variety of site limitations?

A. Advanced system(s) C. Final treatment and dispersal components
B. Pressurized distribution methods D. None of the above

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

104. Which of the following are also called submerged-flow wetlands? This system type treats septic tank effluent by horizontal flow through a lined bed of unmulched gravel planted with wetland species. The plants fill in spaces between the rocks and provide aesthetic appeal.

A. Unsaturated soil C. Vegetative submerged bed(s)
B. Media filter(s) D. None of the above

105. Which of the following are extremely passive and require little management in producing a good quality effluent (typically BOD and TSS of less than 30 mg/L)?

A. Cluster system(s) C. Wetland system(s)
B. Treatment facilities D. None of the above

106. Effluent is further treated when discharged to _____following flow through the wetland cell(s).

A. Unsaturated soil C. Vegetative submerged bed(s)
B. Media filter(s) D. None of the above

Cluster System Applications

107. A cluster system is designed to collect wastewater from _____ homes.
A. Three to fifty C. Two to several hundred
B. Two to one hundred D. None of the above

Septic System Failures

108. Which of the following failures are a major source of groundwater pollution?
A. Soil dispersal system C. Individual and clustered systems
B. Septic system D. None of the above

109. Layers of soil act as a natural filter, removing microbes and other particles as water seeps through. Improperly treated water can carry _____that can cause gastroenteritis, fever, common cold, respiratory infections and hepatitis.
A. All sewage C. Waterborne pollution
B. Bacteria and viruses D. None of the above

110. Which of the following are effective, cost efficient, and easy to maintain?
A. Septic tank effluent pump (STEP) C. Septic systems
B. Individual and clustered systems D. None of the above

111. Failing systems are a major source of groundwater pollution, cause _____, such as dysentery and hepatitis, and are expensive for homeowners to replace. There are many different types of wastewater collection and treatment technologies.
A. Aerobic microsite(s) C. Chemical diseases
B. Waterborne illnesses D. None of the above

112. Which of the following for clustered facilities can work by gravity or operate via vacuum or pressure pump?
A. Septic system(s) C. Collection systems
B. Cluster system(s) D. None of the above

Advanced (Tertiary) Systems Introduction

113. Advanced systems can be designed and built on-site or can consist of prefabricated units designed to overcome some site and soil limitations including:
When the aerated (unsaturated) soil depth below the infiltrative surface in the drainfield is less than the minimum required, advanced treatment processes or components (e.g.,_____) can be added to increase pollutant removal prior to soil discharge.
A. Fixed film treatment units C. Infiltrative surface
B. Septic tank effluent D. None of the above

114. In environmentally sensitive areas, _____ can be used to meet effluent standards for oxygen-demanding wastes, bacteria, nitrogen, and phosphorus.
A. Gravity flow systems C. Advanced systems
B. Septic tank effluent D. None of the above

115. If a soil dispersal area malfunctions hydraulically due to a buildup of the biomat (inorganic, organic, and/or bacterial slime) 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. Soil oxidation C. Infiltrative surface
B. Septic tank effluent D. None of the above

116. _____ allows the soil to drain between doses, improving soil oxygen transfer.
A. The dose/rest cycle C. Infiltrative surface
B. Septic tank effluent D. None of the above

117. Wastewater with high organic strength (e.g., from a restaurant) can employ _____to improve aeration, biological decomposition, and treatment of organic wastes.
A. Gravity flow systems C. Advanced treatment units/processes
B. Septic tank effluent D. None of the above

118. Which of the following 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) C. Pressurized distribution methods
B. The dose/rest cycle D. None of the above

119. Advanced systems employ _____can reduce bacteria and nutrient loading to groundwater by applying wastewater high in the soil profile, improving bacteria predation and uptake of nutrients by plants and providing a carbon source for denitrification.
A. Nutrient loading C. Pressure drip dispersal of the effluent
B. Modified dispersal area D. None of the above

Advanced Onsite Wastewater Treatment Systems and Components
Elevated (Mound or At-Grade) Systems
120. This system type includes _____to provide primary (and sometimes secondary) treatment prior to discharging the effluent to a modified drainfield.
A. Pressure distribution C. A septic tank or prefabricated treatment unit
B. Septic system D. None of the above

121. Effluent flows from the tank or treatment unit to a pump tank and periodically dosed to the_____, which is typically constructed of a layer of clean, uniformly graded sand on a plowed or roughened natural soil surface.
A. At-grade systems C. Modified dispersal area
B. Sand dispersal field D. None of the above

122. The tank effluent is uniformly dosed onto the _____within the mound, which may be 1-4 ft. above the natural grade. Sand within the mound compensates for shallow unsaturated soil conditions below the natural grade.
A. Media filter(s) C. Infiltrative surface
B. ATU(s) D. None of the above

Mound Systems

123. Mound systems are appropriate for areas with a high water table or shallow, fractured bedrock. After treatment through the_____, the effluent percolates directly into the soil under the mound.

A. Effluent dispersal piping C. Sand
B. Aerobic treatment units (ATUs) D. None of the above

124. _____feature effluent dispersal piping placed at natural grade, with the mound consisting mostly of cover soil for the piping.

A. At-grade systems C. Effluent flows from the tank
B. Aerobic treatment units (ATUs) D. None of the above

125. 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. Media filter(s) C. Distribution lines
B. ATU(s) D. None of the above

Aerobic Treatment Units

126. _____) 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. Effluent dispersal piping C. Effluent flows from the tank
B. Aerobic treatment units (ATUs) D. None of the above

127. When _____ is supplied, the rate of microbial activity and related treatment processes accelerates.

A. Nitrogen C. Hydrogen
B. Oxygen D. None of the above

128. Three processes are involved in most_____: physical separation (mostly settling), aerobic treatment (aeration and mixing), and clarification (final settling).

A. Media filter(s) C. Aerobic systems
B. Anaerobic systems D. None of the above

129. _____ 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. Media filter(s) C. Septic tank effluent
B. ATU(s) D. None of the above

Media Filters

130. _____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 enhance biochemical treatment processes.

A. Media filter(s) C. Septic tank effluent
B. ATU(s) D. None of the above

131. A number of these so-called "_____" are available to treat wastewater.

A. Media filter(s) C. Septic tank effluent
B. ATU(s) D. None of the above

132. Sand is the most commonly used _____, but clean gravel, crushed glass, textile strips, peat, and tire crumbs are also used, depending on site restrictions and state/local regulations.
A. Media C. Soil dispersal field
B. Septic tank effluent D. None of the above

133. In single-pass or intermittent filter (ISF) design, _____is pump-dosed uniformly onto the media at regular intervals 12 to 48 times per day.
A. Media C. Sand
B. Septic tank effluent D. None of the above

134. As the effluent trickles through the _____, suspended and some colloidal particles are filtered, and bacteria growing on the media aerobically treat organic wastewater.
A. Media C. Sand
B. Septic tank effluent D. None of the above

135. Effluent that percolates through the media bed is discharged to the _____.
A. Septic tank effluent C. Aerobic treatment units (ATUs)
B. Soil dispersal field D. None of the above

ONSITE OPERATION AND MAINTENANCE SECTION

System Operation and Maintenance Requirements

136. When _____exist, adjustments to the upstream treatment train may be needed to reduce biochemical oxygen demand, total suspended solids, bacteria levels, nutrients, or other pollutants.
A. Groundwater pollution C. Soil limitations
B. Hydraulic failures D. None of the above

137. Adjustments could involve reducing _____at the source (e.g., better plate and pot scraping prior to dishwashing in restaurant kitchens, adding grease trap tanks, etc.), 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. Septic system maintenance C. Pollutant inputs
B. Failure(s) D. None of the above

Septic System Failures

138. Septic system failures are a major source of _____.
A. Groundwater pollution C. Failure(s)
B. Hydraulic failures D. None of the above

139. _____ 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. Septic system maintenance C. Suspended growth treatment unit
B. Failure(s) D. None of the above

140. Some soil-based systems (those with a drain field) are installed at sites with inadequate or inappropriate soils, excessive slopes, or high ground water tables. These conditions can cause hydraulic failures and_____.
A. Groundwater pollution C. Upstream treatment train
B. Contamination of nearby water sources D. None of the above

141. Failure to perform routine maintenance, such as pumping the septic tank generally at least every _____ years, can cause solids in the tank to migrate into the drain field and clog the system.
A. 1 to 2 C. 3 to 4
B. 3 to 5 D. None of the above

Regular Maintenance
142. Verification of _____ contracts, operator expertise, and reporting requirements for system maintenance such as tank pumping and repairs should be included in the approval process.
A. Drainage features C. System maintenance
B. Installation specifications D. None of the above

These records should reflect:
143. If properly designed, installed, and maintained, a septic system can effectively treat household wastewater for up to _____ years or more. Look to see if the house has a system that is near the end of its life-span.
A. 50 C. 20
B. 30 D. None of the above

144. Size is important because graywater (laundry water, sink water) and blackwater (toilet water) need to be retained in the tank for at least a _____ to allow solids to separate from the liquids and begin breaking down. If wastewater is pushed through without proper settling, the solids can clog the drainfield, stressing and possibly damaging the system.
A. Day or more C. Week or more
B. 12 hours or more D. None of the above

Individual Wastewater Systems
145. Individual treatment systems collect, treat, and disperse wastewater from _____and are associated with low-density communities and developments, such as rural residential and small commercial developments.
A. Type of system C. An individual property
B. Subsurface dispersal system D. None of the above

146. Individual systems generally consist of one or more treatment devices (e.g., septic tank, fixed film treatment unit) and _____.
A. Type of system C. Low-density communities and developments
B. A subsurface dispersal system D. None of the above

147. The _____of an individual system can vary greatly depending on the type of system.
A. Type of system C. Operation and maintenance requirements
B. Subsurface dispersal system D. None of the above

148. Mechanical systems, such as activated sludge-based units, require servicing three to four times a year, while conventional systems need service or pumping every _____ years, depending on occupancy and use.
A. 1 to 5 C. 5 to 10
B. 3 to 5 D. None of the above

Septic System Evaluation Guideline
Enhanced Treatment Systems

149. _____have proven to be effective in situations where conventional systems are not appropriate.

A. Treatment performance
B. Several wastewater alternative technologies
C. Wastewater treatment system(s)
D. None of the above

Enhanced Wastewater Treatment

150. Advanced or innovative technologies that provide a _____beyond conventional systems. Generally, these systems have mechanical or moving parts that require periodic operation and maintenance, inspections, and eventual replacement.

A. Clustered system(s)
B. O&M requirement(s)
C. Higher level of treatment
D. None of the above

151. Enhanced wastewater treatment systems are more complex than _____and require greater oversight to keep all aspects of the treatment process in balance.

A. Treatment performance
B. O&M requirement(s)
C. Conventional systems
D. None of the above

Perforated Pipe

152. Perforated pipe is laid in the bottom of upslope trenches excavated into the restrictive horizon. A durable, porous medium is placed around the piping and up to a level above the estimated _____.

A. Low-saturated zone
B. An outfall for the drain
C. Seasonally high-saturated zone
D. None of the above

153. The porous medium intercepts the ground water and conveys it to the drainage pipe. To provide an outfall for the drain, one or both ends of the pipe are extended downslope to a point where it intercepts_____.

A. The ground surface
B. An outfall for the drain
C. Drainage enhancements
D. None of the above

154. When drainage enhancements are used, the _____must be carefully evaluated to protect local water quality.

A. Outlet and boundary conditions
B. An outfall for the drain
C. Drainage enhancements
D. None of the above

155. _____should avoid capture of the SWIS percolate plume and ground water infiltrating from below the SWIS or near the end of the drain.

A. SWIS
B. Outlet locations
C. The drain
D. None of the above

156. A separation distance between the _____that is sufficient to prevent percolate from the SWIS from entering the drain should be maintained.

A. SWIS and the drain
B. Outlet locations
C. Plume and ground water
D. None of the above

157. The _____between the bottom of the SWIS and the drain and soil permeability characteristics should determine this distance.

A. SWIS
B. Outlet locations
C. Vertical distance
D. None of the above

158. As the vertical distance increases and the _____decreases, the necessary separation distance increases.
A. SWIS C. Plume and ground water
B. Permeability D. None of the above

159. A _____-foot separation is used for most applications.
A. 2 C. 4
B. 10 D. None of the above

160. If both ends of the drain cannot be extended to the ground surface, the upslope end should be extended some distance along the surface contour beyond the_____.
A. End of the SWIS C. Plume and ground water
B. Outlet locations D. None of the above

161. If not done, ground water that seeps around the _____can render the drain ineffective.
A. End of the drain C. Plume and ground water
B. Outlet locations D. None of the above

162. Similar cautions should be observed when designing and locating _____ for commercial systems on flat sites.
A. SWIS C. Plume and ground water
B. Outlet locations D. None of the above

163. The design of a curtain drain is based on the permeability of the soil in the_____, the size of the area upslope of the SWIS that contributes water to the saturated zone, the gradient of the drainage pipe, and a suitable outlet configuration.
A. Saturated zone C. Plume and ground water
B. Outlet locations D. None of the above

164. If the saturated hydraulic conductivity is low and the drainable porosity (the percentage of pore space drained when the soil is at field capacity) is small, even _____might have limited effect on soil wetness conditions.
A. SWIS C. Effectively designed curtain drains
B. Outlet locations D. None of the above

Inspections and Maintenance Requirements
165. A four-bedroom home might have a daily flow of 480 gallons per day (assuming 120 gallons per bedroom per day). In a 1,000-gallon tank, this provides _____ days for solids to settle.
A. 2 C. 4
B. 3 D. None of the above

166. Nevertheless, as the solids build up, there is less room in the tank for the liquid and thus less settling time. The accepted maximum level of solids in the tank is _____ of the liquid depth. Any more than this and the tank is overdue for pumping. Having these solids removed, is a critical component of how well the septic system, as a whole, will function.
A. 1/2 C. 1/4
B. 1/3 D. None of the above

SWIS Designs

167. There are several different designs for_____. They include trenches, beds, seepage pits, at grade systems, and mounds.
A. Seepage pits C. Secondary infiltrative surface
B. SWISs D. None of the above

168. SWIS applications differ in their geometry and location in the_____.
A. Sidewall infiltration C. Infiltration surface(s)
B. Soil profile D. None of the above

169. _____have a large length-to-width ratio, while beds have a wide, rectangular or square geometry.
A. Seepage pits C. Trenches
B. Infiltration surface D. None of the above

170. _____are deep, circular excavations that rely almost completely on sidewall infiltration.
A. Sidewall infiltration C. Infiltration surface(s)
B. Seepage pits D. None of the above

171. _____ are no longer permitted in many jurisdictions because their depth and relatively small horizontal profile create a greater point-source pollutant loading potential to ground water than other geometries. Because of these shortcomings, seepage pits are not recommended in this manual.
A. Seepage pits C. Secondary infiltrative surface
B. Infiltration surface D. None of the above

172. Infiltration surfaces may be created in natural soil or imported fill material. Most traditional systems are constructed below_____.
A. Ground surface in natural soil C. Infiltration surface(s)
B. Soil profile D. None of the above

173. In some instances, _____above a more permeable horizon may be removed and the excavation filled with suitable porous material in which to construct the infiltration surface.
A. A restrictive horizon C. Secondary infiltrative surface
B. Infiltration surface D. None of the above

174. _____ may be constructed at the ground surface ("at-grades") or elevated in imported fill material above the natural soil surface ("mounds").
A. Sidewall infiltration C. Infiltration surface(s)
B. Soil profile D. None of the above

175. An important difference between infiltration surfaces constructed in natural soil and those constructed in fill material is that a secondary infiltrative surface (which must be considered in design) is created at the_____.
A. Fill/natural soil interface C. Secondary infiltrative surface
B. Infiltration surface D. None of the above

Maintenance Inspections

176. Maintenance inspections are gaining appeal as a management tool to assess the condition of systems and determine pumping or_____.

A. Other O&M needs C. Alternative and enhanced wastewater technologies
B. Advances in technology D. None of the above

177. Some local agencies have adopted a sewage management program that requires the annual inspection of systems with newly issued or modified permits and proof of _____ for all systems (old and new).

A. Septic tank pumping C. Operation and maintenance inspection programs
B. Advances in technology D. None of the above

178. _____ are usually coupled with a mandatory septic tank pumping program. The local agency notifies the system owner when pumping is due. Verification of pumping is provided to the regulating agency.

A. Septic tank pumping C. Operation and maintenance inspection programs
B. Advances in technology D. None of the above

179. Typical pumping requirements vary from three to five years or more based on the _____and individual household wastewater characteristics.

A. Typical pumping requirement(s) C. Daily sewage flow
B. Enhanced system(s) D. None of the above

180. Alternative and _____require additional maintenance and/or ongoing attention. In states and communities where these systems are authorized, performance inspections are mandated in the state code or in the system's operating permit.

A. O&M needs C. Enhanced wastewater technologies
B. Advances in technology D. None of the above

Maintenance of Systems

181. A key part of _____is to track the maintenance of systems. The only way to ensure that maintenance contracts are kept in effect and that systems are monitored when required is for the management entity or regulatory authority to have a structured reporting program.

A. An O&M program C. Alternative and enhanced wastewater technologies
B. Advances in technology D. None of the above

182. 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. Typical pumping requirement(s) C. O&M activities
B. Enhanced system(s) D. None of the above

Standard Leach Field Septic System Inspection

183. As the septic system is used, there is an accumulation of solids in the tank, which is sometime referred to as _____.

A. Slime C. Long-term biochemical oxygen demand
B. Sludge D. None of the above

184. The septic tank removes solids by holding wastewater in the tank for at least 24 hours, allowing the _____ to settle and _____ to rise to the top. This is accomplished by a series of baffles inside the tank.
A. Scum - Solids C. Solids - Scum
B. Sludge - Scum D. None of the above

185. Up to _____% of the solids retained in the tank will decompose over time.
A. 25 C. 40
B. 50 D. None of the above

186. Effluent water discharges from the tank to perforated drain pipes. From there, it drains to a _____
A. Constructed absorption or leach field C. A septic tank, the septic drain field
B. Leach fields or leach drains D. None of the above

187. Septic drain fields, also called leach fields or leach drains are used to remove contaminants and impurities from the liquid that emerges from_____.
A. Effluent water discharges C. The septic tank
B. Leach fields or leach drains D. None of the above

188. A septic tank, the septic drain field, and the associated piping compose_____.
A. Effluent water discharges C. A complete septic system
B. Leach fields or leach drains D. None of the above

189. _____is effective for disposal of organic materials readily catabolized by a microbial ecosystem.
A. Effluent water discharges C. The septic drain field
B. Leach fields or leach drains D. None of the above

190. _____typically consists of an arrangement of trenches containing perforated pipes and porous material (often gravel) covered by a layer of soil to prevent animals and surface runoff from reaching the wastewater distributed within those trenches.
A. Effluent water discharges C. A trench
B. The drain field D. None of the above

191. Primary design considerations are hydraulic for the _____requiring disposal and catabolic for the long-term biochemical oxygen demand of that wastewater.
A. Septic tank effluent C. Insoluble particles small enough
B. Volume of wastewater D. None of the above

192. Many health departments require a percolation test (“perc” test) to establish suitability of drain field soil to receive_____. An engineer or licensed designer may be required to work with the local governing agency to design a system that conforms to these criteria.
A. Groundwater levels C. Percolation rates
B. Septic tank effluent D. None of the above

193. _____ measure the rate at which clean water disperses through a disposal trench into the soil.
A. Groundwater levels C. Percolation tests
B. Gravitational force D. None of the above

194. Several factors may reduce observed percolation rates when the drain field receives _____.
A. Groundwater levels C. Anoxic septic tank effluent
B. Gravitational force D. None of the above

195. Microbial colonies catabolizing _____from the septic tank effluent will adhere to soil particles and reduce the interstitial area available for water flow between soil particles. These colonies tend to form a low-permeability biofilm of gelatinous slime at the soil interface of the disposal trench
A. Soluble organic compounds C. Insoluble particles small enough
B. Wastewater D. None of the above

196. A certain vertical distance is required between the effluent level in the disposal trench and the water level where the effluent is leaving the drain field for gravitational force to overcome _____ resisting flow through porous soil.
A. Viscous frictional forces C. Percolation rates
B. Gravitational force D. None of the above

197. Effluent levels in the vicinity of the _____will appear to rise toward the ground surface to preserve that vertical distance difference if groundwater levels surrounding the drain field approach the level of effluent in the disposal trench.
A. Groundwater levels C. Drain field
B. Gravitational force D. None of the above

Septic Management Considerations
198. In the past, state and local wastewater management programs rarely specified O&M requirements for_____. The regulation of system design, construction, and operation was considered to be satisfactory community oversight.
A. Cluster system(s) C. Conventional or enhanced wastewater systems
B. O&M requirement(s) D. None of the above

199. 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) C. Advanced or innovative technologies
B. O&M requirement(s) D. None of the above

200. 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 data management that support proper _____.
A. System performance C. Wastewater alternative technologie(s)
B. O&M requirement(s) D. None of the above

Aerobic Treatment Units (ATUs)
201. A mechanical onsite treatment unit that provides _____by mixing air (oxygen) and aerobic and facultative microbes with the wastewater in a sewage tank.
A. Secondary wastewater treatment C. Size of the household and the size of the tank
B. Sewage tank D. None of the above

Gravity Effluent Distribution Devices

202. Divide and/or transport the liquid effluent from a _____ to absorption trenches for dispersal into the soil. These devices include distribution boxes, drop boxes, and step-downs.

A. Proper maintenance
B. Pressure manifold(s)
C. Septic tank or ATU
D. None of the above

Gravity Laterals

203. A system of trenches excavated along ground contours used to distribute effluent by gravity flow from a _____and apply the effluent to the soil infiltrative surface.

A. Sand/media filter(s)
B. Septic tank or ATU
C. Onsite system
D. None of the above

204. Generally, _____-inch deep trenches are used; however, with approval trenches can be up to _____ inches deep.

A. 18-30
B. 16-36
C. 12-24
D. None of the above

Dosed Gravity Systems

205. Use siphons or pumps to dose into a _____or through a pressure manifold into the ends of gravity lateral trenches.

A. Necessary pumping frequency
B. Gravity distribution device
C. Pressure manifold(s)
D. None of the above

206._____ can be used to more equally divide effluent between gravity lateral trenches or to proportion effluent to unequal length trenches; however, effluent is still moved along the length of a trench by gravity.

A. Necessary pumping frequency
B. An advanced OWTS
C. Pressure manifold(s)
D. None of the above

Impacts of Effluent on Groundwater

207. When the soil is overloaded with a treatable contaminant, or when the contaminant cannot be treated by the soil, the quality of the _____ may change significantly.

A. Distribution media
B. Underlying groundwater
C. Dispersal zone
D. None of the above

208. When a septic system fails to effectively treat and disperse _____, it can become a source of pollution. This type of failure can occur in three different ways.

A. Effluent
B. Anaerobic bacteria
C. Unsaturated flow
D. None of the above

209. 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. It is also important to prevent a third, and less obvious, type of failure, which is contamination of the ground or surface waters.

A. Septic system
B. Distribution media
C. Soil treatment trench
D. None of the above

Soil Treatment Processes

210. The soil treatment and _____ provides for the final treatment and dispersal of septic tank effluent.

A. Distribution media C. Dispersal zone
B. Biomat D. None of the above

211. To varying degrees, the _____ and dispersal zone treats the wastewater by acting as a filter, exchanger, or absorber by providing a surface area on which many chemical and biochemical processes occur. The combination of these processes, acting on the effluent as it passes through the soil, and purifies the water.

A. Pollution of groundwater C. Soil treatment
B. Effluent D. None of the above

Biomat

212. As septic tank effluent flows into a soil treatment trench, it moves vertically through the distribution media to the _____ where treatment begins.

A. Distribution media C. Dispersal zone
B. Biomat D. None of the above

213. The biomat is a biological layer formed by _____, which secrete a sticky substance and anchor themselves to the soil, rock particles, or other available surfaces.

A. Aerobic bacteria C. Unsaturated flow
B. Anaerobic bacteria D. None of the above

214. 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. Distribution media C. Dispersal zone
B. Biomat D. None of the above

215. _____ increases the travel time of effluent through the soil, ensuring that it has sufficient time to contact the surfaces of soil particles and microorganisms.

A. Gravity-fed system C. Unsaturated flow
B. Soil system D. None of the above

216. A properly functioning _____will have wastewater ponded in the distribution media while the soil a few inches outside of and below the distribution media will be unsaturated.

A. Gravity-fed system C. Unsaturated flow
B. Soil system D. None of the above

217. Unsaturated soil has pores containing both air and water so aerobic microorganisms living in the soil can effectively treat the wastewater as it travels through the_____.

A. Gravity-fed system C. Unsaturated flow
B. Soil system D. None of the above

218. In unsaturated soil under a biomat, _____is restricted.

A. Water movement C. Unsaturated flow
B. Bacteria D. None of the above

Sewage Treatment Utilizing Soil

219. A developed biomat reaches _____ over time, remaining at about the same thickness and the same permeability if effluent quality is maintained.

A. Equilibrium
B. Quality of the effluent
C. Permeability of the biomat
D. None of the above

220. For equilibrium to be maintained, the biomat and the effluent ponded within the trench must be in_____, the organic materials in the wastewater feed the anaerobic microorganisms, which grow and multiply, increasing the thickness and decreasing the permeability of the biomat.

A. Equilibrium
B. Anaerobic conditions
C. Permeability of the biomat
D. None of the above

221. On the soil side of the biomat beneath the drainfield, oxygen is present so that conditions are allowing aerobic soil bacteria to feed on and continuously break down the_____. These two processes occur at about the same rate so that the thickness and permeability of the biomat remain in equilibrium.

A. Aerobic bacteria
B. Equilibrium
C. Biomat
D. None of the above

222. _____leaving the septic tank decreases because of failure to regularly pump out the septic tank, more food will be present for the anaerobic bacteria, which will cause an increase in the thickness of the biomat and decrease its permeability.

A. Wastewater flow/strength
B. Quality of the effluent
C. If the quality of the effluent
D. None of the above

223. If seasonally saturated conditions occur in the soil outside the trench, aerobic conditions will no longer exist, which will prevent _____from breaking down the biomat. Under these conditions the biomat will thicken, reducing its permeability and the effectiveness of effluent entering the soil.

A. Aerobic bacteria
B. Equilibrium
C. Aerobic
D. None of the above

Site Evaluations

224. Site evaluations are a key driver of treatment system design. The success of any soil-discharging wastewater treatment system depends on the appropriate match between_____, the treatment system design, and the site that receives effluent from the system.

A. Site-specific
B. Quality of the effluent
C. Wastewater flow/strength
D. None of the above

225. _____ 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. Site-specific observations
B. Quality of the effluent
C. Wastewater flow/strength
D. None of the above

Assure System Performance

226. Wastewater systems depend on the soil for 1) final treatment of effluent from the tank or unit process components, and 2)_____.

A. Final treatment of effluent
B. Dispersal of the effluent to the soil
C. Upstream processes in the treatment train
D. None of the above

227. The soil component of the system receives, stores, and treats_____.

A. Site-specific effluent
B. Incoming effluent
C. Wastewater flow/strength
D. None of the above

228. 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 (e.g., phosphorus), filtration of solids, and decomposition of organic constituents.

A. Clustered wastewater system(s)
B. Equilibrium
C. Aerobic nitrification of ammonia
D. None of the above

229. Predicting the _____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 upstream processes in the treatment train can be adjusted or adapted to ensure that the soil can handle the flow and pollutant load delivered.

A. Final treatment of effluent
B. Wastewater flow/strength
C. Pollutant removal
D. None of the above

Improving OSSF Treatment through Performance Requirements

230. Most onsite wastewater treatment systems are of the conventional type, consisting of a septic tank and a_____.

A. Regular maintenance
B. Site limitations
C. Subsurface wastewater infiltration system (SWIS)
D. None of the above

231. _____ and more stringent performance requirements have led to significant improvements in the design of wastewater treatment systems and how they are managed.

A. Regular maintenance
B. Site limitations
C. Subsurface wastewater infiltration system (SWIS)
D. None of the above

232. Over the past 20 years the onsite wastewater treatment system (OWTS) industry has developed many _____that can achieve high performance levels on sites with size, soil, ground water, and landscape limitations that might preclude installing conventional systems.

A. Water resources
B. Fixed-film reactors
C. New treatment technologies
D. None of the above

233. New technologies and _____are based on defining the performance requirements of the system, characterizing wastewater flow and pollutant loads, evaluating site conditions, defining performance and design boundaries, and selecting a system design that addresses these factors.

A. Existing technologies
B. Improvements to existing technologies
C. Wastewater characteristics and site conditions
D. None of the above

(s) means the answer may be plural or singular in nature.

234. _____ can be expressed as numeric criteria (e.g., pollutant concentration or mass loading limits) or narrative criteria (e.g., no odors or visible sheen) and are based on the assimilative capacity of regional ground water or surface waters, water quality objectives, and public health goals.

A. Performance requirements
B. Water resources
C. Primary and secondary processes
D. None of the above

235. _____ help define system design and size and can be estimated by comparing the size and type of facility with measured effluent outputs from similar, existing facilities.

A. Existing technologies
B. Wastewater flow and pollutant content
C. Wastewater characteristics and site conditions
D. None of the above

236. _____integrate detailed analyses of regional hydrology, geology, and water resources with site specific characterization of soils, slopes, structures, property lines, and other site features to further define system design requirements and determine the physical placement of system components.

A. Site evaluations
B. Infiltration area protection
C. Individual and clustered systems
D. None of the above

237. _____applied today treat wastes after they exit the septic tank; the tank retains settleable solids, grease, and oils and provides an environment for partial digestion of settled organic wastes.

A. Regular maintenance
B. Septic system
C. Most of the alternative treatment technologies
D. None of the above

238. Post-tank treatment can include aerobic (with oxygen) or anaerobic (with no or low oxygen) biological treatment in suspended or fixed-film reactors, physical/chemical treatment, soil infiltration,_____.

A. Fixed-media filtration, and/or disinfection
B. Water resources
C. Primary and secondary processes
D. None of the above

239. _____based on these technologies are defined by performance requirements, wastewater characteristics, and site conditions.

A. Alternative treatment technologies
B. Wastewater flow and pollutant content
C. The application and sizing of treatment units
D. None of the above

Performance-Based Standards

240. The move toward site-appropriate, risk-based system design and the growing interest in _____has increased the need for performance-based design guidance.

A. Performance requirements
B. Clustered facilities
C. Primary and secondary processes
D. None of the above

241. _____ approaches have been proposed as a substitute for prescriptive requirements for system design, siting, and operation.

A. Alternative treatment technologies
B. Wastewater flow and pollutant content
C. Performance-based management
D. None of the above

System Design Considerations

242. One of the more common reasons why some individual or cluster systems do not perform properly is inappropriate _____ selection.

A. System/technology C. System compatibility
B. Subsurface drainfield(s) D. None of the above

243. A wastewater system should be matched to the volume and_____, and the site, soil, and groundwater/surface water conditions must be known in detail in order to develop an appropriate system design.

A. Alternative treatment technologies C. Pollutant profile of wastewater
B. Wastewater flow and pollutant content D. None of the above

244. _____permitting programs are expanding the options available for providing treatment services, especially for sites with limiting soil conditions and those with threatened or impaired water resources nearby.

A. Regular maintenance C. State and local wastewater system
B. Septic system D. None of the above

Management Considerations

245. All _____systems require management. Management services can be provided by an outside contractor or responsible management entity.

A. System/technology C. Wastewater treatment
B. Subsurface drainfield(s) D. None of the above

246. In general, _____with septic tanks and subsurface drainfields require less management attention; clustered facilities with collection system pumps, mechanized treatment units, and time or demand-dosed infiltration areas require much more.

A. System/technology C. Individual gravity flow systems
B. Subsurface drainfield(s) D. None of the above

247. Factors that influence system management include:
_____, such as very cold or wet climates.

A. Complexity of service C. Operation in extreme conditions
B. All system components D. None of the above

248. _____ and access to repair parts.

A. Soil condition(s) C. Life of system components
B. Subsurface drainfield(s) D. None of the above

249. Maintenance needs, including frequency and _____.

A. Complexity of service C. Very cold or wet climates
B. Final design components D. None of the above

Permitting and Approval Process

250. State and local governments vary considerably in their approach to approving _____and issuing installation and operation permits.
Consultation with the property owner regarding final design components.

A. Complexity of service C. System types and components
B. Final design components D. None of the above

(s) means the answer may be plural or singular in nature.

251. It is important that the application include_____, narratives, forms, calculations, catalog cuts, photos, and other data, including detailed equipment and installation specifications to make siting the system components easier.
A. System drawings C. System maintenance
B. Installation specifications D. None of the above

252. If the site has been developed, all structures, utilities, and _____should be identified.
A. Regular maintenance C. Ingress and egress pathways
B. Septic system D. None of the above

253. The source of potable water and distribution lines 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_____.
A. System location and features C. Minimum setbacks met
B. Installation specifications D. None of the above

Summary
OSSF Maintenance
254. _____ 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. Proper maintenance C. Septic tank or ATU
B. Necessary pumping frequency D. None of the above

255. Try to determine how frequently the tank has been pumped from the realty agent or owner. Ask to see maintenance records. Keep in mind the necessary pumping frequency depends on the size of the household and the size of the _____.
A. Sand/media filter(s) C. Onsite system
B. Tank D. None of the above

256. For example, a four-bedroom home with a 1,250 gallon tank should be pumped approximately every _____ years. Modern conveniences such as garbage disposals, hot tubs, or whirlpools will increase the necessary pumping frequency.
A. 3 C. 2.6
B. 4.5 D. None of the above

Permit
257. Several factors should be considered when choosing the type of onsite system for a site including: soil/site limitations, available space, operation and maintenance (O & M) requirements, initial costs as well as_____, landscape disturbance, and the owners' preferences and ability to manage the system.
A. Soil resource C. O & M costs
B. Type of human sewage D. None of the above

258. Of these considerations, often the most limiting is the _____or site and space limitations.
A. Soil resource C. O & M costs
B. Type of human sewage D. None of the above

259. When the soil and site are suited to a _____or to a septic tank and conventional soil absorption system, any registered OWTS installer can assist with the permitting and can install a basic onsite system.
A. Drainfield C. An advanced OWTS
B. Lagoon D. None of the above

260. When site limitations or other factors lead to _____, the installer must be registered as an advanced OWTS installer.
A. Drainfield C. An advanced OWTS
B. Lagoon D. None of the above

SUBSURFACE WASTEWATER INFILTRATION CONSTRUCTION SECTION

Construction Section

261. Correct wastewater treatment system construction and/or installation practices are critical to the performance of individual and _____.
A. Pressure distribution C. Clustered systems
B. Declustered systems D. None of the above

262. Construction actions can affect short-term and long-term system performance by failing to adhere to _____, neglecting proper pipe slope requirements, inadvertently switching tank inlet/outlet orientation, or failing to protect infiltration area soils from equipment compaction.
A. Inlet/outlet orientation C. Uphill dispersal piping
B. Material specifications D. None of the above

263. Which of the following is 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. Pressure distribution C. Individual and declustered systems
B. Infiltration area protection D. None of the above

264. The development of a final design plan that includes drawings, narratives, forms, calculations, photos, and other data, including_____, will help ensure a successful outcome. This information must be assembled into a cohesive document to allow the proper installation of the design without the need for any assumptions.
A. Infiltration area C. Detailed equipment and installation specifications
B. Inlet/outlet orientation D. None of the above

Background and Use of Onsite Wastewater Treatment Systems

265. Only about _____ of the land area in the United States has soils suited for conventional subsurface soil absorption fields.
A. 10 percent C. 1/4
B. 1/3 D. None of the above

266. System densities in some areas exceed the capacity of even suitable soils to assimilate wastewater flows and retain and transform their _____.
A. Nitrates C. Contaminants
B. Phosphorus compounds D. None of the above

267. Many systems are located too close to ground water or surface waters and others, particularly in rural areas with newly installed public water lines, are not designed to handle increasing _____ flows.
A. Wastewater C. Contaminants
B. Phosphorus compounds D. None of the above

268. Conventional onsite system installations might not be adequate for minimizing nitrate contamination of ground water, removing _____, and attenuating pathogenic organisms (e.g., bacteria, viruses).
A. Nitrates and phosphorus C. Contaminants
B. Phosphorus compounds D. None of the above

269. Which of the following that leach into ground water used as a drinking water source can cause methemoglobinemia, or blue baby syndrome, and other health problems for pregnant women?
A. Nitrates C. Contaminants
B. Phosphorus D. None of the above

270. Which of the following discharged into surface waters directly or through subsurface flows can spur algal growth and lead to eutrophication and low dissolved oxygen in lakes, rivers, and coastal areas?
A. Nitrates and phosphorus C. Contaminants
B. Phosphorus compounds D. None of the above

Septic Site Preparation and Excavation Practices
271. Overhead power lines, steep slopes, and excavations at the installation site can all present serious _____.
A. Safety hazard(s) C. Excavation(s)
B. Disturbance(s) D. None of the above

272. A brief preconstruction meeting can ensure that _____ and practices to eliminate, minimize, or respond to them are identified.
A. Safety hazard(s) C. Excavation(s)
B. Disturbance D. None of the above

273. Site preparation requires a number of activities including clearing and surface preparation for filling. Use of lightweight tracked equipment will minimize soil _____.
A. Compaction C. Excavation
B Infiltration D. None of the above

274. Soil _____ should be determined to ensure that it is dry, and care should be taken to avoid soil disturbance as much as possible.
A. Compaction C. Excavation
B. Moisture D. None of the above

275. To avoid potential soil damage during construction, the soil below the proposed infiltration surface elevation must be below its _____ during construction (i.e., it must lack the moisture required to make it moldable into stable shapes). This should be tested before excavation begins.
A. Compaction C. Excavation
B. Plastic limit D. None of the above

276. Site _____ is conducted only when the infiltration surface can be covered the same day to avoid loss of soil permeability from wind-blown silt or raindrop impact.
A. Compaction C. Excavation
B. Plastic limit D. None of the above

277. _____ and areas for traffic lanes, material stockpiling, and equipment parking should be designated on the drawings for the contractor.
A. Site access points C. Excavation
B. Disturbance D. None of the above

278. Flagging off the _____ area as early as possible is critical to ensure long-term function of the system.
A. Compaction C. Excavation
B. Infiltration D. None of the above

279. Grubbing of the site (mechanically raking away roots) should be avoided. If the site is to be filled, the surface should be moldboard- or chisel-plowed parallel to the contour (usually to a depth of seven to ten inches) when the soil is sufficiently dry to ensure maximum vertical_____.
A. Compaction C. Permeability
B. Infiltration D. None of the above

280. The organic layer should not be removed. Scarifying the surface with the teeth of a backhoe bucket is not sufficient. All efforts should be made to avoid any disturbance to the exposed _____ surface.
A. Moisture C. Infiltration
B. Disturbance D. None of the above

Field Construction Practices
281. Changes in construction practices over the past 25 years have led to improvements in the performance of _____.
A. Individual wastewater system(s) C. Long-term system performance
B. System design D. None of the above

282. _____in infiltration trenches should be scarified and the surface gently raked prior to installing the gravel or gravel-less piping/chambers.
A. Compaction C. Excavation
B. Smeared soil surfaces D. None of the above

283. If gravel or crushed rock is to be used for the system medium, the rock should be placed in the trench by using the backhoe bucket to_____.
A. Individual wastewater system(s) C. Long-term system performance
B. System design D. None of the above

284. It might be necessary to remove as much as four inches of soil to regain the natural soil porosity and _____.
A. Permeability C. Horizon
B. Disturbance D. None of the above

285. 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 an unacceptable soil_____.
A. Permeability C. Horizon
B. Disturbance D. None of the above

286. For gravel filled trenches, the trench bottom should be left rough and covered with six inches of clean (i.e., no fines) rock. _____ should be carefully placed over the rock, leveled, and bedded in on the sides.
A. Infiltration area C. Distribution pipe(s)
B. System design D. None of the above

287. After the rock and pipes have been placed in the trench, the _____should be placed over the top of the rock to prevent soil from moving into the rock. The soil backfill should be carefully crowned to fill the trench cavity at a height to allow for settling.
A. Filter fabric C. Onsite management
B. Infiltration area D. None of the above

288. Post construction activities include accurate documentation of all of the system components and the system location. Flag off the _____ to keep construction and other traffic away.
A. System design C. Onsite management
B. Infiltration area D. None of the above

Management Considerations
289. All _____programs should carefully consider construction and installation elements to ensure the proper operation of onsite systems. These programs should include permits, inspections, and installer training requirements.
A. System design C. Onsite management
B. Infiltration area D. None of the above

Construction/Installation Programs Basic Approach
290. Construction permit based on code-compliant site evaluations and _____.
A. System design C. Onsite management
B. Infiltration area D. None of the above

Construction Phases
Preparation Phase
291. Conduct a pre-construction conference at the site to _____, verify setbacks and other site conditions, check surface elevations, and identify potential problems or safety concerns.
A. Assess changes in conditions C. Identify site component locations
B. Septic system D. None of the above

292. _____ that may have occurred since design work was completed.
A. Assess changes in conditions C. Identify site component locations
B. Septic system D. None of the above

293. If work will be delayed, flag off or otherwise protect the _____.
A. Infiltration area(s) C. Gravity flow pipe(s)
B. Gravity flow system(s) D. None of the above

Project Execution

294. Verify designed treatment system components and materials, such as tank type, size, and material; piping; and gravel (if used) that is free of_____.

A. Gravity flow system(s) C. Pipe slopes
B. Fines D. None of the above

295. Excavate areas for conveyance piping, the tank(s), secondary treatment units, and infiltration or soil dispersal components according to designated depths and required _____.

A. Gravity flow system(s) C. Pipe slopes
B. Treatment system components D. None of the above

296. 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. Gravity flow system(s) C. Pipe slopes
B. Treatment system components D. None of the above

297. Ensure that the tank is on solid tamped ground, installed level and at the proper elevation, and that _____ is correct. Secure tank covers after hours to prevent accidents. Backfill tanks as soon as possible.

A. Inlet/outlet orientation C. Uphill dispersal piping
B. Distribution pipe effluent D. None of the above

298. Follow manufacturer's recommendations for_____. Plastic and fiberglass tanks usually require special installation techniques (e.g., anchoring, backfilling with sand, tamping backfill in lifts, filling tank with water as its backfilled, etc.)

A. Infiltration area(s) C. Gravity flow pipe(s)
B. Installing tanks D. None of the above

299. 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. Infiltration area(s) C. Gravity flow pipe(s)
B. Site component location(s) D. None of the above

300. Ensure that _____effluent dispersal holes go on the bottom.

A. Site component location(s) C. Distribution pipe
B. Gravity flow system(s) D. None of the above

301. Extend _____piping stubs 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/outlet C. Uphill dispersal piping
B. Distribution pipe effluent D. None of the above

302. Install access _____to the surface, install outlet filters/screens, and complete installation of pumps, wiring, control panels, and other components.

A. Port risers C. Gravity flow pipe(s)
B. Gravity flow system(s) D. None of the above

303. Install _____in key locations (near building sewer, D-box, etc.); this aids in operation/maintenance later on.
A. Infiltration area C. Cleanouts and inspection ports
B. Inlet/outlet orientation D. None of the above

Soil Texture
Identify the missing term.

304. When moist, a thin ribbon or 1/8 inch or smaller wire formed between thumb and finger will withstand considerable movement and deformation.
A. Sand C. Silty Clay
B. Loamy Sand D. None of the above

305. Consists of large amounts of clay and moderate to small amounts of sand and silt. It breaks into very hard clods or lumps when dry. When moist, a thin, long ribbon or 1/16-inch wire can be molded with ease. Fingerprints will show on the soil, and a dull to bright polish is made on the soil by a shovel.
A. Silt Loam C. Loam
B. Clay D. None of the above

306. Consists of an even mixture of the different sizes of sand and of silt and clay. It is easily crumbled when dry and has a slightly gritty, yet fairly smooth feel. It is slightly plastic.
A. Silt Loam C. Loam
B. Clay D. None of the above

307. Consists of a moderate amount of clay, a large amount of silt, and a small amount of sand. It breaks into moderately hard clods or lumps when dry.
A. Sandy Loam C. Soil Texture
B. Silty Clay Loam D. None of the above

308. When moist, a thin ribbon or 1/8-inch wire can be formed between thumb and finger that will sustain its weight and will withstand gentle movement.
A. Sandy Loam C. Soil Texture
B. Silty Clay Loam D. None of the above

309. Consists largely of sand, but has enough silt and clay present to give it a small amount of stability.
A. Sandy Loam C. Soil Texture
B. Silty Clay Loam D. None of the above

310. Individual sand grains can be readily seen and felt. Squeezed in the hand when dry, this soil will readily fall apart when the pressure is released.
A. Sandy Loam C. Soil Texture
B. Silty Clay Loam D. None of the above

311. Squeezed when moist, it forms a cast that will not only hold its shape when the pressure is released but will withstand careful handling without breaking. The stability of the moist cast differentiates this soil from sand.
A. Sandy Loam C. Soil Texture
B. Silty Clay Loam D. None of the above

312. Means the amount of each soil separate in a soil mixture. Field methods for judging the texture of a soil consist of forming a cast of soil, both dry and moist, in the hand and pressing a ball of moist soil between thumb and finger.
A. Sandy Loam C. Soil Texture
B. Silty Clay Loam D. None of the above

313. Individual grains can be seen and felt readily. Squeezed in the hand when dry, this soil will fall apart when the pressure is released.
A. Sand C. Silty Clay
B. Loamy Sand D. None of the above

314. Squeezed when moist, it will form a cast that will hold its shape when the pressure is released but will crumble when touched.
A. Sand C. Silty Clay
B. Loamy Sand D. None of the above

315. Consists primarily of sand, but has enough silt and clay to make it somewhat cohesive. The individual sand grains can readily be seen and felt.
A. Sand C. Silty Clay
B. Loamy Sand D. None of the above

316. Squeezed when dry, the soil will form a cast that will readily fall apart, but if squeezed when moist, a cast can be formed that will withstand careful handling without breaking.
A. Sand C. Silty Clay
B. Loamy Sand D. None of the above

317. Consists of a moderate amount of fine grades of sand, a small amount of clay, and a large quantity of silt particles. Lumps in a dry, undisturbed state appear quite cloddy, but they can be pulverized readily; the soil then feels soft and floury.
A. Silt Loam C. Loam
B. Clay D. None of the above

318. When wet, _____ runs together in puddles. Either dry or moist, casts can be handled freely without breaking. When a ball of moist soil is passing between thumb and finger, it will not press out into a smooth, unbroken ribbon but will have a broken appearance.
A. Silt Loam C. Loam
B. Clay D. None of the above

319. Consists of an even mixture of sand, silt, and clay that breaks into clods or lumps when dry. When a ball of moist soil is pressed between the thumb and finger, it will form a thin ribbon that will readily break, barely sustaining its own weight. The moist soil is plastic and will form a cast that will withstand considerable handling.
A. Clay Loam C. Loam
B. Clay D. None of the above

320. Consists of even amounts of silt and clay and very small amounts of sand. It breaks into hard clods or lumps when dry.
A. Sand C. Silty Clay
B. Loamy Sand D. None of the above

321. Squeezed in the hand when dry, it will form a cast that will withstand careful handling. The cast formed of moist soil can be handled freely without breaking.
A. Silt Loam C. Loam
B. Clay D. None of the above

Percolation Tests
322. A percolation test consists of digging one or more holes in the soil of the proposed dispersal field to a specified depth, presoaking the holes by maintaining a high water level in the holes, then completing the test by filling the holes to a specific level and timing and _____as the water percolates into the surrounding soil.
A. Allowable hydraulic loading rates C. An inappropriately high loading rate
B. Measuring the water level drop D. None of the above

323. The limitations of the test have caused many state and local agencies to either eliminate this test altogether or to require additional tests that must be conducted during a _____ to determine limiting site conditions and to estimate allowable hydraulic loading rates.
A. Allowable hydraulic loading rates C. Site evaluation
B. Specific level and timing D. None of the above

Fixed Film and Suspended Growth Advanced Treatment Systems
324. Fixed film and suspended growth advanced treatment systems provide an effluent of higher quality than_____.
A. Conventional septic tank discharges C. Effluent application rate(s)
B. Percolation test(s) D. None of the above

325. _____ allow marginal soils to more easily absorb and treat wastewater.
A. Allowable hydraulic loading rates C. An inappropriately high loading rate
B. Higher levels of treatment D. None of the above

326. Regular operation and maintenance attention for these systems is critical to maintaining performance and _____over the long term.
A. Critical factors C. Effluent application rate(s)
B. Ensuring system operation D. None of the above

327. The site evaluator needs to understand and analyze all of these critical factors when recommending_____.
A. Allowable hydraulic loading rates C. An inappropriately high loading rate
B. An alternative or advanced treatment system D. None of the above

328. _____may also need to be considered when planning large wastewater treatment systems or clustered facilities.
A. Critical factors C. Effluent application rate(s)
B. Several additional site evaluation factors D. None of the above

Perc Condition Terms Associated with Saturation

329. Mineral soils with a high amount of decomposed organic matter in the saturated zone, a value of 3 or less, and a chroma of 1 or less. Included in this category are organic soils with a minor amount of mineral matter.

A. High Chroma Matrix with Iron Depletions
B. Dark Colored Soils with Organic Matter Accumulation
C. Depleted Matrix without Iron Concentrations
D. None of the above

330. Soil horizons whose matrix color has a value of 4 or more and a chroma of 2 or less as a result of removal of iron and manganese oxides. Some visible zones of iron concentration are present as soft masses or pore linings.

A. High Chroma Matrix with Iron Depletions
B. Depleted Matrix with Iron Concentrations
C. Depleted Matrix without Iron Concentrations
D. None of the above

331. Soil horizons whose color is more or less uniform with a value of 4 or more and a chroma of 2 or less as a result of removing iron and manganese oxides. These horizons lack visible iron concentrations as soft masses or pore linings.

A. High Chroma Matrix with Iron Depletions
B. Depleted Matrix with Iron Concentrations
C. Depleted Matrix without Iron Concentrations
D. None of the above

Bedding and Backfilling

332. The tank should rest on_____. It is good practice to provide a level, granular base for the tank. The underlying soils must be capable of bearing the weight of the tank and its contents.

A. Tank and its contents
B. A uniform bearing surface
C. Shape and material of the tank
D. None of the above

333. Soils with a _____ or containing large boulders or massive rock edges are not suitable.

A. Imported granular material
B. High organic content
C. Drainage swales or depressions
D. None of the above

334. After setting the tank, leveling, and joining the_____, the tank can be backfilled.

A. Tank and its contents
B. Effluent line
C. Building sewer and effluent line
D. None of the above

335. The backfill material should be free-flowing and free of stones larger than _____ inches in diameter, debris, ice, or snow. It should be added in lifts and each lift compacted.

A. 2
B. 3
C. 4
D. None of the above

336. In fine-textured soils such as silts, silt loams, clay loams, and clay, _____ should be used. This is a must where freeze and thaw cycles are common because the soil movement during such cycles can work tank joints open. This is a significant concern when using plastic and fiberglass tanks.
A. Imported granular material C. Drainage swales or depressions
B. High organic content D. None of the above

337. _____and backfilling requirements vary with the shape and material of the tank. The manufacturer should be consulted for acceptable materials and procedures.
A. Tank and its contents C. The specific bedding
B. Effluent line D. None of the above

Joint Watertightness
338. The joints should be clean and dry before applying the joint sealer. Only _____joint sealers should be used.
A. High-quality C. Cured
B. Clean and dry D. None of the above

Flotation Prevention
339. If the tank is set where the soil can be saturated, tank flotation may occur, particularly when the tank is empty (e.g., recently pumped dose tanks or septic tank after septage removal). Tank manufacturers should be consulted for_____.
A. Tank and its contents C. Shape and material of the tank
B. Appropriate anti-flotation devices D. None of the above

Placement of the Infiltration Surface
340. Placement of a SWIS infiltration surface may be below, at, or _____ (in an in-ground trench, at grade, or elevated in a mound system).
A. Original soil profile C. Above the existing ground surface
B. SWIS infiltration surface D. None of the above

341. Actual placement relative to _____at the site is determined by desired separation from a limiting condition.
A. Original soil profile C. A limiting condition
B. SWIS infiltration surface D. None of the above

342. Treatment by removal of additional pollutants during movement through soils and the potential for excessive ground water mounding will control the _____from a limiting condition.
A. Minimum separation distance C. A limiting condition
B. SWIS infiltration surface D. None of the above

Collection Systems Section

Collection System and its Purpose
343. In accumulation to what homes and businesses flush down the drain, the system also collects excess groundwater, infiltration liquids, and inflow water.
A. True B. False

344. Wastewater collection is an incomplete liquid waste removal system.
A. True B. False

345. The fluid waste distributed through this system is about 78% water. The waste floats on, is carried along by, and goes into suspension or solution in water.
A. True B. False

Collection System Defined

346. Centralized systems are more inexpensive, allow for greater control, require fewer people, and produce only one discharge to monitor instead of several. However, _____systems can be useful, and this option should be evaluated on a case-by-case basis.
A. Decentralized C. Onsite
B. Centralized D. None of the above

347. Which of the following are the most common wastewater treatment system used in rural areas?
A. Decentralized C. Onsite
B. Centralized D. None of the above

348. Wastewater in _____ systems can also be treated by a small, private wastewater treatment plant. These plants can have similar treatment processes and equipment as centralized systems but on a smaller scale.
A. Decentralized C. Onsite
B. Centralized D. None of the above

349. Which of the following are designed to collect both sanitary wastewater and storm water runoff?
A. Combined sewer systems C. Wastewater management
B. Wastewater collection system D. None of the above

350. Which of the following systems can be a single septic system and drainfield serving one residence or a large soil absorption system serving an entire subdivision?
A. Decentralized C. Onsite
B. Centralized D. None of the above

351. During wet weather, the combined sanitary waste and _____ can overflow and discharge untreated wastewater directly to a surface water through a combined sewer overflow (CSO).
A. Storm water C. POTW
B. Combined sewers D. None of the above

352. During dry weather, _____ carry sanitary waste to a POTW.
A. Storm water C. POTW
B. Combined sewers D. None of the above

Collection System Operators' Purpose

353. Collection system operators are charged with protecting public health and the environment, and therefore must have documented proof of their certifications in the respective _____.
A. POTW C. Wastewater management system
B. Wastewater collection system D. None of the above

354. Collection system operators ensure that the system pipes remain clear and open. They eliminate obstructions and are constantly striving to improve flow characteristics. They keep the wastewater moving underground, unseen and unheard.
A. True B. False

355. Underground sanitary sewer pipes can clog or break, causing unplanned "overflows" of raw sewage that flood basements and streets.
A. True B. False

356. Storm sewers are not designed to quickly get rainwater off the streets during rain events.
A. True B. False

357. When there is too much rain, combined sewer systems cannot handle the extra volume and designed "overflows" of raw sewage into streams and rivers occur. The great majority of sewer systems have separated, not combined, sanitary and storm water pipes.
A. True B. False

358. The maintenance of the sewer system is a semi-continuous cycle.
A. True B. False

359. As sections of the system age, problems such as corroded concrete pipe, cracked tile, lost joint integrity, grease, and heavy root intrusion must be constantly monitored and repaired.
A. True B. False

360. Technology has developed collection system maintenance with such tools as television camera assisted line inspection equipment, jet-cleaning trucks, and improvements in pump design. Because of the increasing complexity of wastewater collection systems, collection system maintenance is evolving into a highly skilled trade.
A. True B. False

361. Leaking, overflowing, and insufficient wastewater collection systems cannot release untreated wastewater into receiving waters.
A. True B. False

362 Outdated pump stations, undersized to carry sewage from newly developed subdivisions or commercial areas, will not create any potential overflow hazards, adversely affecting human health and degrading the water quality of receiving waters.
A. True B. False

Understanding Gravity Sanitary Sewers

363. Sewer systems are designed to maintain proper flow velocities with?
A. Stormwater inflow C. Minimum head loss
C. Maximum head lass D. None of the above

364. Which of the following may find it necessary to dissipate excess potential energy?
A. Flow velocities C. Higher elevations in the system
B. Wastewater D. None of the above

365. Which of the following is determined largely by population served, density of population, and water consumption?
A. Design flow(s) C. Inflow
B. Flow D. None of the above

Excavation and Trenching Section

366. According to the text, the _____ was revised because excavating is the most dangerous of all construction operations.
A. Competent rule C. Emergency rule
B. OSHA excavation standard D. None of the above

367. OSHA also revised the _____ to clarify the requirements.
A. Competent rule C. Protective equipment standard
B. Existing standard D. None of the above

368. The performance criteria in the new standard provides employers with options when classifying soil and when selecting methods to protect the _____ from cave-ins.
A. Competent person C. Construction equipment
B. Employee D. None of the above

Competent Person

369. Competent person means one who is capable of identifying existing hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees. The _____ has authorization to take prompt corrective measures to eliminate identified hazards.
A. Competent person C. Watchman
B. Contractor D. None of the above

370. A _____ must have specific training in and be knowledgeable about soils analysis, the use of protective systems and the requirements of 29 CFR Part 1926.650-652 Subpart P.
A. Competent person C. Watchman
B. Contractor D. None of the above

371. Everyone is required to practice _____ one a year.
A. Competent person training C. Emergency procedures
B. Rescue training exercises D. None of the above

Competent Person Duties

372. The competent person performs daily inspections of the protective equipment, _____, safety equipment, and adjacent areas.
A. Work progress C. Trench conditions
B. Construction Crew D. None of the above

373. The competent person shall make _____ prior to the start of work and as needed throughout the shift.
A. Personnel assignments C. Inspections
B. Training available D. None of the above

374. The competent person shall make _____ after every rainstorm or other hazard occurrence.
A. Inspections C. Protective equipment available
B. Training available D. None of the above

375. The competent person must have knowledge of _____, telephone or radio dispatch.
A. Personnel assignments C. Emergency contact methods
B. Work schedules D. None of the above

Scope of Work
376. According to the text, during excavation work a competent person shall be on the job site at all times when personnel are working within or around the _____.
A. Competent person C. Excavation
B. Contractors D. None of the above

377. Prior to opening an excavation, the estimated locations of _____ that reasonably may be expected to be encountered during excavation work shall be determined.
A. Unauthorized persons C. Underground utility installations
B. Employees D. None of the above

378. _____ shall be taken to protect employees against the hazards posed by water accumulation in the excavation.
A. Additional care C. Ladders
B. Adequate precautions D. None of the above

379. In trench excavations that are four (4') feet or more in depth, a stairway, ladder, or ramp shall be used as a _____.
A. Tool C. Bridge
B. Means of access or egress D. None of the above

380. When ladder(s) are employed, the top of the ladder shall extend a minimum of _____ feet above the ground and shall be properly secured.
A. Two C. Four
B. Three D. None of the above

381. When excavations are made in vehicular traffic areas, _____ shall wear a warning vest made with reflective material or highly visibility material.
A. Competent persons C. Rescue personnel
B. Each employee D. None of the above

382. The air shall be tested in excavations where _____ exist, or could be reasonably expected to exist.
A. Limited visibilities C. Oxygen deficiency or gaseous conditions
B. Employees D. None of the above

383. When the atmosphere contains less than 19.5 percent oxygen, the area must be continuously ventilated until the _____.
A. Excavation is closed C. Oxygen levels are above 19.5 percent
B. Employees enter the space D. None of the above

384. Where a _____, the area shall be ventilated until the flammable gas concentration is below 20 percent of the LFL (lower flammable limit).
A. Competent person requires monitoring
B. Gaseous condition exists
C. Worker encounters fumes
D. None of the above

385. Whenever _____ exist or could reasonably exist, the air must be monitored continuously to assure that workers are protected.
A. Traffic conditions
B. Excavations
C. Oxygen deficiency or gaseous conditions
D. None of the above

386. Where the stability of adjoining buildings, walls or other structures are _____, shoring, bracing, or underpinning shall be provided to ensure the stability of such structures for the protection of employees.
A. Not a concern
B. Not mentioned in the specifications
C. Endangered by excavation operations
D. None of the above

387. In situations where sidewalks, pavement and appurtenant structures may be undermined, a support system such as shoring must be provided to protect _____ from the possible collapse of such structures.
A. Unauthorized persons
B. Employees
C. Vehicles
D. None of the above

Personnel Protective Systems
388. According to the text, employees in _____ shall be protected from cave-ins by an adequate protective system, which shall be inspected by a competent person.
A. Excavations
B. Vehicles
C. Protective systems
D. None of the above

389. The use of _____ is required for all excavations deeper than five (5') feet, except when excavation is within stable rock.
A. Tables
B. Tabulated data
C. Protective systems
D. None of the above

390. For trench excavations less than five (5') feet deep, the use of _____ may not be required unless there is evidence of a potential cave-in. The competent person shall make this determination.
A. Ladders
B. Protective systems
C. Ramps
D. None of the above

391. Requirements for sloping, benching or protective systems are found in _____.
A. Safety Manuals
B. Tabulated data
C. CFR 1926.652 (OSHA Construction Standards)
D. None of the above

392. Whenever support systems, _____, or other protective systems are being used, a written copy of the manufacturer's specifications, recommendations, and limitations sheet shall be available at the job site.
A. Shield systems
B. Tabulated data
C. Ramps
D. None of the above

Excavation Protection Systems

393. There are three basic protective systems for excavations and trenches. They are sloping and benching systems, _____, and shields.

A. Shoring C. Attendants
B. Ramps D. None of the above

394. Every employee in an excavation or trench shall be protected from _____ by an adequate protective system.

A. Unauthorized persons C. Polluted air
B. Cave-ins D. None of the above

Sloping and Benching Systems

395. An option for sloping is to slope to the angle required by OSHA Construction Standards for Type C, which is the most _____.

A. Unstable soil type C. Porous soil type
B. Stable soil type D. None of the above

396. Another option for sloping is to first determine the soil type, then use the table provided in Appendix B of the standard to determine the _____.

A. Maximum allowable angle C. Protective system to be used
B. Porosity D. None of the above

Shoring Systems

397. _____ is another protective system that utilizes a framework of vertical members, horizontal members, and cross braces to support the sides of the excavation to prevent a cave-in.

A. Shoring C. Lateral support
B. Tabulated data D. None of the above

Shield Systems (Trench Boxes)

398. Shielding is the third method of providing a safe workplace in excavations. Unlike sloping and shoring, _____ does not prevent a cave-in.

A. Shielding C. Soil testing
B. Tabulated data D. None of the above

Safety Precautions for Shield Systems

399. There must not be any lateral movement of _____ when installed.

A. Sloping and benching systems C. Ladders
B. Shields D. None of the above

Personal Protective Equipment

400. _____ requires that employees wear a hard hat, safety glasses, and work boots on the jobsite.

A. The contractor C. Recommended practice
B. OSHA policy D. None of the above