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This course contains general EPA's CWA federal rule requirements. Please be aware that each state implements 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.

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Onsite Treatment Processes

1. Onsite sewage treatment systems provide septic system owners with best management practices to keep their _____ functioning properly.

- A. Conventional system(s)
- B. The tank effluent
- C. Septic systems
- D. Volumes of treated wastewater
- E. Primary and secondary treatment
- F. None of the Above

2. These practices are really about recycling water: cleaning _____ and returning safe water to the water cycle. If a septic system is not functioning properly, clean water is not returned to our groundwater systems.

- A. Sewage
- B. Wastewater
- C. Septic system
- D. Collection system
- E. Centralized wastewater treatment
- F. None of the Above

3. 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. Sewage
- B. Dispersed or discharged effluent
- C. Septic system
- D. Collection system
- E. Centralized wastewater treatment
- F. None of the Above

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

- A. Wastewater
- B. Onsite sewage treatment
- C. Sewage
- D. Biological and chemical processes
- E. Wastewater collection and treatment
- F. None of the Above

5. Which of the following terms 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. Wastewater system(s)
- C. Septic system(s)
- D. Collection system(s)
- E. Centralized wastewater system(s)
- F. None of the Above

Primary Treatment

6. 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. The quantity of contaminants
- D. Septic tank effluent filters
- E. Primary and secondary treatment
- F. None of the Above

Secondary Treatment

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

- A. Wastewater
- B. Onsite sewage treatment
- C. Enhanced organic matter removal
- D. Biological and chemical processes
- E. Wastewater collection and treatment
- F. None of the Above

8. A typical standard for _____ is biochemical oxygen demand (BOD) and total suspended solids (TSS) concentrations less than or equal to 20 mg/L each on a 30-day average basis.

- A. Wastewater
- B. Onsite sewage treatment
- C. Enhanced organic matter removal
- D. Biological and chemical processes
- E. Wastewater collection and treatment
- F. None of the Above

Tertiary (Advanced) Treatment

9. Which of the following terms includes enhanced organic matter removal, pathogen reduction, and nutrient removal. Standards for advanced or tertiary effluent vary according to regulatory requirements.

- A. Advanced treatment of wastewater
- B. Onsite sewage treatment
- C. Enhanced organic matter removal
- D. Biological and chemical processes
- E. Wastewater collection and treatment
- F. None of the Above

10. Which of the following terms parameters can include nitrate-nitrogen, phosphorus, and bacteria (fecal coliform less than 10 colony forming units per 100 ml).

- A. Conventional system(s)
- B. The tank effluent
- C. The quantity of contaminants
- D. Volumes of treated wastewater
- E. Typical effluent quality
- F. None of the Above

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

- A. Advanced treatment
- B. Onsite sewage treatment
- C. Enhanced organic matter removal
- D. Biological and chemical processes
- E. Wastewater collection and treatment
- F. None of the Above

Conventional Systems

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

- A. Conventional system(s)
- B. The tank effluent
- C. The quantity of contaminants
- D. Volumes of treated wastewater
- E. Conventional treatment systems
- F. None of the Above

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

13. Which of the following terms consists of a septic tank and a soil absorption field that allows primary treatment effluent to infiltrate into unsaturated soil?

- A. A conventional wastewater treatment system
- B. The tank effluent
- C. The quantity of contaminants
- D. Volumes of treated wastewater
- E. Primary and secondary treatment
- F. None of the Above

14. Which of the following terms can serve individual homes or businesses, or clusters of buildings?

- A. Conventional system(s)
- B. The tank effluent
- C. The quantity of contaminants
- D. Volumes of treated wastewater
- E. Primary and secondary treatment
- F. None of the Above

15. The septic tank treats _____ by allowing floatable materials to rise to the surface, forming a scum layer, and the heavier solids to sink to the bottom, creating a layer of sludge.

- A. Pretreatment components
- B. Gravity flow systems
- C. Septic tank effluent
- D. Septic tanks, trash tanks, and processing tanks
- E. Wastewater
- F. None of the Above

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

- A. Conventional system(s)
- B. The tank effluent
- C. The quantity of contaminants
- D. Volumes of treated wastewater
- E. Primary and secondary treatment
- F. None of the Above

Pretreatment Components

17. Which of the following terms remove many of the contaminants from the wastewater to prepare the effluent for final treatment and dispersal into the environment?

- A. Pretreatment components
- B. Gravity flow systems
- C. Septic tank effluent
- D. Septic tanks, trash tanks, and processing tanks
- E. Advanced systems
- F. None of the Above

18. Which of the following terms is reduced to a level the soil can accept and treat?

- A. Advanced system(s)
- B. Septic tank effluent
- C. The dose/rest cycle
- D. The quantity of contaminants
- E. Final treatment and dispersal components
- F. None of the Above

19. Which of the following terms 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
- B. Gravity flow systems
- C. Septic tank effluent
- D. Septic tanks, trash tanks, and processing tanks
- E. Advanced systems
- F. None of the Above

20. Which of the following terms provide the final removal of contaminants and distribute the effluent for dispersal back into the environment?

- A. Advanced system(s)
- B. Septic tank effluent
- C. The dose/rest cycle
- D. Pressurized distribution methods
- E. Final treatment and dispersal components
- F. None of the Above

21. Which of the following terms 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. Pretreatment components
- B. Gravity flow systems
- C. Septic tank effluent
- D. Septic tanks, trash tanks, and processing tanks
- E. Advanced systems
- F. None of the Above

22. Which of the following terms overcome a variety of site limitations. Low pressure, subsurface drip, and spray distribution systems are designed to function in difficult areas?

- A. Advanced system(s)
- B. Septic tank effluent
- C. The dose/rest cycle
- D. Pressurized distribution methods
- E. Final treatment and dispersal components
- F. None of the Above

Advanced Systems

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

- A. Pretreatment components
- B. Gravity flow systems
- C. Septic tank effluent
- D. Septic tanks, trash tanks, and processing tanks
- E. Advanced systems
- F. None of the Above

24. 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 soil depth below the infiltrative surface in the drainfield is less than the minimum required, _____ or components can be added to increase pollutant removal prior to soil discharge.

- A. Advanced system(s)
- B. Septic tank effluent
- C. The dose/rest cycle
- D. Advanced treatment processes
- E. Final treatment and dispersal components
- F. None of the Above

25. In environmentally sensitive areas, _____ can be used to meet effluent standards for oxygen-demanding wastes, bacteria, nitrogen, and phosphorus.

- A. Pretreatment components
- B. Gravity flow systems
- C. Septic tank effluent
- D. Septic tanks, trash tanks, and processing tanks
- E. Advanced systems
- F. None of the Above

26. Which of the following terms malfunctions hydraulically due to a buildup of the biomat at the infiltrative surface, it may be restored, and treatment may be enhanced?

- A. Advanced system(s)
- B. Septic tank effluent
- C. The dose/rest cycle
- D. Pressurized distribution methods
- E. Final treatment and dispersal components
- F. None of the Above

27. Which of the following terms allows the soil to drain between doses, improving soil oxygen transfer?

- A. Advanced system(s)
- B. Septic tank effluent
- C. The dose/rest cycle
- D. Pressurized distribution methods
- E. Final treatment and dispersal components
- F. None of the Above

28. Wastewater with high organic strength (e.g., from a restaurant) can employ _____ to improve aeration, biological decomposition, and treatment of organic wastes.

- A. Pretreatment components
- B. Gravity flow systems
- C. Septic tank effluent
- D. Septic tanks, trash tanks, and processing tanks
- E. Advanced treatment units/processes
- F. None of the Above

29. Which of the following terms that provide timed dosing of septic tank or treatment unit effluent to the soil can sometimes be used where soil infiltration areas are limited?

- A. Advanced system(s)
- B. Septic tank effluent
- C. The dose/rest cycle
- D. Pressurized distribution methods
- E. Final treatment and dispersal components
- F. None of the Above

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

- A. Pretreatment components
- B. Gravity flow systems
- C. Septic tank effluent
- D. Septic tanks, trash tanks, and processing tanks
- E. Advanced systems
- F. None of the Above

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

- A. Advanced system(s)
- B. Septic tank effluent
- C. The dose/rest cycle
- D. Pressurized distribution methods
- E. Final treatment and dispersal components
- F. None of the Above

Elevated (Mound or At-Grade) Systems

32. This system type includes _____ to provide primary (and sometimes secondary) treatment prior to discharging the effluent to a modified drainfield.

- A. Pressure distribution
- B. Septic tank effluent
- C. Septic system
- D. A septic tank or prefabricated treatment unit
- E. Infiltration area protection
- F. None of the Above

33. 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
- B. Septic tank effluent
- C. Soil dispersal field
- D. Modified dispersal area
- E. Aerobic treatment units (ATUs)
- F. None of the Above

34. 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
- B. Media filter(s)
- C. ATU(s)
- D. Vegetative submerged bed(s)
- E. Infiltrative surface
- F. None of the Above

Mound Systems

35. Which of the following terms are appropriate for areas with a high water table or shallow, fractured bedrock?

- A. At-grade systems
- B. Septic tank effluent
- C. Soil dispersal field
- D. Effluent flows from the tank
- E. Aerobic treatment units (ATUs)
- F. None of the Above

36. 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
- B. Media filter(s)
- C. ATU(s)
- D. Vegetative submerged bed(s)
- E. Distribution lines
- F. None of the Above

Aerobic Treatment Units

37. Which of the following terms 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?

- A. At-grade systems
- B. Septic tank effluent
- C. Soil dispersal field
- D. Effluent flows from the tank
- E. Aerobic treatment units (ATUs)
- F. None of the Above

38. Three processes are involved in most _____: physical separation (mostly settling), aerobic treatment, and clarification.

- A. Media
- B. Media filter(s)
- C. ATU(s)
- D. Vegetative submerged bed(s)
- E. Aerobic systems
- F. None of the Above

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

- A. Media
- B. Media filter(s)
- C. ATU(s)
- D. Vegetative submerged bed(s)
- E. Distribution lines
- F. None of the Above

Media Filters

40. Which of the following terms 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. Septic tank effluent
- B. Wastewater
- C. Septic system
- D. Individual and clustered systems
- E. Infiltration area protection
- F. None of the Above

41. _____ are available to treat wastewater. Sand is the most commonly used media, but clean gravel, crushed glass, textile strips, peat, and tire crumbs are also used, depending on site restrictions and state/local regulations.

- A. Media
- B. Media filter(s)
- C. ATU(s)
- D. Vegetative submerged bed(s)
- E. Distribution lines
- F. None of the Above

42. 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. At-grade systems
- B. Septic tank effluent
- C. Soil dispersal field
- D. Effluent flows from the tank
- E. Aerobic treatment units (ATUs)
- F. None of the Above

43. 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
- B. Media filter(s)
- C. ATU(s)
- D. Vegetative submerged bed(s)
- E. Distribution lines
- F. None of the Above

44. Effluent that percolates through the media bed is discharged to the?

- A. At-grade systems
- B. Septic tank effluent
- C. Soil dispersal field
- D. Effluent flows from the tank
- E. Aerobic treatment units (ATUs)
- F. None of the Above

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

45. Which of the following terms 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. Media
- B. Media filter(s)
- C. ATU(s)
- D. Vegetative submerged bed(s)
- E. Distribution lines
- F. None of the Above

46. Which of the following terms are extremely passive and require little management in producing a good quality effluent?

- A. Septic system(s)
- B. Cluster system(s)
- C. Treatment facilities
- D. Collection systems for clustered facilities
- E. Wetland system(s)
- F. None of the Above

47. Effluent is further treated when discharged to _____ following flow through the wetland cell(s).

- A. Media
- B. Media filter(s)
- C. Unsaturated soil
- D. Vegetative submerged bed(s)
- E. Distribution lines
- F. None of the Above

Cluster System Applications

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

- A. Pressure distribution
- B. Septic tank effluent pump (STEP)
- C. Septic system
- D. Individual and clustered systems
- E. Infiltration area protection
- F. None of the Above

49. Which of the following terms facilities serving clustered buildings may range from a communal septic tank and soil dispersal system to a more advanced treatment system?

- A. Treatment
- B. Wastewater
- C. Septic system
- D. Individual and clustered systems
- E. Infiltration area protection
- F. None of the Above

50. Advanced systems may facilitate local reuse of the treated effluent for toilet flushing, irrigation, industrial purposes, or to replenish?

- A. Aerobic microsite(s)
- B. All sewage
- C. Aquifer(s)
- D. Microbes and other particles
- E. Waterborne illnesses
- F. None of the Above

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

- A. Septic system(s)
- B. Cluster system(s)
- C. Treatment facilities
- D. Collection systems for clustered facilities
- E. Wetland system(s)
- F. None of the Above

Septic System Failures

52. Septic system failures are a major source of groundwater pollution. 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. Aerobic microsite(s)
- B. All sewage
- C. Bacteria and viruses
- D. Microbes and other particles
- E. Waterborne illnesses
- F. None of the Above

53. Septic system maintenance 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?

- A. Septic system(s)
- B. Cluster system(s)
- C. Treatment facilities
- D. Collection systems for clustered facilities
- E. System
- F. None of the Above

54. 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)
- B. All sewage
- C. Aquifer(s)
- D. Microbes and other particles
- E. Waterborne illnesses
- F. None of the Above

55. Systems can treat individual homes, clusters of buildings, or whole subdivisions and/or commercial establishments. _____ for clustered facilities can work by gravity or operate via vacuum or pressure pump.

- A. Septic system(s)
- B. Cluster system(s)
- C. Treatment facilities
- D. Collection systems
- E. Wetland system(s)
- F. None of the Above

56. Wastewater is typically treated through primary and secondary processes (and sometimes tertiary or _____) and can be disinfected prior to discharge.

- A. Advanced "polishing" procedures
- B. Wastewater
- C. Septic system
- D. Individual and clustered systems
- E. Infiltration area protection
- F. None of the Above

Improving OSSF Treatment through Performance Requirements

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

- A. Regular maintenance
- B. Drainage features
- C. Septic system
- D. Subsurface wastewater infiltration system (SWIS)
- E. Approving the use of various treatment technologies
- F. None of the Above

58. Over the past 20 years the onsite wastewater treatment system 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. Performance requirements
- B. Water resources
- C. Fixed-film reactors
- D. Primary and secondary processes
- E. New treatment technologies
- F. None of the Above

59. 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. Alternative treatment technologies
- B. Existing technologies
- C. Improvements to existing technologies
- D. Performance-based management
- E. Wastewater characteristics, and site conditions
- F. None of the Above

60. Which of the following terms can be expressed as numeric criteria or narrative criteria 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. Fixed-film reactors
- D. Primary and secondary processes
- E. Onsite wastewater treatment system (OWTS)
- F. None of the Above

61. Which of the following terms 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. Alternative treatment technologies
- B. Existing technologies
- C. Wastewater flow and pollutant content
- D. Performance-based management
- E. Wastewater characteristics, and site conditions
- F. None of the Above

62. Which of the following terms 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. Wastewater
- C. Septic system
- D. Individual and clustered systems
- E. Infiltration area protection
- F. None of the Above

63. Which of the following terms based on these technologies are defined by performance requirements, wastewater characteristics, and site conditions?

- A. Alternative treatment technologies
- B. Existing technologies
- C. Wastewater flow and pollutant content
- D. The application and sizing of treatment units
- E. Wastewater characteristics, and site conditions
- F. None of the Above

Performance-Based Standards

64. 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. Fixed-film reactors
- D. Primary and secondary processes
- E. Onsite wastewater treatment system (OWTS)
- F. None of the Above

65. Which of the following terms approaches have been proposed as a substitute for prescriptive requirements for system design, siting, and operation?

- A. Alternative treatment technologies
- B. Existing technologies
- C. Wastewater flow and pollutant content
- D. Performance-based management
- E. Wastewater characteristics, and site conditions
- F. None of the Above

System Design Considerations

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

- A. Soil condition(s)
- B. System/technology
- C. Subsurface drainfield(s)
- D. Life of system components
- E. System compatibility
- F. None of the Above

67. 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
- B. Existing technologies
- C. Wastewater flow and pollutant content
- D. Pollutant profile of wastewater
- E. Wastewater characteristics, and site conditions
- F. None of the Above

68. Which of the following terms permitting programs are expanding the options available for providing treatment services?

- A. Regular maintenance
- B. Drainage features
- C. Septic system
- D. State and local wastewater system
- E. Approving the use of various treatment technologies
- F. None of the Above

Management Considerations

69. Which of the following terms systems require management?

- A. Soil condition(s)
- B. System/technology
- C. Subsurface drainfield(s)
- D. Life of system components
- E. Wastewater treatment
- F. None of the Above

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

- A. Complexity of service
- B. Final design components
- C. All system components
- D. Operation in extreme conditions
- E. Designs and materials specifications
- F. None of the Above

71. _____ and access to repair parts.

- A. Soil condition(s)
- B. System/technology
- C. Subsurface drainfield(s)
- D. Life of system components
- E. System compatibility
- F. None of the Above

72. Maintenance needs, including frequency and?
- A. Complexity of service
 - B. Final design components
 - C. All system components
 - D. Very cold or wet climates
 - E. Designs and materials specifications
 - F. None of the Above

Permitting and Approval Process

73. State and local governments vary considerably in their approach to approving _____ and issuing installation and operation permits. Consultation with state and local regulatory agencies is required in all cases to ensure that minimum requirements are met. In general, a typical permit application procedure should include the following information:

Consultation with the property owner regarding final design components.

- A. Complexity of service
- B. Final design components
- C. All system components
- D. System types and components
- E. Designs and materials specifications
- F. None of the Above

74. 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
- B. System location and features
- C. Installation specifications
- D. System maintenance
- E. Wastewater treatment system
- F. None of the Above

75. If the site has been developed, all structures, utilities, and _____ should be identified.

- A. Regular maintenance
- B. Drainage features
- C. Septic system
- D. Ingress and egress pathways
- E. Various treatment technologies
- F. None of the Above

76. 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. Drainage features
- B. System location and features
- C. Installation specifications
- D. System maintenance
- E. Minimum setbacks met
- F. None of the Above

Regular Maintenance

77. Regular maintenance is required for _____. However, it is especially important for more complex alternative systems, especially those that use pumps, controls, timers, and pressure distribution.

- A. All systems
- B. Wastewater systems
- C. Septic systems
- D. Individual and clustered systems
- E. Infiltration area protection
- F. None of the Above

78. 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
- B. System location and features
- C. Installation specifications
- D. System maintenance
- E. Wastewater treatment system
- F. None of the Above

These records should reflect:

79. The _____. If properly designed, installed, and maintained, a septic system can effectively treat household wastewater for up to 20 years or more.

- A. Regular maintenance
- B. Drainage features
- C. Size of the system
- D. Age of the system
- E. Location of the system
- F. None of the Above

80. The _____. Size is important because graywater and blackwater need to be retained in the tank for at least a day or more to allow solids to separate from the liquids and begin breaking down.

- A. Regular maintenance
- B. Drainage features
- C. Size of the system
- D. Age of the system
- E. Location of the system
- F. None of the Above

81. The _____. Knowing where the tank and drainfield are will help you visually check the area for obvious signs of failure.

- A. Regular maintenance
- B. Drainage features
- C. Size of the system
- D. Age of the system
- E. Location of the system
- F. None of the Above

Testing and Certification

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

- A. Regular maintenance
- B. Drainage features
- C. Septic system
- D. Adequate tank size
- E. Treatment technologies
- F. None of the Above

Construction Section

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

- A. Pressure distribution
- B. Wastewater
- C. Septic system
- D. Clustered systems
- E. Infiltration area protection
- F. None of the Above

84. Construction activities 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. Infiltration area
- B. Inlet/outlet orientation
- C. Distribution pipe effluent
- D. Secondary treatment unit(s)
- E. Uphill dispersal piping
- F. None of the Above

85. Which of the following terms, 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
- B. Wastewater
- C. Septic system
- D. Individual and clustered systems
- E. Infiltration area protection
- F. None of the Above

86. 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
- B. Inlet/outlet orientation
- C. Distribution pipe effluent
- D. Detailed equipment and installation specifications
- E. Uphill dispersal piping
- F. None of the Above

Preparation Phase

87. Conduct a pre-construction conference at the site to identify site component locations, verify setbacks and other site conditions, check surface elevations, and identify potential problems or safety concerns (_____).

- A. Pressure distribution
- B. Wastewater
- C. Septic system
- D. Individual and clustered systems
- E. Infiltration area protection
- F. None of the Above

88. Assess changes in conditions (_____) that may have occurred since design work was completed.

- A. Infiltration area
- B. Inlet/outlet orientation
- C. Distribution pipe effluent
- D. Secondary treatment unit(s)
- E. Uphill dispersal piping
- F. None of the Above

89. If work will be delayed, flag off or otherwise protect the?

- A. Infiltration area(s)
- B. Site component location(s)
- C. Gravity flow system(s)
- D. Gravity flow pipe(s)
- E. Designed component finished condition(s)
- F. None of the Above

Project Execution

90. Verify designed treatment system components and materials, such as tank type, size, and material; piping; and?

- A. Infiltration area(s)
- B. Site component location(s)
- C. Gravity flow system(s)
- D. Gravity flow pipe(s)
- E. Designed component finished condition(s)
- F. None of the Above

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

- A. Infiltration area
- B. Inlet/outlet orientation
- C. Distribution pipe effluent
- D. Pipe slopes
- E. Uphill dispersal piping
- F. None of the Above

92. 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. Infiltration area(s)
- B. Site component location(s)
- C. Gravity flow system(s)
- D. Gravity flow pipe(s)
- E. Designed component finished condition(s)
- F. None of the Above

93. 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. Infiltration area
- B. Inlet/outlet orientation
- C. Distribution pipe effluent
- D. Secondary treatment unit(s)
- E. Uphill dispersal piping
- F. None of the Above

94. Follow manufacturer's recommendations for?

- A. Infiltration area(s)
- B. Site component location(s)
- C. Installing tanks
- D. Gravity flow pipe(s)
- E. Designed component finished condition(s)
- F. None of the Above

95. Ensure that _____ are plumbed, wired, and installed to allow easy inspection, access, and removal (e.g., use quick-connect union and backflow prevention valve between pump and uphill dispersal piping).

- A. Infiltration area
- B. Inlet/outlet orientation
- C. Distribution pipe effluent
- D. Pumps
- E. Uphill dispersal piping
- F. None of the Above

96. 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)
- B. Site component location(s)
- C. Gravity flow system(s)
- D. Gravity flow pipe(s)
- E. Designed component finished condition(s)
- F. None of the Above

97. Ensure that _____ effluent dispersal holes go on the bottom.

- A. Infiltration area(s)
- B. Site component location(s)
- C. Gravity flow system(s)
- D. Gravity flow pipe(s)
- E. Distribution pipe
- F. None of the Above

98. 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. Infiltration area
- B. Inlet/outlet
- C. Distribution pipe effluent
- D. Secondary treatment unit(s)
- E. Uphill dispersal piping
- F. None of the Above

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

- A. Port risers
- B. Site component location(s)
- C. Gravity flow system(s)
- D. Gravity flow pipe(s)
- E. Designed component finished condition(s)
- F. None of the Above

100. Install _____ in key locations (near building sewer, D-box, etc.); this aids in operation/maintenance later on.

- A. Infiltration area
- B. Inlet/outlet orientation
- C. Distribution pipe effluent
- D. Cleanouts and inspection ports
- E. Uphill dispersal piping
- F. None of the Above

101. Conduct functional test of the system after installation, checking flows, pump discharge (if used), operation of?

- A. Infiltration area(s)
- B. Site component location(s)
- C. Gravity flow system(s)
- D. Gravity flow pipe(s)
- E. Designed component finished condition(s)
- F. None of the Above

Site Preparation and Excavation Practices

102. Overhead power lines, steep slopes, and _____ at the installation site can all present serious safety hazards. A brief preconstruction meeting can ensure that safety hazards and practices to eliminate, minimize, or respond to them are identified.

- A. Compaction
- B. Moisture
- C. Disturbance
- D. Excavations
- E. Infiltration
- F. None of the Above

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

- A. Compaction
- B. Moisture
- C. Disturbance
- D. Excavation
- E. Infiltration
- F. None of the Above

104. 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
- B. Moisture
- C. Disturbance
- D. Excavation
- E. Infiltration
- F. None of the Above

105. To avoid potential soil _____ during construction, the soil below the proposed infiltration surface elevation must be below its plastic limit during construction.

- A. Compaction
- B. Moisture
- C. Disturbance
- D. Excavation
- E. Damage
- F. None of the Above

106. 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
- B. Moisture
- C. Disturbance
- D. Excavation
- E. Infiltration
- F. None of the Above

107. Another solution is to use light-weight gravel-less systems, which reduce the _____ process. Site access points and areas for traffic lanes, material stockpiling, and equipment parking should be designated on the drawings for the contractor.

- A. Compaction
- B. Moisture
- C. Disturbance
- D. Excavation
- E. Infiltration
- F. None of the Above

108. Heavy equipment should be diverted from the absorption field to avoid compaction and damage to the area. Flagging off the _____ area as early as possible is critical to ensure long-term function of the system.

- A. Compaction
- B. Moisture
- C. Disturbance
- D. Excavation
- E. Infiltration
- F. None of the Above

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

- A. Compaction
- B. Moisture
- C. Disturbance
- D. Permeability
- E. Infiltration
- F. None of the Above

110. 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. Compaction
- B. Moisture
- C. Disturbance
- D. Excavation
- E. Infiltration
- F. None of the Above

Field Construction Practices

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

- A. Individual wastewater system(s)
- B. Infiltration area
- C. System design
- D. Long-term system performance
- E. Distribution pipe(s)
- F. None of the Above

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

- A. Compaction
- B. Moisture
- C. Smearred soil surfaces
- D. Excavation
- E. Infiltration
- F. None of the Above

113. 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 long-term system performance. If soil compaction occurs during drainfield installation, _____, but only by removing the compacted layer.

- A. Individual wastewater system(s)
- B. Infiltration area
- C. System design
- D. Long-term system performance
- E. Distribution pipe(s)
- F. None of the Above

114. 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. Compaction
- B. Moisture
- C. Disturbance
- D. Horizon
- E. Infiltration
- F. None of the Above

115. For gravel filled trenches, the trench bottom should be left rough and covered with six inches of clean rock. _____ should be carefully placed over the rock, leveled, and bedded in on the sides.

- A. Individual wastewater system(s)
- B. Infiltration area
- C. System design
- D. Long-term system performance
- E. Distribution pipe(s)
- F. None of the Above

116. 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
- B. Infiltration area
- C. System design
- D. Long-term system performance
- E. Distribution pipe(s)
- F. None of the Above

117. 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. Individual wastewater system(s)
- B. Infiltration area
- C. System design
- D. Long-term system performance
- E. Distribution pipe(s)
- F. None of the Above

Management Considerations

118. All _____ programs should carefully consider construction and installation elements to ensure the proper operation of onsite systems.

- A. Individual wastewater system(s)
- B. Infiltration area
- C. System design
- D. Long-term system performance
- E. Onsite management
- F. None of the Above

Construction/Installation Programs Basic Approach

119. Construction permit based on code-compliant site evaluations and?

- A. Individual wastewater system(s)
- B. Infiltration area
- C. System design
- D. Long-term system performance
- E. Distribution pipe(s)
- F. None of the Above

120. Inspection of systems prior to backfilling to confirm that installation complies with?

- A. Activated sludge-based unit(s)
- B. O&M maintenance activities(s)
- C. Inspection(s)
- D. Effective wastewater management
- E. Staking of system components
- F. None of the Above

Intermediate Approach

121. Construction oversight for all critical steps (e.g., field verification and staking of system components, inspections after backfilling, and?

- A. Installation completion
- B. O&M maintenance activitie(s)
- C. Inspection(s)
- D. Effective wastewater management
- E. Staking of system components
- F. None of the Above

Inspections

122. Which of the following terms inspections should be conducted by trained and certified personnel at several stages during the system construction and installation process?

- A. Installation
- B. Clustered wastewater system(s)
- C. Subsurface dispersal system(s)
- D. System construction and installation process
- E. Effluent is discharged or dispersed
- F. None of the Above

123. During the construction process, inspections before and after backfilling can help verify compliance with _____ procedures.

- A. Approved construction
- B. O&M maintenance activitie(s)
- C. Inspection(s)
- D. Effective wastewater management
- E. Staking of system components
- F. None of the Above

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

- A. Soil-discharging system(s)
- B. Clustered wastewater system(s)
- C. Subsurface dispersal system(s)
- D. System construction and installation process
- E. Effluent is discharged or dispersed
- F. None of the Above

Onsite Operation and Maintenance (O&M) Section

125. Effective wastewater management ultimately hinges on the proper?

- A. O&M of systems
- B. O&M maintenance activitie(s)
- C. Inspection(s)
- D. Effective wastewater management
- E. Staking of system components
- F. None of the Above

126. There are several different management approaches that can be used to support O&M, from mandatory inspection programs to permitting and?

- A. Monitoring requirements
- B. Clustered wastewater system(s)
- C. Subsurface dispersal system(s)
- D. System construction and installation process
- E. Effluent is discharged or dispersed
- F. None of the Above

System Operation and Maintenance Requirements

127. Most technologies come with suggested _____ from the manufacturer. These requirements are crucial to the proper operation and performance of the system.

- A. Activated sludge-based unit(s)
- B. O&M maintenance activitie(s)
- C. Inspection(s)
- D. Effective wastewater management
- E. Staking of system components
- F. None of the Above

Individual Wastewater Systems

128. Individual systems generally consist of one or more treatment devices and a?

- A. Soil-discharging system(s)
- B. Clustered wastewater system(s)
- C. Subsurface dispersal system(s)
- D. System construction and installation process
- E. Effluent is discharged or dispersed
- F. None of the Above

129. Mechanical systems, such as _____, require servicing three to four times a year, while conventional systems need service or pumping every three to seven years, depending on occupancy and use.

- A. Activated sludge-based unit(s)
- B. O&M maintenance activitie(s)
- C. Inspection(s)
- D. Effective wastewater management
- E. Staking of system components
- F. None of the Above

Conventional Systems

130. In most communities, the operation and maintenance of _____ is the responsibility of the homeowner.

- A. Soil-discharging system(s)
- B. Clustered wastewater system(s)
- C. Subsurface dispersal system(s)
- D. System construction and installation process
- E. Conventional systems
- F. None of the Above

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

- A. Activated sludge-based unit(s)
- B. O&M maintenance activitie(s)
- C. Conventional systems
- D. Effective wastewater management
- E. Staking of system components
- F. None of the Above

Enhanced Treatment Systems

132. Which of the following terms have proven to be effective in situations where conventional systems are not appropriate?

- A. Treatment performance
- B. Cluster system(s)
- C. Several wastewater alternative technologies
- D. Wastewater treatment system(s)
- E. Wastewater alternative technologie(s)
- F. None of the Above

Material Replacement

133. Technologies that replace one component of the conventional system with a component manufactured from?

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

Enhanced Wastewater Treatment

134. 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. Conventional system(s)
- C. O&M requirement(s)
- D. Higher level of treatment
- E. Wastewater alternative technologie(s)
- F. None of the Above

135. 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. Cluster system(s)
- C. O&M requirement(s)
- D. Conventional systems
- E. Wastewater alternative technologie(s)
- F. None of the Above

Clustered Treatment Systems

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

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

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

- A. Treatment performance
- B. Cluster system(s)
- C. O&M requirement(s)
- D. Enhanced wastewater treatment system(s)
- E. Wastewater alternative technologie(s)
- F. None of the Above

138. Various technologies that can be implemented via a?

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

Management Considerations

139. In the past, state and local wastewater management programs rarely specified O&M requirements for?

- A. Treatment performance
- B. Cluster system(s)
- C. O&M requirement(s)
- D. Enhanced wastewater treatment system(s)
- E. Conventional or enhanced wastewater systems
- F. None of the Above

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

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

141. 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. Treatment performance
- B. System performance
- C. O&M requirement(s)
- D. Enhanced wastewater treatment system(s)
- E. Wastewater alternative technologie(s)
- F. None of the Above

Maintenance Inspections

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

- A. Other O&M needs
- B. Septic tank pumping
- C. Advances in technology
- D. Alternative and enhanced wastewater technologies
- E. Operation and maintenance inspection programs
- F. None of the Above

143. 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. O&M needs
- B. Septic tank pumping
- C. Advances in technology
- D. Alternative and enhanced wastewater technologies
- E. Operation and maintenance inspection programs
- F. None of the Above

144. Which of the following terms are usually coupled with a mandatory septic tank pumping program?

- A. O&M needs
- B. Septic tank pumping
- C. Advances in technology
- D. Alternative and enhanced wastewater technologies
- E. Operation and maintenance inspection programs
- F. None of the Above

145. Typical pumping requirements vary from three to five years or more based on the _____ and individual household wastewater characteristics.

- A. Service provider(s)
- B. Typical pumping requirement(s)
- C. Enhanced system(s)
- D. Performance-based system
- E. Daily sewage flow
- F. None of the Above

146. Alternative and _____ require additional maintenance and/or ongoing attention.

- A. O&M needs
- B. Septic tank pumping
- C. Advances in technology
- D. Enhanced wastewater technologies
- E. Operation and maintenance inspection programs
- F. None of the Above

Maintenance of Systems

147. Enhanced systems may also require an increased frequency of inspections to determine if they are performing as required. These systems are _____ and require an annual operating permit, maintenance contract, and annual inspection from the county health department.

- A. Service provider(s)
- B. Typical pumping requirement(s)
- C. Enhanced system(s)
- D. Performance-based treatment systems
- E. Final inspection
- F. None of the Above

148. 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
- B. Septic tank pumping
- C. Advances in technology
- D. Alternative and enhanced wastewater technologies
- E. Operation and maintenance inspection programs
- F. None of the Above

149. 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. Service provider(s)
- B. Typical pumping requirement(s)
- C. Enhanced system(s)
- D. Performance-based system
- E. O&M activities
- F. None of the Above

Operating Permits

150. More complex (enhanced) systems, however, often include _____, maintenance contracts, and compliance measures.

- A. Service provider(s)
- B. Typical pumping requirement(s)
- C. Enhanced system(s)
- D. Performance-based system
- E. Maintenance inspections
- F. None of the Above

OSSF Maintenance

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

- A. Proper maintenance
- B. Necessary pumping frequency
- C. An advanced OWTS
- D. Septic tank or ATU
- E. Pressure manifold(s)
- F. None of the Above

152. Keep in mind the necessary pumping frequency depends on the size of the household and the size of the?

- A. Sand/media filter(s)
- B. Septic tank or ATU
- C. Tank
- D. Onsite system
- E. Size of the household and the size of the tank
- F. None of the Above

153. For example, a four-bedroom home with a 1,250-gallon tank should be pumped approximately every 2.6 years. Modern conveniences such as garbage disposals, hot tubs, or whirlpools will increase the?

- A. Proper maintenance
- B. Necessary pumping frequency
- C. An advanced OWTS
- D. Septic tank or ATU
- E. Pressure manifold(s)
- F. None of the Above

Permit

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

- A. Sand/media filter(s)
- B. Septic tank or ATU
- C. Sewage tank
- D. Onsite system
- E. O & M costs
- F. None of the Above

155. Of these considerations, often the most limiting is the _____ or site and space limitations.

- A. Proper maintenance
- B. Necessary pumping frequency
- C. Soil resource
- D. Septic tank or ATU
- E. Pressure manifold(s)
- F. None of the Above

Aerobic Treatment Units (ATUs)

156. In Missouri, the minimum construction standards require that _____ comply with NSF Standard 40.

- A. Sand/media filter(s)
- B. ATUs
- C. Sewage tank
- D. Onsite system
- E. Size of the household and the size of the tank
- F. None of the Above

Gravity Effluent Distribution Devices

157. 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. Necessary pumping frequency
- C. OWTS
- D. Septic tank or ATU
- E. Pressure manifold(s)
- F. None of the Above

Gravity Laterals

158. 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. Sewage tank
- D. Onsite system
- E. Size of the household and the size of the tank
- F. None of the Above

Dosed Gravity Systems

159. _____ 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. Proper maintenance
- B. Necessary pumping frequency
- C. An advanced OWTS
- D. Septic tank or ATU
- E. Pressure manifold(s)
- F. None of the Above

Advanced Onsite Wastewater Treatment Systems and components include:

Sand filters

160. A packed-bed filter of sand or other granular materials used to provide advanced secondary treatment of septic tank effluent. _____ consist of a lined excavation or structure filled with uniform washed sand that is placed over an under-drain system.

- A. Sand/media filter(s)
- B. Septic tank or ATU
- C. Sewage tank
- D. Onsite system
- E. Size of the household and the size of the tank
- F. None of the Above

161. The wastewater is dosed onto the surface of the sand through a _____ and allowed to percolate through the sand to the under-drain system, which collects the filter effluent for further processing or discharge.

- A. Proper maintenance
- B. Necessary pumping frequency
- C. An advanced OWTS
- D. Distribution network
- E. Pressure manifold(s)
- F. None of the Above

Other Media Bio-filters

162. Which of the following terms using other more porous materials, to provide advanced secondary treatment of septic tank effluent?

- A. Packed-bed filter(s)
- B. Engineered distribution system(s)
- C. An OWTS
- D. An above ground treatment system
- E. A subsurface soil dispersal system
- F. None of the Above

Constructed Wetlands

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

- A. Packed-bed filter(s)
- B. Engineered distribution system(s)
- C. An OWTS
- D. An above ground treatment system
- E. A subsurface soil dispersal system
- F. None of the Above

Sand Mounds

164. Which of the following terms that incorporates at least 12 inches of clean sand above the original soil surface and disperses the treated wastewater into the original soil?

- A. Packed-bed filter(s)
- B. Engineered distribution system(s)
- C. An OWTS
- D. An above ground treatment system
- E. A subsurface soil dispersal system
- F. None of the Above

Low-pressure Distribution Systems

165. An OWTS in which pressurized small diameter distribution lines are used for equal distribution of effluent within the final treatment and?

- A. Packed-bed filter(s)
- B. Engineered distribution system(s)
- C. Dispersal component
- D. An above ground treatment system
- E. A subsurface soil dispersal system
- F. None of the Above

Drip Irrigation Systems

166. Which of the following terms that distributes treated wastewater through drip irrigations lines?

- A. Packed-bed filter(s)
- B. Engineered distribution system(s)
- C. An OWTS
- D. An above ground treatment system
- E. A subsurface soil dispersal system
- F. None of the Above

Suitable Soil

167. One tablespoon of soil can contain over one million microscopic organisms, including bacteria, protozoa, fungi, molds, and?

- A. Effluent
- B. Soil microorganism(s)
- C. Soil condition(s)
- D. Some organic material and total suspended solids (TSS)
- E. Suitable soil
- F. None of the Above

168. The bacteria and other microorganisms in the soil treat the wastewater and purify it before it reaches groundwater. However, the wastewater must pass through the _____ slowly enough to provide adequate contact time with microorganisms.

- A. Effluent
- B. Soil microorganism(s)
- C. Soil condition(s)
- D. Some organic material and total suspended solids (TSS)
- E. Soil
- F. None of the Above

169. Which of the following terms in soil treat wastewater physically, chemically, and biologically before it reaches the groundwater, preventing pollution and public health hazards?

- A. Complex biological community
- B. Microorganism(s)
- C. Microbial slime(s)
- D. Pathogenic bacteria
- E. TSS and organic material
- F. None of the Above

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

- A. Effluent
- B. Soil microorganism(s)
- C. Soil condition(s)
- D. Some organic material and total suspended solids (TSS)
- E. Subsurface absorption systems
- F. None of the Above

171. Public health is a major concern because domestic wastewaters contain many substances that are undesirable and potentially harmful, such as pathogenic bacteria, _____, organic matter, toxic chemicals, pharmaceutical drugs, and excess nutrients.

- A. Complex biological community
- B. Microorganism(s)
- C. Microbial slime(s)
- D. Infectious viruses
- E. TSS and organic material
- F. None of the Above

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

- A. Effluent
- B. Soil microorganism(s)
- C. Soil condition(s)
- D. Some organic material and total suspended solids (TSS)
- E. Suitable soil
- F. None of the Above

173. Soil microorganisms attach themselves to soil particles using microbial slimes and use the oxygen and water that are present in the?

- A. Complex biological community
- B. Microorganism(s)
- C. Microbial slime(s)
- D. Soil pores
- E. TSS and organic material
- F. None of the Above

174. The first component in an individual sewage treatment system is usually a septic tank, which removes some organic material and?

- A. Effluent
- B. Soil microorganism(s)
- C. Soil condition(s)
- D. Total suspended solids (TSS)
- E. Suitable soil
- F. None of the Above

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

- A. Complex biological community
- B. Microorganism(s)
- C. Microbial slime(s)
- D. Pathogenic bacteria
- E. TSS and organic material
- F. None of the Above

Suitably-textured Soil

176. Which of the following terms must be deep enough to allow adequate filtration and treatment of the effluent before it is released into the natural environment?

- A. Effluent
- B. Soil microorganism(s)
- C. Soil condition(s)
- D. Suitably-textured soil
- E. Suitable soil
- F. None of the Above

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

- A. Complex biological community
- B. Microorganism(s)
- C. Microbial slime(s)
- D. Septic tank effluent
- E. TSS and organic material
- F. None of the Above

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

- A. Effluent
- B. Soil microorganism(s)
- C. Soil condition(s)
- D. Effluent BOD
- E. Suitable soil
- F. None of the Above

Impacts of Effluent on Groundwater

179. Which of the following terms is overloaded with a treatable contaminant, or when the contaminant cannot be treated by the soil, the quality of the underlying groundwater may change significantly?

- A. Wastewater
- B. Distribution media
- C. Biomat
- D. Soil treatment trench
- E. Dispersal zone
- F. None of the Above

180. 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. Pollution of groundwater
- B. Effluent
- C. Anaerobic bacteria
- D. Soil treatment and dispersal zone
- E. Unsaturated flow
- F. None of the Above

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

- A. Septic system
- B. Distribution media
- C. Biomat
- D. Soil treatment trench
- E. Dispersal zone
- F. None of the Above

182. Pollution of groundwater is very difficult to clean up, since the only access to the water table is through wells, trenches, or?

- A. Pollution of groundwater
- B. Effluent
- C. Anaerobic bacteria
- D. Soil treatment and dispersal zone
- E. Unsaturated flow
- F. None of the Above

Soil Treatment Processes

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

- A. Wastewater
- B. Distribution media
- C. Biomat
- D. Soil treatment trench
- E. Dispersal zone
- F. None of the Above

184. 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.

- A. Pollution of groundwater
- B. Effluent
- C. Anaerobic bacteria
- D. Soil treatment
- E. Unsaturated flow
- F. None of the Above

Biomat

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

- A. Wastewater
- B. Distribution media
- C. Biomat
- D. Soil treatment trench
- E. Dispersal zone
- F. None of the Above

186. 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. Pollution of groundwater
- B. Effluent
- C. Anaerobic bacteria
- D. Soil treatment and dispersal zone
- E. Unsaturated flow
- F. None of the Above

187. When fully developed, the gray-to-black sticky _____ layer is about one inch thick.

- A. Wastewater
- B. Distribution media
- C. Biomat
- D. Soil treatment trench
- E. Dispersal zone
- F. None of the Above

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

- A. Pollution of groundwater
- B. Effluent
- C. Anaerobic bacteria
- D. Soil treatment and dispersal zone
- E. Microorganisms
- F. None of the Above

189. 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
- B. Distribution media
- C. Biomat
- D. Soil treatment trench
- E. Dispersal zone
- F. None of the Above

190. 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. Pollution of groundwater
- B. Effluent
- C. Anaerobic bacteria
- D. Soil treatment and dispersal zone
- E. Soil system
- F. None of the Above

191. In unsaturated soil under a biomat, water movement is restricted. In order for the wastewater to move through the soil, it must be pulled or wicked through the fine pores by ?
- A. Aerobic bacteria
 - B. Clustered wastewater system(s)
 - C. Equilibrium
 - D. Aerobic
 - E. Anaerobic
 - F. None of the Above

Sewage Treatment Utilizing Soil

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

- A. Final treatment of effluent
- B. Wastewater flow/strength
- C. Quality of the effluent
- D. Upstream processes in the treatment train
- E. Anaerobic microorganism(s)
- F. None of the Above

193. 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?

- A. Aerobic bacteria
- B. Clustered wastewater system(s)
- C. Equilibrium
- D. Biomat
- E. Anaerobic
- F. None of the Above

194. Which of the following terms 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. Final treatment of effluent
- B. Wastewater flow/strength
- C. Quality of the effluent
- D. Upstream processes in the treatment train
- E. If the quality of the effluent
- F. None of the Above

195. 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.

- A. Aerobic bacteria
- B. Clustered wastewater system(s)
- C. Equilibrium
- D. Aerobic
- E. Anaerobic
- F. None of the Above

Site Evaluations

196. 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. Final treatment of effluent
- B. Wastewater flow/strength
- C. Quality of the effluent
- D. Upstream processes in the treatment train
- E. Wastewater flow/strength
- F. None of the Above

197. Which of the following terms observations 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. Aerobic bacteria
- B. Clustered wastewater system(s)
- C. Equilibrium
- D. Site-specific
- E. Anaerobic
- F. None of the Above

Assure System Performance

198. 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. Quality of the effluent
- D. Upstream processes in the treatment train
- E. Anaerobic microorganism(s)
- F. None of the Above

199. 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. Aerobic bacteria
- B. Clustered wastewater system(s)
- C. Equilibrium
- D. Upstream processes in the treatment train
- E. Aerobic nitrification of ammonia
- F. None of the Above

200. 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. Quality of the effluent
- D. Pollutant removal
- E. Anaerobic microorganism(s)
- F. None of the Above