

*Registration form*

**Sewer and Septic Construction 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.** \_\_\_\_\_

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

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

Wastewater Collection \_\_\_\_\_ O and M \_\_\_\_\_ Onsite Installer \_\_\_\_\_

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

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

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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.

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

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**A second certificate of completion for a second State Agency \$50 processing fee.**

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# Sewer and Septic Construction Answer Key

Name \_\_\_\_\_

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

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What is the course approval number, if necessary? \_\_\_\_\_

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

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**Additional certificate for another Agency – additional fee \$50**

**Please fax the answer key to TLC  
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# SEWER AND SEPTIC CONSTRUCTION CEU TRAINING COURSE

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**PLEASE COMPLETE THIS FORM BY CIRCLING THE NUMBER OF THE APPROPRIATE ANSWER IN THE AREA BELOW.**

1. Please rate the difficulty of your course.

Very Easy 0 1 2 3 4 5 Very Difficult

2. Please rate the difficulty of the testing process.

Very Easy 0 1 2 3 4 5 Very Difficult

3. Please rate the subject matter on the exam to your actual field or work.

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

5. What would you do to improve the Course?

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Any other concerns or comments.

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## Sewer and Septic Construction CEU Training Course Assignment

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

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

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

### Onsite Sewage Facilities (OSSF)

1. Which of the following terms - are wastewater systems designed to treat and dispose of effluent on the same property that produces the wastewater?

- A. Effective management
- B. Clustered wastewater system
- C. Onsite wastewater management
- D. Onsite sewage facilities (OSSF)
- E. Decentralized treatment system(s)
- F. None of the Above

2. Onsite/decentralized wastewater treatment systems, commonly called \_\_\_\_\_, treat sewage from homes and businesses that are not connected to a centralized wastewater treatment plant.

- A. Septic system(s)
- B. Advanced wastewater treatment
- C. Centralized sewer system(s)
- D. Onsite wastewater management program(s)
- E. A septic tank and drainfield combination
- F. None of the Above

3. Decentralized treatment systems include individual onsite septic systems, cluster systems, and \_\_\_\_\_ like constructed wetlands, and recirculating sand filters.

- A. Effective management
- B. Clustered wastewater system
- C. Onsite wastewater management
- D. Alternative wastewater treatment technologies
- E. Decentralized treatment system(s)
- F. None of the Above

4. Which of the following terms account for approximately 25% of all domestic wastewater treatment in the United States?

- A. Septic system(s)
- B. Advanced wastewater treatment
- C. Centralized sewer system(s)
- D. OSSFs
- E. A septic tank and drainfield combination
- F. None of the Above

5. Recognition of the impacts of \_\_\_\_\_ on ground water and surface water quality (e.g., nitrate and bacteria contamination, nutrient inputs to surface waters) has increased interest in optimizing the systems' performance.

- A. Effective management
- B. Clustered wastewater system
- C. Onsite systems
- D. Ground water and surface water quality
- E. Decentralized treatment system(s)
- F. None of the Above

6. Although some \_\_\_\_\_ have functioned successfully in the past, problems persist. Most current onsite regulatory programs focus on permitting and installation.

- A. Septic system(s)
- B. Advanced wastewater treatment
- C. Centralized sewer system(s)
- D. Onsite wastewater management program(s)
- E. A septic tank and drainfield combination
- F. None of the Above

7. Which of the following terms - requires rigorous planning, design, installation, operation, maintenance, monitoring, and controls?

- A. Effective management
- B. Clustered wastewater system
- C. Onsite wastewater management
- D. Effective management of onsite systems
- E. Decentralized treatment system(s)
- F. None of the Above

**What is EPA doing to help manage onsite systems?**

8. EPA develops voluntary policies and guidance for?

- A. Septic system(s)
- B. Advanced wastewater treatment
- C. Centralized sewer system(s)
- D. Onsite wastewater management program(s)
- E. A septic tank and drainfield combination
- F. None of the Above

9. EPA sponsors state-of-the-art research on \_\_\_\_\_ technologies through demonstration projects.

- A. Effective management
- B. Clustered wastewater system
- C. Onsite wastewater management
- D. Onsite and clustered wastewater system
- E. Decentralized treatment system(s)
- F. None of the Above

10. EPA works with state and local officials, industry professionals, and partner organizations to support?

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

11. EPA promotes homeowner awareness to strengthen?

- A. Effective management
- B. Clustered wastewater system
- C. Onsite wastewater management
- D. Ground water and surface water quality
- E. Decentralized treatment system(s)
- F. None of the Above

12. Which of the following terms - treatment increases the percentage of contaminants, particularly nitrogen and fecal coliform, removed in wastewater?

- A. Storm sewer(s)
- B. Sanitary sewer(s)
- C. Advanced wastewater
- D. Water quality of receiving waters
- E. Wastewater management system(s)
- F. None of the Above

13. Advanced pretreatment components typically follow \_\_\_\_\_ from septic tanks and decrease the constituents of concern before they reach the final treatment and dispersal component.

- A. Septic system(s)
- B. Advanced wastewater treatment
- C. Centralized sewer system(s)
- D. Onsite wastewater management program(s)
- E. A septic tank and drainfield combination
- F. None of the Above

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

14. Which of the following terms - components are used when a site has a high risk to public or environmental health and primary treatment is not protective enough?

- A. Storm sewer(s)
- B. Sanitary sewer(s)
- C. Advanced pretreatment
- D. Water quality of receiving waters
- E. Wastewater management system(s)
- F. None of the Above

### Types of Sewer Systems

15. Centralized sewer systems are generally broken out into three different categories: sanitary sewers, storm sewers, and?

- A. Septic system(s)
- B. Advanced wastewater treatment
- C. Centralized sewer system(s)
- D. Onsite wastewater management program(s)
- E. Combined sewers
- F. None of the Above

16. Which of the following terms - carry wastewater or sewage from homes and businesses to treatment plants?

- A. Storm sewer(s)
- B. Sanitary sewer(s)
- C. System
- D. Water quality of receiving waters
- E. Wastewater management system(s)
- F. None of the Above

17. Which of the following terms - are designed to quickly get rainwater off the streets during rain events?

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

18. Which of the following terms - do not connect with a treatment plant, but instead drain directly into nearby rivers, lakes, or oceans?

- A. Most storm sewers
- B. Sanitary sewer(s)
- C. System
- D. Water quality of receiving waters
- E. Wastewater management system(s)
- F. None of the Above

19. Which of the following terms - carry both wastewater and storm water in the same pipe?

- A. Septic system(s)
- B. Advanced wastewater treatment
- C. Centralized sewer system(s)
- D. Onsite wastewater management program(s)
- E. Combined sewers
- F. None of the Above

20. Leaking, overflowing, and insufficient \_\_\_\_\_ can release untreated wastewater into receiving waters.

- A. Storm sewer(s)
- B. Sanitary sewer(s)
- C. Wastewater collection systems
- D. Water quality of receiving waters
- E. Wastewater management system(s)
- F. None of the Above

21. Outdated pump stations, undersized to carry \_\_\_\_\_ from newly developed subdivisions or commercial areas, can also create a potential overflow hazard, adversely affecting human health and degrading the water quality of receiving waters.

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

22. The maintenance of the \_\_\_\_\_ is therefore a continuous, never-ending cycle.

- A. Storm sewer(s)
- B. Sanitary sewer(s)
- C. Sewer system
- D. Water quality of receiving waters
- E. Wastewater management system(s)
- F. None of the Above

23. Technology has improved 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 \_\_\_\_\_, collection system maintenance is evolving into a highly skilled trade.

- A. Storm sewer(s)
- B. Sanitary sewer(s)
- C. Wastewater collection systems
- D. Water quality of receiving waters
- E. Wastewater management system(s)
- F. None of the Above

24. 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. Sewage
- B. Wastewater
- C. Septic system
- D. Wastewater management systems
- E. Centralized wastewater treatment
- F. None of the Above

### Onsite Treatment Processes

25. 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

26. 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

27. Our goal is to ensure that you can treat \_\_\_\_\_ while protecting human and environmental health in a cost-effective manner.

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

28. The high cost of centralized wastewater treatment plants 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 \_\_\_\_\_ management services.

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

29. Which of the following terms - can be closely matched to the types and quantities of sewage generated through a “just in time” modular approach financed via a “user pays” cost structure?

- A. Wastewater collection and 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

### Key Considerations

30. 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

31. Onsite systems treat wastewater and disperse it on the property where it is generated. When functioning properly, onsite systems prevent human contact with \_\_\_\_\_, and prevent contamination of surface and groundwater. Factors that affect the proper functioning of onsite systems include the site and soil conditions, design, installation, operation and maintenance.

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

### Basic Onsite Treatment Processes

32. 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

33. Physical treatment processes 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

34. 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

35. 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**

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

- 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

37. Which of the following terms - parameters can include nitrate-nitrogen, phosphorus, and bacteria?

- 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

38. Which of the following terms - can occur via process controls (e.g., alternating oxic/anoxic conditions) or through exposure to additives or media designed to cause chemical or other reactions (e.g., disinfection, phosphorus precipitation).

- 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**

39. 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

40. 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

41. 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

42. 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. 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

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



43. 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

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

- A. Pretreatment components
- B. The soil absorption system
- C. Septic tank effluent system
- D. Septic tanks, trash tanks, and processing tanks
- E. Advanced system
- F. None of the Above

45. 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. Effluent to the entire drainfield
- 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**

46. 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

47. Which of the following terms - 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)
- 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

48. 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

49. 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

50. Which of the following terms - are the most widely used dispersal systems?

- 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

51. 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. These systems are pressurized, which assists in providing even distribution of wastewater.
- 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

52. 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

53. 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, \_\_\_\_\_ or components (e.g., fixed film treatment units) 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

54. 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

55. 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, by improving soil oxidation through timed dosing of septic tank effluent to the dispersal field.

- 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

56. 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

57. Wastewater with high organic strength 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

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

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

59. 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, improving bacteria predation and uptake of nutrients by plants and providing a carbon source for denitrification.

- 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

60. Which of the following terms - require management, but advanced systems, due to their use of pumps, switches, and other electromechanical components, especially need regular operation and maintenance attention?

- 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**

61. 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

62. 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

63. 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**

64. 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

65. Which of the following terms - 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**

66. 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 in an oxygen rich environment.

- 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

67. Three processes are involved in most \_\_\_\_\_: physical separation (mostly settling), aerobic treatment (aeration and mixing), and clarification (final settling).

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

68. 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**

69. 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

70. A number of these so-called " \_\_\_\_\_ " 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

71. In single-pass or intermittent filter 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

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

72. 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

73. 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)**

74. 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?

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

75. 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

76. 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**

77. 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

78. 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

79. 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

80. 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

81. 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

82. 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

83. Failing systems are a major source of groundwater pollution, cause \_\_\_\_\_, such as dysentery and hepatitis, and are expensive for homeowners to replace.

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

84. 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

85. 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

86. 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

87. 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. Performance requirements
- B. Water resources
- C. Fixed-film reactors
- D. Primary and secondary processes
- E. New treatment technologies
- F. None of the Above

88. 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

89. 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

90. 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

91. 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

92. Which of the following terms - 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. Drainage features
- C. Septic system
- D. Most of the alternative treatment technologies
- E. Approving the use of various treatment technologies
- F. None of the Above

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

94. 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

95. 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

96. 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

97. 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

98. 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

99. Which of the following terms - permitting programs are expanding the options available for providing treatment services, especially for sites with limiting soil conditions?

- 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

100. Which of the following terms - systems require management. Management services can be provided by an outside contractor or responsible management entity.

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

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



101. 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

102. \_\_\_\_\_ 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

103. 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

104. 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
- B. Final design components
- C. All system components
- D. System types and components
- E. Designs and materials specifications
- F. None of the Above

105. 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

106. 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

107. 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

108. 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

109. 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:**

110. The \_\_\_\_\_. If properly designed, installed, and maintained, a septic system can effectively treat household wastewater for up to 20 years or more. Look to see if the house has a system that is near the end of its life-span.

- 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

111. The \_\_\_\_\_. Size is important because graywater (laundry water, sink water) and blackwater (toilet water) need to be retained in the tank for at least a day or more to allow solids to separate from the liquids and begin breaking down. If wastewater is pushed through without proper settling, the solids can clog the drainfield, stressing and possibly damaging the system.

- 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

112. The \_\_\_\_\_. Knowing where the tank and drainfield are will help you visually check the area for obvious signs of failure. In addition, poorly sited drainfields can result in septic system failures. Location of the system in relation to wells, other septic systems, slope of the land, natural drainage patterns, underlying soil conditions, and lot boundaries may indicate potential problems with the septic system and should be reviewed by you or a professional.

- 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**

113. 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**

114. 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

115. 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

116. \_\_\_\_\_, 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

117. 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

118. 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

119. 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

120. 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

121. 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

122. 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

123. 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

124. 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

125. 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)
- B. Site component location(s)
- C. Installing tanks
- D. Gravity flow pipe(s)
- E. Designed component finished condition(s)
- F. None of the Above

126. 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

127. 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.

- 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

128. 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

129. 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 and outlet
- C. Distribution pipe effluent
- D. Secondary treatment unit(s)
- E. Uphill dispersal piping
- F. None of the Above

130. 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

131. 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

132. 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

133. 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

134. 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

135. 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

136. To avoid potential soil \_\_\_\_\_ during construction, the soil below the proposed infiltration surface elevation must be below its plastic limit 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
- B. Moisture
- C. Disturbance
- D. Excavation
- E. Damage
- F. None of the Above

137. 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

138. 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

139. 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

140. 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
- B. Moisture
- C. Disturbance
- D. Permeability
- E. Infiltration
- F. None of the Above

141. 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

142. Changes in construction practices over the past 25 years have led to improvements in the performance of \_\_\_\_\_. For example, construction materials used in plumbing, wastewater lines, and lateral fields should meet American Society for Testing and Materials standards.

- 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

143. 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

144. 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

145. 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

146. Which of the following terms - 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

147. 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.

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

148. 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

149. 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. 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

150. 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

### Enhanced Treatment Systems

151. 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

152. 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

153. 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

154. 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

155. 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

156. Which of the following terms - have become an attractive option for many locations, especially in areas like small lakeside communities?

- 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

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

- A. Cluster 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

158. 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

159. 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



160. 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

161. Maintenance inspections are gaining appeal as a management tool to assess the condition of systems and determine pumping or \_\_\_\_\_. In some cases, this is a strictly voluntary program, while in other cases; communities have elected to mandate pumping based on third party inspections.

- 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

162. 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.

- 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

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

- A. 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

164. 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

165. 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
- 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

166. 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

167. 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

168. 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

169. More complex systems, however, often include \_\_\_\_\_, maintenance contracts, and compliance measures. In the case of a performance-based system, the operating permit may include specific standards that must be maintained along with monitoring and reporting requirements.

- 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

170. 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

171. 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

172. 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

173. 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.

- 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

174. 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)**

175. A mechanical onsite treatment unit that provides secondary wastewater treatment by mixing air (oxygen) and aerobic and facultative microbes with the wastewater in a sewage tank. 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**

176. 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**

177. 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**

178. Which of the following terms - can be used to more equally divide effluent between gravity lateral trenches or to proportion effluent to unequal length trenches?

- 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**

179. Which of the following terms - 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

180. 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

181. \_\_\_\_\_ using other more porous materials, (e.g., peat, textile, or foam) 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

182. 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

183. 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

184. 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

185. 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

186. 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

187. The bacteria and other microorganisms in the soil treat the wastewater and purify it before it reaches groundwater. But 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

188. 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

189. 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

190. 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 (e.g. endocrine disruptors), 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

191. 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

192. 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

193. 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

194. 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**

195. 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

196. 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

197. 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

198. 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

199. 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

200. 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. Biomat
- D. Soil treatment trench
- E. Dispersal zone
- F. None of the Above

201. Pollution of groundwater (with nitrogen, pathogens, bacteria, chemicals, etc.) is very difficult to clean up, since the only access to the water table is through wells, trenches (if the water table is high enough), 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

202. 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

203. 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**

204. 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

205. 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

206. The biomat develops first along the trench bottom, where effluent begins to pond. The biomat develops along the soil-media contact surfaces on the trench's sidewalls. 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

207. 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

208. 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

209. 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

210. 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**

211. 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

212. 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

213. 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

214. 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**

215. 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

216. 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**

217. 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



218. 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

219. Predicting the \_\_\_\_\_ and overall treatment efficacy of the soil component of the system requires a fairly comprehensive understanding of how these processes work.

- 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

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

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

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

### **Septic Tanks**

221. A watertight, covered container designed and constructed to receive the discharge of sewage from a building sewer. Its function is to separate solids from liquid, digest organic matter, store liquids through a period of detention and allow the \_\_\_\_\_ to discharge to other components of an onsite system.

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

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

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

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

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

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

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

### **Gravity Effluent Distribution Devices**

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

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

### Gravity laterals

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

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

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

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

### Wastewater Collection System Introduction

227. Every house, restaurant, business, and industry produces waste. Wastewater collection protects public health and the environment by removing this?

- A. Almost infinite
- B. Storm sewers
- C. Infectious waste and recycling the water
- D. Wastewater
- E. Concern
- F. None of the Above

228. A network of \_\_\_\_\_ accepts the flow from each building's sewer connection and delivers it to the treatment facilities.

- A. Interconnected pipes
- B. Storm sewers
- C. Combined sewers
- D. Wastewater
- E. Manholes
- F. None of the Above

229. Wastewater collection is therefore a comprehensive \_\_\_\_\_ removal system.

- A. Almost infinite
- B. Storm sewers
- C. Liquid waste
- D. Wastewater
- E. Plan
- F. None of the Above

230. Which of the following terms - distributed through this system is about 98% water?

- A. Fluid waste
- B. Storm sewers
- C. Combined sewers
- D. Wastewater
- E. Solids
- F. None of the Above

231. The waste floats on, is carried along by, and goes into \_\_\_\_\_ in water. Possible waste includes anything that can be flushed down the drain--human excretion, body fluids, paper products, soaps and detergents, foods, fats, oil, grease, paints, chemicals, hazardous materials, solvents, disposable and flushable items; the list is almost infinite.

- A. Sewer
- B. Storm sewers
- C. Suspension or solution
- D. Wastewater
- E. Drain
- F. None of the Above

232. This mixture of water and wastes is called?

- A. Sewage
- B. Solids and liquids
- C. Combined sewage
- D. Wastewater
- E. Stink Pickles
- F. None of the Above

233. "Wastewater" is a more accurate description and has become the standard term for this fluid waste because it encompasses the total \_\_\_\_\_ in water that is gathered from homes and businesses.

- A. Slurry of wastes
- B. Storm sewers
- C. Combined sewers
- D. Wastewater
- E. Stink Pickles
- F. None of the Above

### Types of Sewer Systems

234. Centralized sewer systems are generally broken out into three different categories: sanitary sewers, storm sewers, and?

- A. Storm drains
- B. Storm sewers
- C. Combined sewers
- D. Dark or grey water
- E. Bad water
- F. None of the Above

235. Underground \_\_\_\_\_ pipes can clog or break, causing unintentional "overflows" of raw sewage that flood basements and streets.

- A. Sanitary sewer
- B. Storm sewer
- C. Combined sewer
- D. Wastewater
- E. Clay
- F. None of the Above

236. Which of the following terms - are designed to quickly get rainwater off the streets during rain events.

- A. Drains
- B. Storm sewers
- C. Combined sewers
- D. Wastewater
- E. Streets
- F. None of the Above

237. Most storm sewers do not connect with a \_\_\_\_\_, but instead drain directly into nearby rivers, lakes, or oceans.

- A. Treatment plant
- B. Storm sewer
- C. Combined sewer
- D. Wastewater factory
- E. Turd collector
- F. None of the Above

238. Combined sewers carry both wastewater and storm water in the same pipe. Most of the time, \_\_\_\_\_ transport the wastewater and storm water to a treatment plant.

- A. Wastewater collection system
- B. Sewer systems
- C. Combined sewers
- D. Mammals
- E. Trucks
- F. None of the Above

239. However, when there is too much rain, combined sewer systems cannot handle the extra volume and designed "\_\_\_\_\_ " of raw sewage into streams and rivers occur.

- A. Wastewater collection
- B. Sewers
- C. Combined sewers
- D. Overflows
- E. CMOM
- F. None of the Above

240. The great majority of \_\_\_\_\_ have separated, not combined, sanitary and storm water pipes.

- A. Wastewater collection system
- B. Sewer systems
- C. Combined sewers
- D. Solids
- E. People
- F. None of the Above

241. As the infrastructure in the United States and other parts of the world ages, increasing importance is being placed on rehabilitating?

- A. Wastewater collection system
- B. Sewer systems
- C. Combined sewers
- D. Inspecting equipment
- E. Collection workers
- F. None of the Above

242. Cracks, settling, tree root intrusion, and other disturbances that develop over time deteriorate pipelines and other conveyance structures that comprise \_\_\_\_\_, including stormwater, sanitary, and combined sewers.

- A. Wastewater collection systems
- B. Sewer systems
- C. Combined sewers
- D. Septic Tanks
- E. Stormwater systems
- F. None of the Above

243. Outdated pump stations, undersized to carry sewage from newly developed subdivisions or commercial areas, can also create a \_\_\_\_\_, adversely affecting human health and degrading the water quality of receiving waters.

- A. Wastewater collection system
- B. Potential overflow hazard
- C. Combined sewers
- D. FUBAR
- E. CMOM
- F. None of the Above

244. The maintenance of the \_\_\_\_\_ is therefore a continuous, never-ending cycle.

- A. Wastewater collection system
- B. Sewer system
- C. Combined sewers
- D. Inspection equipment
- E. Drain
- F. None of the Above

245. As sections of the system age, problems such as corroded concrete pipe, cracked tile, lost joint integrity, grease, and heavy root intrusion must be?

- A. Promoted
- B. Patched
- C. Constantly monitored and repaired
- D. Inspected
- E. Removed
- F. None of the Above

246. Technology has improved \_\_\_\_\_ with such tools as television camera assisted line inspection equipment, jet-cleaning trucks, and improvements in pump design.

- A. Wastewater collection system
- B. Sewer systems
- C. Combined sewers
- D. Collection system maintenance
- E. The space shuttle
- F. None of the Above

247. Because of the increasing complexity of wastewater collection systems, \_\_\_\_\_ is evolving into a highly skilled trade.

- A. Wastewater treatment
- B. Collection system maintenance
- C. Combined careers
- D. The operator
- E. Management
- F. None of the Above

248. Collection system operators are charged with \_\_\_\_\_ and the environment, and therefore must have documented proof of their certifications in the respective wastewater management systems.

- A. Protecting public health
- B. Making arrests
- C. Smoking out
- D. Inspecting
- E. Debt
- F. None of the Above

249. These professionals ensure that the system pipes remain clear and open. They eliminate obstructions and are constantly striving to \_\_\_\_\_. They keep the wastewater moving underground, unseen and unheard.

- A. Find problems
- B. Create problems
- C. Improve flow characteristics
- D. Inspect equipment
- E. Hide from the public
- F. None of the Above

250. Because this \_\_\_\_\_ and the professionals who maintain it operate at such a high level of efficiency, problems are very infrequent. So much so that the public often takes the wastewater collection system for granted. In truth, these operators must work hard to keep it functioning properly.

- A. Wastewater collection system
- B. Sewer system
- C. Combined sewer
- D. Inspection equipment
- E. Pecking order
- F. None of the Above

### **Sewer Main**

251. In a centralized \_\_\_\_\_, the sewer to which sewer connections are made from individual residences.

- A. Sewer pipe
- B. Wastewater treatment system
- C. Combined sewer
- D. Manhole
- E. Building
- F. None of the Above

### **Trunk Lines**

252. Sewer pipes measuring more than 12 inches in diameter and having a capacity of 1 to 10 million gallons per day. Trunk lines connect smaller sewer pipes, or \_\_\_\_\_, to the largest transport pipes or interceptors.

- A. Manholes
- B. Wastewater treatment system
- C. Combined sewers
- D. Services
- E. Collectors
- F. None of the Above

### **Collectors**

253. Small \_\_\_\_\_ measuring twelve inches or less in diameter.

- A. Manholes
- B. Services
- C. Combined sewers
- D. Inspection equipment
- E. Sewer pipes
- F. None of the Above

### **Wastewater Collection Rules and Regulations**

#### **Rule to Protect Communities from Overflowing Sewers**

254. Which of the following terms - has clarified and expanded permit requirements under the Clean Water Act for 19,000 municipal sanitary sewer collection systems in order to reduce sanitary sewer overflows?

- A. POTW
- B. CWA or Act
- C. EPA
- D. NPDES
- E. OSFF
- F. None of the Above

255. The requirements will help communities improve some of our Nation's most valuable infrastructure –our wastewater collection systems–by requiring facilities to develop and implement new capacity, management, operation, and maintenance programs and?

- A. POTW's
- B. CWA
- C. EPA
- D. NPDES
- E. OSHA
- F. None of the Above

256. The 19,000 systems covered by this rule include 4,800 municipal satellite collection systems which will be directly regulated under the \_\_\_\_\_ for the first time.

- A. POTW's
- B. Law
- C. EPA
- D. NPDES
- E. CWA or Act
- F. None of the Above

### Clean Water Act (Rule) Summary

#### 33 U.S.C. s/s 1251 et seq. (1977)

257. Which of the following terms - is a 1977 amendment to the Federal Water Pollution Control Act of 1972, which set the basic structure for regulating discharges of pollutants to waters of the United States?

- A. POTW's
- B. Law
- C. EPA
- D. NPDES
- E. CWA
- F. None of the Above

258. The law gave \_\_\_\_\_ the authority to set effluent standards on an industry basis and continued the requirements to set water quality standards for all contaminants in surface waters.

- A. POTW's
- B. OSHA
- C. EPA
- D. NPDES
- E. CWA
- F. None of the Above

259. The CWA makes it unlawful for any person to discharge any pollutant from a point source into navigable waters unless a permit ( \_\_\_\_\_ ) is obtained under the Act.

- A. POTW's
- B. OSHA
- C. EPA
- D. NPDES
- E. CWA
- F. None of the Above

260. The 1977 amendments focused on toxic pollutants. In 1987, the \_\_\_\_\_ was reauthorized and again focused on toxic substances, authorized citizen suit provisions, and funded sewage treatment plants (POTW's) under the Construction Grants Program.

- A. POTW's
- B. Law
- C. EPA
- D. NPDES
- E. CWA
- F. None of the Above

261. The CWA provisions for the delegation by the \_\_\_\_\_ of many permitting, administrative, and enforcement aspects of the law to state governments. In states with the authority to implement CWA programs, the EPA still retains oversight responsibilities.

- A. POTW's
- B. OSHA
- C. EPA
- D. NPDES
- E. CWA
- F. None of the Above

262. In 1972, \_\_\_\_\_ enacted the first comprehensive national clean water legislation in response to growing public concern for serious and widespread water pollution.

- A. POTW's
- B. OSHA
- C. EPA
- D. NPDES
- E. CWA
- F. None of the Above

263. Which of the following terms - is the primary federal law that protects our nation's waters, including lakes, rivers, aquifers, and coastal areas. Lake Erie was dying?

- A. POTW's
- B. Law
- C. EPA
- D. NPDES
- E. CWA or Act
- F. None of the Above

264. Which of the following terms - primary objective is to restore and maintain the integrity of the nation's waters?

- A. POTW's
- B. Law
- C. EPA
- D. NPDES
- E. CWA or Act
- F. None of the Above

265. Which of the following terms - focuses on improving the quality of the nation's waters. It provides a comprehensive framework of standards, technical tools and financial assistance?

- A. POTW's
- B. Law
- C. EPA
- D. NPDES
- E. CWA or Act
- F. None of the Above

266. Which of the following terms - requires major industries to meet performance standards to ensure pollution control; charges states and tribes with setting specific water quality criteria appropriate for their waters?

- A. POTW's
- B. Law
- C. EPA
- D. NPDES
- E. CWA or Act
- F. None of the Above

267. Which of the following terms - provides funding to states and communities to help them meet their clean water infrastructure needs?

- A. POTW's
- B. Law
- C. EPA
- D. NPDES
- E. CWA or Act
- F. None of the Above

268. After 25 years, the \_\_\_\_\_ continues to provide a clear path for clean water, and a solid foundation for an effective national water program.

- A. POTW's
- B. Law
- C. EPA
- D. NPDES
- E. CWA or Act
- F. None of the Above

**In 1972**

269. Only a third of the \_\_\_\_\_ were safe for fishing and swimming. Wetlands losses were estimated at about 460,000 acres annually.

- A. Nitrogen levels
- B. Phosphorus and nitrogen
- C. Wetlands
- D. Lakes and Rivers
- E. Fish
- F. None of the Above

270. Agricultural runoff resulted in the erosion of 2.25 billion tons of soil and the deposit of large amounts of \_\_\_\_\_ into many waters. Sewage treatment plants served only 85 million people.

- A. Nitrogen levels
- B. Phosphorus and nitrogen
- C. Wetlands
- D. Lakes and Rivers
- E. Fish
- F. None of the Above

### Today

271. Two-thirds of the nation's waters are safe for fishing and swimming. The rate of annual wetlands \_\_\_\_\_ is estimated at about 70,000-90,000 acres according to recent studies.

- A. Nitrogen levels
- B. Losses
- C. Replenishment
- D. And lakes
- E. Including fish
- F. None of the Above

272. The amount of soil lost due to \_\_\_\_\_ has been cut by one billion tons annually, and phosphorus and nitrogen levels in water sources are down. Modern wastewater treatment facilities serve 173 million people.

- A. Nitrogen levels
- B. Agricultural runoff
- C. Dust
- D. Losses
- E. Pollution
- F. None of the Above

### The Future

273. All Americans will enjoy clean water that is safe for \_\_\_\_\_. We will achieve a net gain of wetlands by preventing additional losses and restoring hundreds of thousands of acres of wetlands.

- A. Fishing and swimming
- B. Hunting and Camping
- C. Preservation
- D. Drinking
- E. Birds
- F. None of the Above

274. Soil erosion and runoff of phosphorus and nitrogen into watersheds will be minimized, helping to sustain the nation's farming?

- A. Nitrogen levels
- B. Economy and aquatic systems
- C. Wetlands
- D. Additional losses
- E. Discharges
- F. None of the Above

### CMOM - "Capacity, Management, Operation and Maintenance"

275. Proper function of sanitary sewer systems is vital to protect public health, property, and waterways in the surrounding area. Most utilities have a management, operation, and maintenance (\_\_\_\_\_) plan to ensure their system is in working order.

- A. OSSF
- B. CMOM or MOM
- C. Infiltration and Inflow (I/I)
- D. Clean Water Act
- E. SSOs
- F. None of the Above

276. More than 40,000 sanitary sewage overflows \_\_\_\_\_ occur every year, causing huge monetary losses, damage to fish/shellfish beds, polluting groundwater, and decreased tourism.

- A. OSSF
- B. CMOM or MOM
- C. Infiltration and Inflow (I/I)
- D. Clean Water Act
- E. SSOs
- F. None of the Above

277. Which of the following terms - release raw sewage from the collection system before it can reach a treatment facility?

- A. OSSF
- B. CMOM or MOM
- C. Infiltration and Inflow (I/I)
- D. Clean Water Act
- E. SSOs
- F. None of the Above



278. Sewage \_\_\_\_\_, into businesses and homes, and eventually ends up in local waterways.

- A. OSSF
- B. CMOM or MOM
- C. Infiltration and Inflow (I/I)
- D. Clean Water Act
- E. Is not harmful
- F. None of the Above

279. Many factors are involved in \_\_\_\_\_. Many municipalities started constructing sewer systems over 100 years ago. Some of these have not been adequately maintained, improved, or repaired over the last century.

- A. OSSF
- B. CMOM or MOM
- C. Infiltration and Inflow (I/I)
- D. Clean Water Act
- E. SSOs
- F. None of the Above

280. Cities have used a wide variety of building materials, designs, and installation techniques, which aren't \_\_\_\_\_ to withstand heavy, continuous use.

- A. OSSF
- B. CMOM or MOM
- C. Infiltration and Inflow (I/I)
- D. Clean Water Act
- E. SSOs
- F. None of the Above

281. Problems can be especially bad where an older system is attached to a new system or an older system has?

- A. OSSF
- B. CMOM or MOM
- C. Infiltration and Inflow (I/I)
- D. Problems
- E. SSOs
- F. None of the Above

282. Which of the following terms - is a release of untreated wastewater before the flow reaches a treatment plant. SSOs pose a significant threat to public health and water quality.

- A. OSSF
- B. CMOM or MOM
- C. Infiltration and Inflow (I/I)
- D. Clean Water Act
- E. SSOs
- F. None of the Above

*The term **or** means **or** and is only here to help you in answering the question. Not a trick*

### **Municipality Self-Assessment**

283. Under the MOM Programs Project, Region 4 invites municipalities to undertake a detailed self-assessment of their \_\_\_\_\_ programs.

- A. OSSF
- B. CMOM or MOM
- C. Infiltration and Inflow (I/I)
- D. Clean Water Act
- E. SSOs
- F. None of the Above

284. The municipalities submit this self-assessment along with recommendations for improvements to the \_\_\_\_\_ programs and/or remedial measures to correct sewer infrastructure problems.

- A. OSSF
- B. SSOs
- C. Infiltration and Inflow (I/I)
- D. Clean Water Act
- E. CMOM or MOM
- F. None of the Above

285. In consideration for undertaking the self-assessment, the municipality is able to establish its own reasonable goals and schedules, and the Region may use its discretion to significantly reduce penalties related to?

- A. OSSF
- B. CMOM or MOM
- C. Infiltration and Inflow (I/I)
- D. Clean Water Act
- E. SSOs
- F. None of the Above

286. Where an enforcement action is necessary, the Region works with the municipality to identify necessary \_\_\_\_\_ and to establish schedules. The Region will likely defer any penalty decision until after the completion of the necessary improvements.

- A. OSSF
- B. Permits
- C. Infiltration and Inflow (I/I)
- D. Clean Water Act
- E. Maintenance
- F. None of the Above

### Project Initiation

287. In 1998, Region 4 began the \_\_\_\_\_ Programs Project by identifying priority watersheds and geographical areas in each of the eight States in the Region.

- A. OSSF
- B. SSOs
- C. Infiltration and Inflow (I/I)
- D. Clean Water Act
- E. CMOM or MOM
- F. None of the Above

288. These included areas where \_\_\_\_\_ could cause significant public health concerns, such as beaches, shellfish harvesting areas and drinking water supplies. In addition, watersheds already listed as impaired by collection system overflows or bacterial contamination were identified.

- A. OSSF
- B. SSOs
- C. Infiltration and Inflow (I/I)
- D. Clean Water Act
- E. CMOM or MOM
- F. None of the Above

289. Those municipalities wanting to participate in the \_\_\_\_\_ Project undertake the self-assessment using the guidance materials provided and submit the self-assessment to the Region within seven months of the kickoff.

- A. OSSF
- B. SSOs
- C. Infiltration and Inflow (I/I)
- D. Clean Water Act
- E. CMOM or MOM
- F. None of the Above

### Infiltration and Inflow (I/I)

290. \_\_\_\_\_ occurs when rain or snowmelt enters the ground and seeps into leaky sanitation sewers, which were not designed to carry rainfall or drain property.

- A. Sanitary Sewer Overflows (SSOs)
- B. Line/main breaks
- C. Infiltration and Inflow (I/I)
- D. Inflow
- E. Leaks
- F. None of the Above

291. Which of the following terms - can also occur when excess waters from roof drains, broken pipes and bad connections at sewer service lines infiltrates the sanitary sewer?

- A. Sanitary Sewer Overflows (SSOs)
- B. Line/main breaks
- C. Infiltration and Inflow (I/I)
- D. Inflow
- E. Leaks
- F. None of the Above

### Structural Failures

292. Which of the following terms - are a major result of structural failure. Undersized systems do not have large enough pumps or lines to carry all the sewage generated by the buildings attached to them. This is especially true for new subdivisions or commercial areas.

- A. Sanitary Sewer Overflows (SSOs)
- B. Line/main breaks
- C. Infiltration and Inflow (I/I)
- D. Inflow
- E. Leaks
- F. None of the Above

293. Some cities estimate that up to 60% of \_\_\_\_\_ come from service lines.

- A. Sanitary Sewer Overflows (SSOs)
- B. Line/main breaks
- C. Infiltration and Inflow (I/I)
- D. Inflow
- E. Leaks
- F. None of the Above

### What are Sanitary Sewer Overflows?

294. Which of the following terms - are discharges of raw sewage from municipal sanitary sewer systems?

- A. Sanitary Sewer Overflows (SSOs)
- B. Line/main breaks
- C. Infiltration and Inflow (I/I)
- D. Inflow
- E. Leaks
- F. None of the Above

295. Which of the following terms - can release untreated sewage into basements or out of manholes and onto city streets, playgrounds, and into streams before it can reach a treatment facility.

- A. Sanitary Sewer Overflows (SSOs)
- B. Line/main breaks
- C. Infiltration and Inflow (I/I)
- D. Inflow
- E. Leaks
- F. None of the Above

*The term **or** means **or** and is only here to help you in answering the question. Not a trick.*

296. Which of the following terms - are often caused by blockages and breaks in the sewer lines?

- A. Sanitary Sewer Overflows (SSOs)
- B. Line/main breaks
- C. Infiltration and Inflow (I/I)
- D. Inflow
- E. Leaks
- F. None of the Above

### Why do Sewers Overflow?

297. SSOs occasionally occur in almost every \_\_\_\_\_, even though systems are intended to collect and contain all the sewage that flows into them.

- A. Sanitary Sewer Overflows (SSOs)
- B. Line/main breaks
- C. Infiltration and Inflow (I/I)
- D. Inflow
- E. Leaks
- F. None of the Above

298. When \_\_\_\_\_ happen frequently, it means something is wrong with the system.

- A. Sanitary Sewer Overflows (SSOs)
- B. Line/main breaks
- C. Infiltration and Inflow (I/I)
- D. Inflow
- E. Leaks
- F. None of the Above

**Problems that Can Cause Chronic SSOs Include:**

299. Infiltration and Inflow (I&I): too much rainfall or snowmelt infiltrating through the ground into leaky sanitary sewers not designed to hold rainfall or to drain property, and excess water inflowing through roof drains connected to sewers, broken pipes, and?

- A. Break or collapse
- B. Infiltration and inflow
- C. Inflow
- D. Badly connected sewer service lines
- E. Carry sewage
- F. None of the Above

300. Undersized Systems: Sewers and pumps are too small to \_\_\_\_\_ from newly-developed subdivisions or commercial areas.

- A. Break or collapse
- B. Infiltration and inflow
- C. Inflow
- D. Badly connected sewer service lines
- E. Carry sewage
- F. None of the Above

301. Pipe Failures: blocked, broken or cracked pipes, tree roots grow into the sewer, sections of pipe settle or shift so that pipe joints no longer match, and sediment and other material builds up causing pipes to?

- A. Break or collapse
- B. Infiltration and inflow
- C. Inflow
- D. Badly connected sewer service lines
- E. Carry sewage
- F. None of the Above

302. Sewer Service Connections: discharges occur at \_\_\_\_\_ to houses and other buildings; some cities estimate that as much as 60% of overflows comes from the service lines.

- A. Break or collapse
- B. Infiltration and inflow
- C. Inflow
- D. Badly connected sewer service lines
- E. Sewer service connections
- F. None of the Above

303. Deteriorating Sewer System: \_\_\_\_\_, improper maintenance; widespread problems that can be expensive to fix develop over time.

- A. Combined Sewer Overflows
- B. Infiltration and inflow
- C. Improper installation
- D. Sanitary Sewer Overflows (SSOs)
- E. Maintenance activities
- F. None of the Above

**Why are SSOs a Problem?**

304. The EPA has found that \_\_\_\_\_ caused by poor sewer collection system management pose a substantial health and environmental challenge. The response to this challenge varies considerably from state to state.

- A. Combined Sewer Overflows
- B. Infiltration and inflow
- C. Inflow
- D. Sanitary Sewer Overflows (SSOs)
- E. Maintenance activities
- F. None of the Above

305. Many municipalities have asked for national consistency in the way permits are considered for wastewater discharges, including \_\_\_\_\_, and in enforcement of the law prohibiting unpermitted discharges.

- A. Combined Sewer Overflows
- B. Infiltration and inflow
- C. Inflow
- D. Sanitary Sewer Overflows (SSOs)
- E. Maintenance activities
- F. None of the Above

306. This SSO Federal Advisory Subcommittee examines the need for national consistency in permitting and enforcement, effective sewer operation and maintenance principles, public notification for \_\_\_\_\_ with potential health or environmental dangers, and other public policy issues.

- A. Combined Sewer Overflows
- B. Infiltration and inflow
- C. Inflow
- D. Sanitary Sewer Overflows (SSOs)
- E. Maintenance activities
- F. None of the Above

307. The EPA carefully considers the Subcommittee's recommendations for regulatory and nonregulatory actions to reduce \_\_\_\_\_ nationally.

- A. Combined Sewer Overflows
- B. Infiltration and inflow
- C. Inflow
- D. Sanitary Sewer Overflows (SSOs)
- E. Maintenance activities
- F. None of the Above

### How Big is the SSO Problem?

308. The total number of \_\_\_\_\_ that occur nationwide each year is not known. In some areas, they might not be reported or are underreported to the EPA and state environmental agencies. Two surveys, however, help to define the size of the problem:

- A. Combined Sewer Overflows
- B. Infiltration and inflow
- C. Inflow
- D. Sanitary Sewer Overflows (SSOs)
- E. Maintenance activities
- F. None of the Above

309. In a 1994 survey of 79 members of the Association of Metropolitan Sewerage Agencies, 65 percent of the respondents reported wet weather?

- A. Combined Sewer Overflows
- B. Infiltration and inflow
- C. Inflow
- D. Sanitary Sewer Overflows (SSOs)
- E. Maintenance activities
- F. None of the Above

310. Municipal respondents with \_\_\_\_\_ had only limited information about them. Only 60 percent had estimated the annual number. Half of those had estimated the amount of sewerage discharged, and 17 percent had determined what pollutants were in their overflows.

- A. Combined Sewer Overflows
- B. Infiltration and inflow
- C. Inflow
- D. Sanitary Sewer Overflows (SSOs)
- E. Maintenance activities
- F. None of the Above

### Combined Sewer Overflow Section

311. Which of the following terms - are sewers that are designed to collect rainwater runoff, domestic sewage, and industrial wastewater in the same pipe?

- A. Combined Sewer systems
- B. Infiltration and inflow
- C. Inflow
- D. Sanitary Sewer Overflows (SSOs)
- E. Maintenance activities
- F. None of the Above

312. Most of the time, \_\_\_\_\_ transport all of their wastewater to a sewage treatment plant, where it is treated and then discharged to a water body.

- A. Combined Sewer systems
- B. Infiltration and inflow
- C. Inflow
- D. Sanitary Sewer Overflows (SSOs)
- E. Maintenance activities
- F. None of the Above

313. Which of the following terms - are designed to overflow occasionally and discharge excess wastewater directly to nearby streams, rivers, or other water bodies?

- A. Combined Sewer Overflows
- B. Infiltration and inflow
- C. Inflow
- D. Sanitary Sewer systems
- E. Maintenance activities
- F. None of the Above

314. These overflows, called \_\_\_\_\_ contain not only storm water but also untreated human and industrial waste, toxic materials, and debris.

- A. Combined Sewer Overflows
- B. Infiltration and inflow
- C. Inflow
- D. Sanitary Sewer Overflows (SSOs)
- E. Maintenance activities
- F. None of the Above

315. They are a major water pollution concern for the approximately 772 cities in the U.S. that have combined sewer systems. \_\_\_\_\_ may be thought of as a type of "urban wet weather" discharge.

- A. Combined Sewer Overflows
- B. Infiltration and inflow
- C. Inflow
- D. Sanitary Sewer Overflows (SSOs)
- E. Maintenance activities
- F. None of the Above

316. Which of the following terms - and storm water discharges, they are discharges from a municipality's wastewater conveyance infrastructure that are caused by precipitation events such as rainfall or heavy snowmelt?

- A. Combined Sewer Overflows
- B. Infiltration and inflow
- C. Inflow
- D. Sanitary Sewer Overflows (SSOs)
- E. Maintenance activities
- F. None of the Above

317. The Policy provides guidance on how communities with combined sewer systems can meet Clean Water Act goals in as flexible and cost-effective a manner as possible. EPA's Report to Congress on implementation of the \_\_\_\_\_ Control Policy assesses the progress made by EPA, states, and municipalities in implementing and enforcing the CSO Control Policy.

- A. Combined Sewer Overflows or (CSOs)
- B. Infiltration and inflow
- C. Inflow
- D. Sanitary Sewer Overflows (SSOs)
- E. Maintenance activities
- F. None of the Above

### **The Elements of a Proper CMOM Program**

#### **Utility Specific**

318. The complexity and expense associated with a utility's CMOM or MOM programs is specific to the size and complexity of the \_\_\_\_\_ and related infrastructure. Factors such as population growth rate and soil/groundwater conditions also dictate the level of investment which should be made.

- A. Maintenance activities
- B. POTW
- C. MOM
- D. Goals
- E. Properly maintained
- F. None of the Above

#### **Purposeful**

319. When MOM programs are present and \_\_\_\_\_, they support customer service and protect system assets, public health, and water quality.

- A. Maintenance activities
- B. POTW
- C. MOM
- D. Goals
- E. Properly maintained
- F. None of the Above

### Goal-Oriented

320. Which of the following terms - programs have goals directed toward their individual purposes. Progress toward these goals is measurable, and the goals are attainable.

- A. Maintenance activities
- B. POTW
- C. MOM
- D. Goals
- E. Properly maintained
- F. None of the Above

### Uses Performance Measures

321. Performance measures should be established for each MOM program in conjunction with the program goal. These \_\_\_\_\_, and used in determining progress to, or beyond, the program goal.

- A. Maintenance activities
- B. POTW
- C. MOM
- D. Measures are quantifiable
- E. Properly maintained
- F. None of the Above

### What Costs are Involved with Reducing or Eliminating SSOs?

322. \_\_\_\_\_ are a valuable part of the nation's infrastructure. The EPA estimates that our nation's sewers are worth a total of more than \$1 trillion.

- A. Rehabilitation or Upgrading sewer
- B. SSOs
- C. Sanitary sewer collection systems
- D. Performance measures
- E. Evaluation
- F. None of the Above

323. The collection system of a single large municipality is an asset \_\_\_\_\_ of dollars and that of a smaller city could cost many millions to replace.

- A. Rehabilitation or Upgrading sewer
- B. SSOs
- C. Sanitary sewer collection systems
- D. Performance measures
- E. Evaluation
- F. None of the Above

324. Sewer \_\_\_\_\_ to reduce or eliminate SSOs can be expensive, but the cost must be weighed against the value of the collection system asset and the added costs if this asset is allowed to further deteriorate.

- A. Rehabilitation or Upgrading sewer
- B. SSOs
- C. Sanitary sewer collection systems
- D. Performance measures
- E. Evaluation
- F. None of the Above

325. Ongoing maintenance and \_\_\_\_\_ adds value to the original investment by maintaining the system's capacity and extending its life.

- A. Rehabilitation
- B. SSOs
- C. Sanitary sewer collection systems
- D. Performance measures
- E. Evaluation
- F. None of the Above

326. The costs of rehabilitation and other measures to correct \_\_\_\_\_ can vary widely by community size and sewer system type.

- A. Rehabilitation or Upgrading sewer
- B. SSOs
- C. Sanitary sewer collection systems
- D. Performance measures
- E. Evaluation
- F. None of the Above

### Overflow Response Plan

327. The overflow response plan should be designed provide a quick response to?

- A. Rehabilitation or Upgrading sewer
- B. SSOs
- C. Sanitary sewer collection systems
- D. Performance measures
- E. Evaluation
- F. None of the Above

### System Evaluation and Capacity Assurance Plan

328. These two activities work hand-in-hand to detect and address deficiencies and scheduling. These will provide an \_\_\_\_\_ of parts of the collection system that have substandard performance.

- A. Rehabilitation or Upgrading sewer
- B. SSOs
- C. Sanitary sewer collection systems
- D. Performance measures
- E. Evaluation
- F. None of the Above

329. Performance measures and indicators are important in evaluating collection system performance and \_\_\_\_\_, operation and maintenance programs.

- A. Rehabilitation or Upgrading sewer
- B. SSOs
- C. Sanitary sewer collection systems
- D. Performance measures
- E. Implementing capacity management
- F. None of the Above

### Communication/Notification

330. If an \_\_\_\_\_ occurs, sanitary sewer facilities will be required to immediately notify the NPDES permit authority.

- A. Rehabilitation or Upgrading sewer
- B. SSOs
- C. Sanitary sewer collection systems
- D. Performance measures
- E. Record keeping provisions
- F. None of the Above

331. Facilities must post locations of recurrent \_\_\_\_\_ and let the public know that the annual report is available to them.

- A. Rehabilitation or Upgrading sewer
- B. SSOs
- C. Sanitary sewer collection systems
- D. Performance measures
- E. Record keeping provisions
- F. None of the Above

332. The \_\_\_\_\_ mandate that facilities must maintain records for three years about all overflows, complaints, work orders on the system, and implementation measures.

- A. Rehabilitation or Upgrading sewer
- B. SSOs
- C. Sanitary sewer collection systems
- D. Performance measures
- E. Record keeping provisions
- F. None of the Above

333. According to the EPA, an effective \_\_\_\_\_ program would help NPDES permittees to: Develop/revise routine preventive maintenance activities that prevent service interruption and protect capital investments.

- A. Rehabilitation or Upgrading sewer
- B. SSOs
- C. Sanitary sewer collection systems
- D. MOM
- E. CMOM
- F. None of the Above

334. Create an \_\_\_\_\_ and respond to the inspection results.

- A. Inspection schedule
- B. SSOs
- C. Hydraulic (capacity)
- D. Performance measures
- E. Record keeping provisions
- F. None of the Above



335. Investigate the causes of \_\_\_\_\_ and take corrective measures.

- A. Inspection schedule
- B. SSOs
- C. Hydraulic (capacity)
- D. Performance measures
- E. Record keeping provisions
- F. None of the Above

336. Respond quickly to \_\_\_\_\_ to minimize impacts to human health and the environment.

- A. Inspection schedule
- B. SSOs
- C. Hydraulic (capacity)
- D. Performance measures
- E. Record keeping provisions
- F. None of the Above

337. Identify \_\_\_\_\_ and physical deficiencies and prioritize responses, including capital investments.

- A. Inspection schedule
- B. SSOs
- C. Hydraulic (capacity)
- D. Performance measures
- E. Record keeping provisions
- F. None of the Above

338. Identify and develop \_\_\_\_\_ to program deficiencies (e.g., lack of legal authority, inadequate funding, and inadequate preventive maintenance).

- A. Inspection schedule
- B. SSOs
- C. Skill of the responding crews
- D. Procedures
- E. Appropriate responses
- F. None of the Above

### **Continuous Training**

339. Which of the following terms - for emergency response plans should be understood and practiced by all personnel in order to ensure safety of the public and the collection system personnel responding?

- A. Inspection schedule
- B. SSOs
- C. Skill of the responding crews
- D. Procedures
- E. Appropriate responses
- F. None of the Above

340. Which of the following terms - should be specific to the type of emergency that could occur?

- A. Inspection schedule
- B. SSOs
- C. Skill of the responding crews
- D. Procedures
- E. Appropriate responses
- F. None of the Above

341. The ability to deal with emergencies depends on the knowledge and \_\_\_\_\_, in addition to availability of equipment.

- A. Inspection schedule
- B. SSOs
- C. Skill of the responding crews
- D. Procedures
- E. Appropriate responses
- F. None of the Above

342. The crew should be able to \_\_\_\_\_ in the field under stress and select the right equipment needed to correct the problem.

- A. Routine preventative operations
- B. Procedures
- C. Exceed the capacity of staff
- D. Rapidly diagnose problems
- E. Be utilized to perform
- F. None of the Above

343. If resources are limited, consideration should be given to contracting other departments or private industries to respond to some emergency situations, for example, those rare emergencies that would?

- A. Routine preventative operations
- B. Procedures
- C. Exceed the capacity of staff
- D. Rapidly diagnose problems
- E. Be utilized to perform
- F. None of the Above

**Routine Preventative O&M Activities – Wastewater Collection Lines**

344. Which of the following terms - and maintenance activities for wastewater collection lines shall be performed by the system's personnel and outside contractors?

- A. Routine preventative operations
- B. Procedures
- C. Exceed the capacity of staff
- D. Rapidly diagnose problems
- E. Be utilized to perform
- F. None of the Above

345. A qualified outside contractor can also \_\_\_\_\_ hydraulic cleaning using a jet hydro-vac combination truck and mechanical cleaning using a rodding machine.

- A. Routine preventative operations
- B. Procedures
- C. Exceed the capacity of staff
- D. Rapidly diagnose problems
- E. Be utilized to perform
- F. None of the Above

346. Which of the following terms - including cleaning and removing roots from small and large diameter lines?

- A. Routine preventative operations
- B. Procedures
- C. Exceed the capacity of staff
- D. Rapidly diagnose problems
- E. Routine operations and maintenance activities
- F. None of the Above

347. Closed-circuit television (CCTV) is used to assess the condition of the sewers. There are four types of activities that the system or a CCTV contractor can also perform: 1) inspect new work, 2) inspect condition of older portions of the wastewater collection system, 3) routine inspection of approximately 10% of the wastewater collection, and 4) \_\_\_\_\_ to determine the cause of selected overflow events. Manhole inspection, manhole coating (to prevent concrete deterioration) and manhole painting (for roach control) are also routinely performed.

- A. Routine preventative operations
- B. Damage your system
- C. Problem identification
- D. Routine operations and maintenance activities
- E. Necessary process
- F. None of the Above

348. Sewer filled with grass will \_\_\_\_\_, pumps, and upset the wastewater treatment system. Require your industrial users like golf courses to install grass, grease, and sand/oil interceptors.

- A. Routine preventative operations
- B. Damage your system
- C. Problem identification
- D. Routine operations and maintenance activities
- E. Necessary process
- F. None of the Above

349. Certain compounds and undesirable solids, like grease and grass clippings, can disturb this delicate balance and \_\_\_\_\_ at the wastewater treatment facility.

- A. Routine preventative operations
- B. Damage your system
- C. Problem identification
- D. Routine operations and maintenance activities
- E. Necessary process
- F. None of the Above

350. There are compounds and mixtures that should never be introduced into a?
- A. Stormwater Program
  - B. Sanitary sewer system
  - C. WET
  - D. Permit conditions
  - E. NPDES
  - F. None of the Above

**National Pollutant Discharge Elimination System (NPDES) Permit Program**

351. The Clean Water Act requires that all point source wastewater dischargers obtain and comply with an \_\_\_\_\_ permit.
- A. Stormwater Program
  - B. Sanitary sewer system
  - C. WET
  - D. Permit conditions
  - E. NPDES
  - F. None of the Above

352. Which of the following terms - permits regulate the discharges from publicly owned wastewater treatment facilities, other wastewater treatment facilities?
- A. Stormwater Program
  - B. Sanitary sewer system
  - C. WET
  - D. Permit conditions
  - E. NPDES
  - F. None of the Above

353. The \_\_\_\_\_ program also regulates wet weather discharges such as stormwater discharges from industrial activities (e.g. factory stormwater runoff) and municipal stormwater discharges including urban storm-water runoff, combined sewer overflows, and storm sewer overflows.
- A. Stormwater Program
  - B. Sanitary sewer system
  - C. WET
  - D. Permit conditions
  - E. NPDES
  - F. None of the Above

354. Which of the following terms - permits are developed to ensure that such discharges to receiving waters are protective of human health and the environment?
- A. Stormwater Program
  - B. Sanitary sewer system
  - C. WET
  - D. Permit conditions
  - E. NPDES
  - F. None of the Above

355. Violations of permit conditions are enforceable under the \_\_\_\_\_. The EPA uses a variety of techniques to monitor permittee compliance status, including on-site inspections and review of data submitted by permittees. NPDES permits are issued for a term of five years (or less).
- A. Stormwater Program
  - B. Sanitary sewer system
  - C. Clean Water Act
  - D. Permit conditions
  - E. NPDES
  - F. None of the Above

**Wastewater Collection**

356. A very economical and quick method of determining if a new sewer line is straight and unobstructed is called “\_\_\_\_\_” and can be done with a mirror and a bright source of light, for example a headlight at night or Sunlight.
- A. Flamer
  - B. Lamping
  - C. Natural lighting
  - D. Candling
  - E. Lighting
  - F. None of the Above

357. Which of the following terms - coupled with a good cleaning program can be a highly effective maintenance tool.

- A. Gravity-flow
- B. Lamping
- C. Natural elevation
- D. Video inspection
- E. Taste testing
- F. None of the Above

358. Which of the following terms - your lines, restrictions caused by debris, roots and grease buildup can be prevented?

- A. Video inspection
- B. By cleaning and root sawing
- C. Gravity-flow sanitary sewers
- D. Bucketing
- E. Rodding
- F. None of the Above

359. Sewage collection systems that have video inspection closed circuit television (CCTV) and cleaning programs, \_\_\_\_\_ in the number of emergency calls because the system was cleaned and potential trouble spots were located prior to problems occurring.

- A. Video inspection
- B. By cleaning and root sawing
- C. Gravity-flow sanitary sewers
- D. Bucketing
- E. Rodding
- F. None of the Above

360. Sanitary sewers are designed to transport the wastewater by utilizing the potential energy provided by the \_\_\_\_\_ of the earth resulting in a downstream flow.

- A. Gravity-flow
- B. Lamping
- C. Natural elevation
- D. Video inspection
- E. Taste testing
- F. None of the Above

361. This energy, if not designed properly, can cause losses due to free falls, \_\_\_\_\_, and sharp bends.

- A. Designed to follow the topography of the land
- B. Dissipate excess potential energy
- C. Turbulent junctions
- D. Population served, density of population, and water consumption
- E. Based on the quantity of wastewater to be transported
- F. None of the Above

362. Sewer systems are designed to?

- A. Designed to follow the topography of the land
- B. Dissipate excess potential energy
- C. Maintain proper flow velocities with minimum head loss
- D. Population served, density of population, and water consumption
- E. Based on the quantity of wastewater to be transported
- F. None of the Above

363. Higher elevations in the system may find it necessary to?

- A. Designed to follow the topography of the land
- B. Dissipate excess potential energy
- C. Maintain proper flow velocities with minimum head loss
- D. Population served, density of population, and water consumption
- E. Based on the quantity of wastewater to be transported
- F. None of the Above

364. Design flows are?

- A. Designed to follow the topography of the land
- B. Dissipate excess potential energy
- C. Maintain proper flow velocities with minimum head loss
- D. Population served, density of population, and water consumption
- E. Based on the quantity of wastewater to be transported
- F. None of the Above

365. Flow is determined largely by?

- A. Designed to follow the topography of the land
- B. Dissipate excess potential energy
- C. Maintain proper flow velocities with minimum head loss
- D. Population served, density of population, and water consumption
- E. Based on the quantity of wastewater to be transported
- F. None of the Above

366. Sanitary sewers should be?

- A. Designed to follow the topography of the land
- B. Dissipate excess potential energy
- C. Designed for peak flow of population
- D. Population served, density of population, and water consumption
- E. Designed separate from the sanitary system
- F. None of the Above

367. Stormwater inflow is highly discouraged and should be?

- A. Designed to follow the topography of the land
- B. Dissipate excess potential energy
- C. Designed for peak flow of population
- D. Population served, density of population, and water consumption
- E. Designed separate from the sanitary system
- F. None of the Above

368. Gravity-flow sanitary sewers are usually \_\_\_\_\_ and to flow full or nearly full at peak rates of flow and partly full at lesser flows.

- A. Designed to follow the topography of the land
- B. Dissipate excess potential energy
- C. Designed for peak flow of population
- D. Population served, density of population, and water consumption
- E. Designed separate from the sanitary system
- F. None of the Above

369. Most of the time the flow surface is exposed to the atmosphere within the sewer and it functions as an open channel. At extreme peak flows the wastewater will?

- A. Surge back into the manholes
- B. Evaluate the capacity
- C. Protect the health of the customers we serve
- D. Population served, density of population, and water consumption
- E. Understanding of flow velocities
- F. None of the Above

370. In order to design a sewer system, many factors are considered. The purpose of this topic is to aid in the \_\_\_\_\_ and design depths of flow.

- A. Surge back into the manholes
- B. Evaluate the capacity
- C. Protect the health of the customers we serve
- D. Understanding of flow velocities
- E. None of the Above

371. The ultimate goal for our industry is to \_\_\_\_\_. This is achieved by prevention of sewer manhole overflows.

- A. Surge back into the manholes
- B. Evaluate the capacity
- C. Protect the health of the customers we serve
- D. Population served, density of population, and water consumption
- E. Understanding of flow velocities
- F. None of the Above

### **Sewer System Capacity Evaluation - Testing and Inspection**

372. The collection system owner or operator should have a program in place to periodically \_\_\_\_\_ of the sewer system in both wet and dry weather flows and ensure the capacity is maintained as it was designed.

- A. Surge back into the manholes
- B. Evaluate the capacity
- C. Protect the health of the customers we serve
- D. Population served, density of population, and water consumption
- E. Understanding of flow velocities
- F. None of the Above

373. The \_\_\_\_\_ builds upon ongoing activities and the everyday preventive maintenance that takes place in a system.

- A. General inspection
- B. Flow and rainfall monitoring
- C. Capacity evaluation program
- D. Address hydraulic deficiencies
- E. Continuously update
- F. None of the Above

374. The system then undergoes general inspection which serves to \_\_\_\_\_ and add to the inventory information.

- A. General inspection
- B. Flow and rainfall monitoring
- C. Capacity evaluation program
- D. Address hydraulic deficiencies
- E. Continuously update
- F. None of the Above

### **Capacity Limitations**

375. The next step in the \_\_\_\_\_ is to identify the location of wet weather related SSOs, surcharged lines, basement backups, and any other areas of known capacity limitations.

- A. General inspection
- B. Flow and rainfall monitoring
- C. Capacity evaluation
- D. Address hydraulic deficiencies
- E. Continuously update
- F. None of the Above

376. These areas warrant further investigation in the form of \_\_\_\_\_ and inspection procedures to identify and quantify the problem.

- A. General inspection
- B. Flow and rainfall monitoring
- C. Capacity evaluation program
- D. Address hydraulic deficiencies
- E. Continuously update
- F. None of the Above

377. The reviewer should determine that the capacity evaluation includes an estimate peak flows experienced in the system, an estimate of the \_\_\_\_\_ components, and identifies the major sources of I/I that contribute to hydraulic overloading events.

- A. Alleviate capacity limitations
- B. Flow and rainfall monitoring
- C. Capacity of key system
- D. Address hydraulic deficiencies
- E. Options or alternatives
- F. None of the Above

378. The capacity evaluation should also make use of a hydraulic model. This model will help identify areas that need to?

- A. Alleviate capacity limitations
- B. Flow and rainfall monitoring
- C. Capacity of key system
- D. Address hydraulic deficiencies
- E. Options or alternatives
- F. None of the Above

379. Short and long term alternatives to \_\_\_\_\_ should be identified, prioritized, and scheduled for implementation.

- A. Alleviate capacity limitations
- B. Flow and rainfall monitoring
- C. Capacity of key system
- D. Address hydraulic deficiencies
- E. Options or alternatives
- F. None of the Above

380. A sewer inspection is an important part of a sewer system capacity evaluation and determining your?

- A. Alleviate capacity limitations
- B. Flow and rainfall monitoring
- C. Capacity of key system
- D. Address hydraulic deficiencies
- E. Options or alternatives
- F. None of the Above

### **Flow Monitoring**

381. Fundamental information about the collection system is obtained by?

- A. Flow monitoring
- B. Records of each inspection
- C. Discharge point
- D. Temporary monitoring
- E. Base flow
- F. None of the Above

382. Which of the following terms - provides information on dry weather flows as well as areas of the collection system potentially affected by I/I.

- A. Flow monitoring
- B. Records of each inspection
- C. Discharge point
- D. Temporary monitoring
- E. Base flow
- F. None of the Above

383. Which of the following terms - may also be performed for billing purposes, to assess the need for new sewers in a certain area, or to calibrate a model?

- A. Flow monitoring
- B. Records of each inspection
- C. Discharge point
- D. Temporary monitoring
- E. Base flow
- F. None of the Above

384. Permanent installations are done at key points in the collection system such as the \_\_\_\_\_ of a satellite collection system, pump stations, and key junctions.

- A. Flow monitoring
- B. Records of each inspection
- C. Discharge point
- D. Temporary monitoring
- E. Base flow
- F. None of the Above

385. Which of the following terms - consists of flow meters typically installed for 30-90 days?

- A. Flow monitoring
- B. Records of each inspection
- C. Discharge point
- D. Temporary monitoring
- E. Base flow
- F. None of the Above

### **Sewer Cleaning**

386. The purpose of \_\_\_\_\_ is to remove accumulated material from the sewer.

- A. Preventing blockages
- B. Lamping
- C. Sewer cleaning
- D. Scraping
- E. Rodding
- F. None of the Above

387. Which of the following terms - helps to prevent blockages and is also used to prepare the sewer for inspections.

- A. Prevent blockages
- B. Identify
- C. Cleaning
- D. Scraping
- E. Rodding
- F. None of the Above

388. Stoppages in gravity sewers are usually caused by a structural defect, poor design, poor construction, an \_\_\_\_\_, or root intrusion.

- A. Prevent blockages
- B. Identify
- C. Sewer cleaning
- D. Scraping
- E. Rodding
- F. None of the Above

389. Protruding traps (lateral sewer connections \_\_\_\_\_ so that they protrude into the main sewer) may catch debris, which then causes a further buildup of solids that eventually block the sewer.

- A. Prevent blockages
- B. Incorrectly installed
- C. Sewer cleaning
- D. Scraping
- E. Rodding
- F. None of the Above

### **Sewer Cleaning Methods**

390. There are three major methods of \_\_\_\_\_: hydraulic, mechanical, and chemical.

- A. Preventing blockages
- B. Lamping
- C. Sewer cleaning
- D. Scraping
- E. Rodding
- F. None of the Above

391. Hydraulic \_\_\_\_\_ refers to any application of water to clean the pipe.

- A. Preventing blockages
- B. Lamping
- C. Cleaning
- D. Scraping
- E. Rodding
- F. None of the Above



392. Mechanical \_\_\_\_\_ uses physical devices to scrape, cut, or pull material from the sewer.

- A. Preventing blockages
- B. Lamping
- C. Cleaning
- D. Scraping
- E. Rodding
- F. None of the Above

393. Chemical cleaning can \_\_\_\_\_ the control of odors, grease buildup, root growth, corrosion, and insect and rodent infestation.

- A. Prevent blockages
- B. Recordkeeping
- C. Identified
- D. Identify
- E. Facilitate
- F. None of the Above

### **Sewer Cleaning Records**

394. The backbone of an effective sewer cleaning program is accurate recordkeeping. Accurate \_\_\_\_\_ provides the collection system owner or operator with information on the areas.

- A. Prevent blockages
- B. Recordkeeping
- C. Identified
- D. Identify
- E. Facilitate
- F. None of the Above

395. The owner or operator should be able to \_\_\_\_\_ problem collection system areas, preferably on a map.

- A. Prevent blockages
- B. Recordkeeping
- C. Identified
- D. Identify
- E. Facilitate
- F. None of the Above

396. Potential problem areas \_\_\_\_\_ should include those due to grease or industrial discharges, hydraulic bottlenecks in the collection system, areas of poor design (e.g., insufficiently sloped sewers), areas prone to root intrusion, sags, and displacements.

- A. Prevent blockages
- B. Recordkeeping
- C. Identified
- D. Cleaning
- E. Facilitate
- F. None of the Above

397. The connection between problem areas in the collection system and the preventive maintenance \_\_\_\_\_ schedule should be clear.

- A. Prevent blockages
- B. Stoppages
- C. Identified
- D. Cleaning
- E. Facilitate
- F. None of the Above

398. The owner or operator should also be able to identify the number of \_\_\_\_\_ experienced per mile of sewer pipe.

- A. Prevent blockages
- B. Stoppages
- C. Identified
- D. Cleaning
- E. Facilitate
- F. None of the Above

### **Infiltration and Inflow**

399. Which of the following terms - occurs when groundwater enters the sewer system through cracks, holes, faulty connections, or other openings?

- A. Inflow
- B. Infiltration
- C. I/I
- D. Sewer taste
- E. Leaks
- F. None of the Above

400. Which of the following terms - occurs when surface water such as storm water enters the sewer system through roof downspout connections, holes in manhole covers, illegal plumbing connections, or other defects?

- A. Inflow
- B. Infiltration
- C. I/I
- D. Sewer odors
- E. Leaks
- F. None of the Above