Registration Form

Sewer / Septic O&M CEU Training Course

48 HOUR RUSH ORDER PROCESSING FEE ADDITIONAL $50.00

Start and Finish Dates:_____

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

List number of hours worked on assignment must match State Requirement. _____

Name_____**Signature**_____

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

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Phone:
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License ID #_____

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

Other _____

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Toll Free (866) 557-1746 Fax (928) 272-0747 info@tlch2o.com

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AFFIDAVIT OF EXAM COMPLETION

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

Grading Information

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

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

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Technical Learning College requires that our students who takes a correspondence or home study program course must pass a proctored course reading, quiz and final examination. The proctor must complete and provide to the school a certification form approved by the commission for each examination administered by the proctor.

Instructions. When a student completes the course work, fill out the blanks in this section and provide the form to the proctor with the examination.

Name of Course:_____

Name of Licensee:_____

Instructions to Proctor. After an examination is administered, complete and return this certification and examination to the school in a sealed exam packet or in pdf format.

I certify that:

1. I am a disinterested third party in the administration of this examination. I am not related by blood, marriage or any other relationship to the licensee which would influence me from properly administering the examination.
2. The licensee showed me positive photo identification prior to completing the examination.
3. The enclosed examination was administered under my supervision on _____. The licensee received no assistance and had no access to books, notes or reference material.
4. I have not permitted the examination to be compromised, copied, or recorded in any way or by any method.
5. Provide an estimate of the amount of time the student took to complete the assignment.

Time to complete the entire course and final exam. _____

Notation of any problem or concerns:

Name and Telephone of Proctor (please print):

_____

_____

Signature of Proctor

Sewer/ Septic O&M Answer Key

Name _____ Phone_____

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

Website __ Telephone Call___ Email____ Spoke to_____

Did you receive the approval number, if applicable? _____

What is the course approval number, if applicable? _____

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Please circle, underline, bold or X only one correct answer
Please Circle, Bold, Underline or X, one answer per question. A **felt tipped pen** works best.

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335. A B C D	352. A B C D	369. A B C D	386. A B C D
336. A B C D	353. A B C D	370. A B C D	387. A B C D
337. A B C D	354. A B C D	371. A B C D	388. A B C D
338. A B C D	355. A B C D	372. A B C D	389. A B C D
339. A B C D	356. A B C D	373. A B C D	390. A B C D
340. A B C D	357. A B C D	374. A B C D	391. A B C D
341. A B	358. A B C D	375. A B C D	392. A B C D
342. A B	359. A B C D	376. A B C D	393. A B C D
343. A B	360. A B C D	377. A B C D	394. A B C D
344. A B	361. A B C D	378. A B C D	395. A B C D
345. A B C D	362. A B C D	379. A B C D	396. A B C D
346. A B C D	363. A B C D	380. A B C D	397. A B C D
347. A B C D	364. A B C D	381. A B C D	398. A B C D
348. A B C D	365. A B C D	382. A B C D	399. A B C D
349. A B C D	366. A B C D	383. A B C D	400. A B C D

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

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

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

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

SEWER / SEPTIC O&M CEU TRAINING COURSE

CUSTOMER SERVICE RESPONSE CARD

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

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Sewer/Septic O&M CEU Training Assignment

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

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

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

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

ONSITE SEWAGE FACILITIES (OSSF) ONSITE SYSTEMS SECTION

1. Onsite sewage treatment systems supply septic system owners with _____to keep their septic systems functioning properly.

A. The tank effluent
B. Best management practices
C. Primary and secondary treatment
D. None of the above

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

A. Groundwater system(s)
B. Septic system
C. Collection system
D. None of the above

Onsite Sewage Facilities (OSSF)

3. Which of the following include individual onsite septic systems, cluster systems, and alternative wastewater treatment technologies like constructed wetlands, recirculating sand filters, mound systems, and ozone disinfection systems?

A. Decentralized treatment systems
B. Municipal wastewater treatment
C. Centralized wastewater treatment plant
D. None of the above

4. A septic tank and drainfield combination is the oldest and most common type of OSSF, although newer aerobic and biofilter units exist which represent scaled down versions of_____.

A. Groundwater system(s)
B. Municipal sewage treatments
C. Collection system
D. None of the above

5. OSSFs account for approximately _____% of all domestic wastewater treatment in the United States.

A. 25
B. 15
C. 50
D. None of the above

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

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

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

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

Types of Sewer Systems
9. Onsite/collection system operators are charged with protecting public health and the environment, and therefore must have documented proof of their certifications in the respective wastewater management systems. You as the operator must ensure that the system pipes remain clear and open. They eliminate obstructions and are constantly striving to improve flow characteristics. They keep the wastewater moving underground, unseen and unheard.
A. True B. False

10. Onsite/wastewater collection system 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 OSSF/wastewater collection system for granted. In truth, these operators must work hard to keep it functioning properly.
A. True B. False

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

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

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

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

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

What is EPA doing to help manage onsite systems?

15. EPA develops _____ for onsite wastewater management program(s).
A. Homeowner awareness C. State-of-the-art research
B. Voluntary policies and guidance D. None of the above

16. EPA sponsors _____ on onsite and clustered wastewater system technologies through demonstration projects.
A. Homeowner awareness C. State-of-the-art research
B. Voluntary policies and guidance D. None of the above

17. EPA promotes _____ to strengthen onsite wastewater management
A. Homeowner awareness C. State-of-the-art research
B. Voluntary policies and guidance D. None of the above

18. Which of the following increases the percentage of contaminants, particularly nitrogen and fecal coliform, removed in wastewater?
A. Sanitary sewer(s) C. Wastewater management system(s)
B. Advanced wastewater treatment D. None of the above

Key Terms

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

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

Onsite Treatment Processes Options

21. The high cost of _____ and the advances made in individual and cluster (decentralized) system technologies have expanded the array of available treatment options and supported development of a more tailored approach to wastewater management services.
A. Sewage C. Centralized wastewater treatment plants
B. Collection system D. None of the above

Key Considerations

22. Wastewater flow and strength, site and local infrastructure conditions, and performance requirements for the _____are all key considerations in deciding what type of wastewater collection and treatment system is needed and how it should be designed.
A. Dispersed or discharged effluent C. Decentralized wastewater treatment
B. Septic tank D. None of the above

23. Onsite systems treat wastewater and disperse it on the property where it is generated.
A. True B. False

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

Basic Onsite Treatment Processes

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

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

Primary Treatment

25. Physical treatment processes involving capture of solids and fats/oils/grease in an enclosed vessel, typically by settling and flotation, such as provided in a septic tank or grease interceptor tank. This process also includes trapping of solids via _____or screens prior to discharge of the tank effluent.

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

Secondary Treatment

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

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

Key Septic Terms

Identify the missing term.

27. Means any onsite wastewater treatment system DEQ or the Commission approves for use in lieu of the standard subsurface system.

A. Alternative System
B. Cesspool
C. Effective Seepage Area
D. None of the above

28. Means the distribution of effluent to a set of absorption trenches in which each trench receives effluent in equivalent or proportional volumes.

A. Equal Distribution
B. Holding Tank System
C. Intermittent Sand Filter
D. None of the above

29. Means a structure used for disposal of human waste without the aid of water. It consists of a shelter built above a pit or vault in the ground into which human waste falls.

A. Septic tank
B. Cesspool
C. Privy
D. None of the above

30. Means a lined pit that receives raw sewage, allows separation of solids and liquids, retains the solids, and allows liquids to seep into the surrounding soil through perforations in the lining.

A. Black Waste
B. Cesspool
C. Swamp
D. None of the above

31. Means the sidewall area within an absorption trench or a seepage trench from the bottom of the trench to a level 2 inches above the distribution pipes, the sidewall area of any cesspool, seepage pit, unsealed earth pit privy, graywater waste absorption sump seepage chamber, or trench with drain media substitute, or the bottom area of a pressurized soil absorption facility installed in soil.

A. Alternative System
B. Cesspool
C. Effective Seepage Area
D. None of the above

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

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

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

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

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

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

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

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

Types of Systems – General
40. Standard gravity systems require _____ feet of "good" soil under the trenches while pressure distribution systems only require _____ feet.
A. 3 & 3 C. 3 & 2
B. 2 & 3 D. None of the above

41. Advanced Treatment systems are more complicated and treat the wastewater to a fairly high level before allowing it to reach the soil. Because of this treatment, they can be used where there is only _____ foot of "good" dirt beneath the trench bottom.
A. 1 C. 3
B. 2 D. None of the above

Conventional Septic Systems typically have three Main Components.

42. Which of the following separates the solids from the liquids, and serves a storage area for the solids to decompose and if properly maintained will decompose the solids faster then they build up?
A. A gravity system C. A pressure distribution system
B. A septic tank D. None of the above

43. Which of the following allows the separated water to drain out of the system and to absorb into the leach field?
A. A gravity system C. A pressure distribution system
B. A drain field D. None of the above

44. Which of the following is the final treatment area for the effluent water to be treated; microorganisms in the soil will treat the drain water before it peculates out of the system?
A. A gravity system C. Soil
B. A drain D. None of the above

45. If installed properly, the _____is environmentally safe, long lasting and almost maintenance free. This is why septic system design is so important.
A. Conventional system C. A pressure distribution system
B. Septic system design D. None of the above

Pressure Distribution

46. Pressure distribution systems are usually required when there is less than optimal soil depth available for complete treatment of the effluent by _____.
A. A gravity system C. A pressure distribution system
B. Septic system design D. None of the above

47. A minimum of _____ feet of properly drained soil is required under the trenches.
A. Three C. Five
B. Two D. None of the above

48. Which of the following are normally the same as a standard gravity system, but the method by which the effluent is distributed to the soil is different?
A. A gravity system C. A pressure distribution system
B. The tank and drainfield size D. None of the above

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

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

Conventional Septic Systems

51. Conventional treatment systems are the least expensive in terms of total cost but require specific conditions (e.g., at least _____ inches of unsaturated soil) and maintenance to perform adequately.

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

52. A conventional wastewater treatment system consists of a septic tank and _____that allows primary treatment effluent to infiltrate into unsaturated soil.

A. A gravity system C. Volumes of treated wastewater
B. A soil absorption field D. None of the above

53. Flow through the system usually occurs via gravity but can be aided by a pump, if necessary, operated by_____.

A. A gravity system C. A pressure distribution system
B. A float switch or timer D. None of the above

54. _____facilitates aerobic treatment and filtration of the remaining contaminants.

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

55. Subsurface discharge of effluent to the soil can be configured to optimize treatment via pressurized time-dosing of preset volumes of treated wastewater, which facilitates oxygenation of the soil matrix between doses, promotes film flow of wastewater over soil particles, and ensures a uniform and consistent application of_____.

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

Basic Onsite Wastewater Treatment Systems and Components

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

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

Septic Tanks

57. The septic tank's function is to separate solids from liquid, digest organic matter, store liquids through a period of detention and allow the _____to discharge to other components of an onsite system.

A. Biological processes C. Organic matter
B. Clarified liquids D. None of the above

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

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

Septic/Sewage Tank Removal

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

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

60. A watertight, covered container designed and constructed to receive the discharge of sewage from a building sewer.

A. True B. False

Subsurface Wastewater Infiltration Systems (SWIS) Operation

61. A typical septic system consists of a septic tank and a drainfield, or soil absorption field.

A. True B. False

Septic Treatment

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

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

63. The volatile fatty acids still exert much of the biochemical oxygen demand that was originally in the organic suspended solids. Because these acids are in the dissolved form, they are able to pass from the tank in the effluent stream, reducing the _____ removal efficiency of septic tanks compared to primary sedimentation.

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

64. Complete digestion, in which the volatile fatty acids are converted to methane, could reduce the amount of _____ released by the tank, but it usually does not occur to a significant extent because wastewater temperatures in septic tanks are typically well below the optimum temperature for methane producing bacteria.

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

65. Gases that form from the microbial action in the tank rise in the wastewater column. The rising gas bubbles disturb the_____, which can reduce the settling efficiency of the tank.

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

66. Gases dislodge _____in the sludge blanket so they can escape in the water column.

A. Organic suspended solid(s) C. BOD
B. Colloidal particles D. None of the above

67. Gases can carry active anaerobic and facultative microorganisms that might help to treat _____present in the wastewater column.

A. Organic suspended solid(s) C. Colloidal and dissolved solids
B. Volatile fatty acid(s) D. None of the above

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

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

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

Septic Pretreatment Components
71. Which of the following remove many of the contaminants from the wastewater to prepare the effluent for final treatment and dispersal into the environment? The level of treatment is selected to match the receiving environment and the intended use.
A. Pretreatment components C. Gravity flow systems
B. Advanced systems D. None of the above

Submerged-Flow Wetland or Vegetative Submerged-Bed (VSB)
72. Which of the following are also called submerged-flow wetlands? This system type treats septic tank effluent by horizontal flow through a lined bed of unmulched gravel planted with wetland species. The plants fill in spaces between the rocks and provide aesthetic appeal.
A. Unsaturated soil C. Vegetative submerged bed(s)
B. Media filter(s) D. None of the above

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

74. 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. Septic tank effluent pump (STEP) C. Infiltration area protection
B. Individual and clustered systems D. None of the above

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

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

Advanced (Tertiary) Systems Introduction

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

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

79. If a soil dispersal area malfunctions hydraulically due to a buildup of the biomat (inorganic, organic, and/or bacterial slime) at the infiltrative surface, it may be restored, and treatment may be enhanced, by improving _____through timed dosing of septic tank effluent to the dispersal field.
A. Soil oxidation C. Infiltrative surface
B. Septic tank effluent D. None of the above

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

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

82. Which of the following provides timed dosing of septic tank or treatment unit effluent to the soil and can sometimes be used where soil infiltration areas are limited, except in cases of high-clay content soils?
A. Advanced system(s) C. Pressurized distribution methods
B. The dose/rest cycle D. None of the above

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

Advanced Onsite Wastewater Treatment Systems and Components
Elevated (Mound or At-Grade) Systems

84. This system type includes _____to provide primary (and sometimes secondary) treatment prior to discharging the effluent to a modified drainfield.
A. Pressure distribution C. A septic tank or prefabricated treatment unit
B. Septic system D. None of the above

85. 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. Above-grade systems C. Modified dispersal area
B. Clay dispersal field D. None of the above

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

Mound Systems
87. Mound systems are appropriate for areas with a high water table or shallow, fractured bedrock. After treatment through the_____, the effluent percolates directly into the soil under the mound.
A. Effluent dispersal piping C. Sand
B. Aerobic treatment units (ATUs) D. None of the above

88. _____feature effluent dispersal piping placed at natural grade, with the mound consisting mostly of cover soil for the piping.
A. At-grade systems C. Effluent flows from the tank
B. Aerobic treatment units (ATUs) D. None of the above

89. The mound should have inspection ports, so wastewater distribution across the infiltration area can be monitored. _____ should have cleanouts so they can be flushed at least twice a year.
A. Media filter(s) C. Distribution lines
B. ATU(s) D. None of the above

Aerobic Treatment Units
90. _____) consist of prefabricated units featuring consecutive or compartmentalized tanks, pumps, blowers, and internal piping, and are designed to treat wastewater via suspended or attached growth decomposition in an oxygen rich environment.
A. Effluent dispersal piping C. Effluent flows from the tank
B. Aerobic treatment units (ATUs) D. None of the above

91. When _____ is supplied, the rate of microbial activity and related treatment processes accelerates.
A. Nitrogen C. Hydrogen
B. Oxygen D. None of the above

92. Three processes are involved in most_____: physical separation (mostly settling), aerobic treatment (aeration and mixing), and clarification (final settling).
A. Media filter(s) C. Aerobic systems
B. Anaerobic systems D. None of the above

93. _____ vary in design and can consist of simple activated sludge variations, sequencing batch reactors, trickling filters, and combinations of two or more of these unit processes.
A. Media filter(s) C. Septic tank effluent
B. ATU(s) D. None of the above

Media Filters
94. _____can be applied to a layer of sand or gravel, a tank containing peat or plastic media, or compartments of hanging textile or other material to improve oxygen access and enhance biochemical treatment processes.
A. Media filter(s) C. Septic tank effluent
B. ATU(s) D. None of the above

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

ONSITE OPERATION AND MAINTENANCE SECTION

Effective Wastewater Management
96. Effective wastewater management ultimately centers on the proper O&M of systems. A very important, but often overlooked, component of a wastewater management program is operation and maintenance (O&M).
A. True B. False

97. There are several different management methods that can be used to support O&M, from mandatory inspection programs to permitting and monitoring requirements.
A. True B. False

98. Operation and maintenance tasks are tied directly to the system type, the wastewater being treated, and the receiving environment where effluent is discharged or dispersed.
A. True B. False

System Operation and Maintenance Requirements
99. Most technologies come with suggested O&M maintenance activities from the manufacturer. These requirements are crucial to the proper operation and performance of the system.
A. True B. False

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

101. Adjustments could involve reducing _____at the source (e.g., better plate and pot scraping prior to dishwashing in restaurant kitchens, adding grease trap tanks, etc.), applying the effluent at lower soil loading rates, or inserting a fixed film or suspended growth treatment unit between the septic tank and drainfield.
A. Septic system maintenance C. Pollutant inputs
B. Failure(s) D. None of the above

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

103. _____ is like automobile maintenance; a little effort on a regular basis can save you a lot of money and significantly prolong the life of the system.
A. Septic system maintenance C. Suspended growth treatment unit
B. Failure(s) D. None of the above

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

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

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

These records should reflect:
107. If properly designed, installed, and maintained, a septic system can effectively treat household wastewater for up to _____ years or more. Look to see if the house has a system that is near the end of its life-span.
A. 150 C. 20
B. 300 D. None of the above

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

Individual Wastewater Systems

109. Individual treatment systems collect, treat, and disperse wastewater from _____and are associated with low-density communities and developments, such as rural residential and small commercial developments.

A. Type of system
B. Subsurface dispersal system
C. An individual property
D. None of the above

110. Individual systems generally consist of one or more treatment devices (e.g., septic tank, fixed film treatment unit) and _____.

A. Type of system
B. A subsurface dispersal system
C. Low-density communities and developments
D. None of the above

111. The _____of an individual system can vary greatly depending on the type of system.

A. Type of system
B. Above dispersal system
C. Operation and maintenance requirements
D. None of the above

112. Mechanical systems, such as activated sludge-based units, require servicing three to four times a year, while conventional systems need service or pumping every _____ years, depending on occupancy and use.

A. 1 to 5
B. 3 to 5
C. 5 to 10
D. None of the above

Septic System Evaluation Guideline

Enhanced Treatment Systems

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

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

Enhanced Wastewater Treatment

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

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

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

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

Perforated Pipe

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

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

117. When drainage enhancements are used, the _____must be carefully evaluated to protect local water quality.
A. Outlet and boundary conditions C. Drainage enhancements
B. An outfall for the drain D. None of the above

118. _____should avoid capture of the SWIS percolate plume and ground water infiltrating from below the SWIS or near the end of the drain.
A. SWIS C. The drain
B. Outlet locations D. None of the above

119. A separation distance between the _____that is sufficient to prevent percolate from the SWIS from entering the drain should be maintained.
A. SWIS and the drain C. Plume and ground water
B. Outlet locations D. None of the above

120. The _____between the bottom of the SWIS and the drain and soil permeability characteristics should determine this distance.
A. SWIS C. Vertical distance
B. Outlet locations D. None of the above

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Maintenance Inspections
137. Maintenance inspections are gaining appeal as a management tool to assess the condition of systems and determine pumping or_____.
A. Other O&M needs C. Alternative and enhanced wastewater technologies
B. Advances in technology D. None of the above

138. Some local agencies have adopted a sewage management program that requires the annual inspection of systems with newly issued or modified permits and proof of _____ for all systems (old and new).
A. Septic tank pumping C. Operation and maintenance inspection programs
B. Advances in technology D. None of the above

139. _____ are usually coupled with a mandatory septic tank pumping program. The local agency notifies the system owner when pumping is due. Verification of pumping is provided to the regulating agency.
A. Septic tank pumping C. Operation and maintenance inspection programs
B. Advances in technology D. None of the above

140. Typical pumping requirements vary from three to five years or more based on the _____and individual household wastewater characteristics.
A. Typical pumping requirement(s) C. Daily sewage flow
B. Enhanced system(s) D. None of the above

Maintenance of Systems
141. A key part of _____is to track the maintenance of systems. The only way to ensure that maintenance contracts are kept in effect and that systems are monitored when required is for the management entity or regulatory authority to have a structured reporting program.
A. An O&M program C. Alternative and enhanced wastewater technologies
B. Advances in technology D. None of the above

142. Service providers should report maintenance events and any lapses in maintenance contracts to the management or regulatory authority. This information should be managed in a database to monitor _____and provide a system of accountability.
A. Typical pumping requirement(s) C. O&M activities
B. Enhanced system(s) D. None of the above

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

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

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

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

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

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

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

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

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

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

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

Septic Management Considerations

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

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

155. Many are strengthening programs with a number of tools, including requirements for homeowner service contracts, routine maintenance inspections, revocable operating permits, monitoring, and enhanced reporting and data management that support proper _____.

A. System performance C. Wastewater alternatives
B. Pretreatment requirement(s) D. None of the above

Aerobic Treatment Units (ATUs)

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

A. Secondary wastewater treatment C. Size of the household and the size of the tank
B. Sewage tank D. None of the above

Gravity Effluent Distribution Devices

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

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

Gravity Laterals

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

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

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

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

Dosed Gravity Systems

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

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

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

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

Impacts of Effluent on Groundwater

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

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

163. When a septic system fails to effectively treat and disperse _____, it can become a source of pollution.

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

164. The first way is when effluent ponds on the soil surface, causing a wet seepy area. The second obvious way that _____can fail is to have effluent backing up into the dwelling. It is also important to prevent a third, and less obvious, type of failure, which is contamination of the ground or surface waters.

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

Soil Treatment Processes

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

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

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

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

Biomat

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

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

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

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

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

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

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

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

171. A properly functioning _____will have wastewater ponded in the distribution media while the soil a few inches outside of and below the distribution media will be unsaturated.
A. Gravity-fed system C. Unsaturated flow
B. Soil system D. None of the above

172. Unsaturated soil has pores containing both air and water so aerobic microorganisms living in the soil can effectively treat the wastewater as it travels through the_____.
A. Gravity-fed system C. Unsaturated flow
B. Soil system D. None of the above

173. In unsaturated soil under a biomat, _____is restricted.
A. Water movement C. Unsaturated flow
B. Bacteria D. None of the above

Sewage Treatment Utilizing Soil
174. A developed biomat reaches _____ over time, remaining at about the same thickness and the same permeability if effluent quality is maintained.
A. Equilibrium C. Permeability of the biomat
B. Quality of the effluent D. None of the above

175. For equilibrium to be maintained, the biomat and the effluent ponded within the trench must be in_____, the organic materials in the wastewater feed the anaerobic microorganisms, which grow and multiply, increasing the thickness and decreasing the permeability of the biomat.
A. Equilibrium C. Permeability of the biomat
B. Anaerobic conditions D. None of the above

176. On the soil side of the biomat beneath the drainfield, oxygen is present so that conditions are allowing aerobic soil bacteria to feed on and continuously break down the_____. These two processes occur at about the same rate so that the thickness and permeability of the biomat remain in equilibrium.
A. Aerobic bacteria C. Biomat
B. Equilibrium D. None of the above

177. _____leaving the septic tank decreases because of failure to regularly pump out the septic tank, more food will be present for the anaerobic bacteria, which will cause an increase in the thickness of the biomat and decrease its permeability.
A. Wastewater flow/strength C. If the quality of the effluent
B. Quality of the effluent D. None of the above

178. If seasonally saturated conditions occur in the soil outside the trench, aerobic conditions will no longer exist, which will prevent _____from breaking down the biomat. Under these conditions the biomat will thicken, reducing its permeability and the effectiveness of effluent entering the soil.
A. Aerobic bacteria C. Aerobic
B. Equilibrium D. None of the above

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

Site Evaluations

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

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

180. _____ and characterization by a qualified, experienced professional is essential to understanding local site conditions and ensuring the proper operation of individual and clustered wastewater systems.

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

Assure System Performance

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

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

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

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

183. The subsurface "ponding" and slow release of effluent to the soil through the biomat facilitates treatment via chemical, physical, and biological processes such as_____, adsorption of potential pollutants (e.g., phosphorus), filtration of solids, and decomposition of organic constituents.

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

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

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

Improving OSSF Treatment through Performance Requirements

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

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

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

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

187. Over the past 20 years the onsite wastewater treatment system (OWTS) industry has developed many _____that can achieve high performance levels on sites with size, soil, ground water, and landscape limitations that might preclude installing conventional systems.
A. Water resources C. New treatment technologies
B. Fixed-film reactors D. None of the above

188. New technologies and _____are based on defining the performance requirements of the system, characterizing wastewater flow and pollutant loads, evaluating site conditions, defining performance and design boundaries, and selecting a system design that addresses these factors.
A. Existing technologies C. Wastewater characteristics and site conditions
B. Improvements to existing technologies D. None of the above

189. _____ can be expressed as numeric criteria (e.g., pollutant concentration or mass loading limits) or narrative criteria (e.g., no odors or visible sheen) and are based on the assimilative capacity of regional ground water or surface waters, water quality objectives, and public health goals.
A. Performance requirements C. Primary and secondary processes
B. Water resources D. None of the above

190. _____ help define system design and size and can be estimated by comparing the size and type of facility with measured effluent outputs from similar, existing facilities.
A. Existing technologies C. Wastewater characteristics and site conditions
B. Wastewater flow and pollutant content D. None of the above

191. _____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 C. Individual and clustered systems
B. Infiltration area protection D. None of the above

192. _____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 C. Most of the alternative treatment technologies
B. Septic system D. None of the above

193. 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 C. Primary and secondary processes
B. Water resources D. None of the above

194. _____based on these technologies are defined by performance requirements, wastewater characteristics, and site conditions.
A. Alternative treatment technologies C. The application and sizing of treatment units
B. Wastewater flow and pollutant content D. None of the above

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

Performance-Based Standards

195. 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 C. Primary and secondary processes
B. Clustered facilities D. None of the above

System Design Considerations

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

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

Management Considerations

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

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

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

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

199. _____ and access to repair parts.

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

200. Maintenance needs, including frequency and _____.

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

Permitting and Approval Process

201. The source of potable water and distribution lines should be identified as well. If there is an existing wastewater treatment system, the condition of all components, including the reserve area, should be recorded and_____.

A. System location and features C. Minimum setbacks met
B. Installation specifications D. None of the above

Summary

OSSF Maintenance

202. _____ can add years to an older system. Even well-designed and properly installed septic systems can fail earlier than expected if previous homeowners did not perform routine maintenance.

A. Proper maintenance C. Septic tank or ATU
B. Necessary pumping frequency D. None of the above

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

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

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

Permit

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

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

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

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

SUBSURFACE WASTEWATER INFILTRATION CONSTRUCTION SECTION

Construction Section

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

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

211. Which of the following is a key component of good system installation practice, should be carefully considered during site preparation, construction equipment selection and use, and before and during construction?
A. Pressure distribution C. Individual and declustered systems
B. Infiltration area protection D. None of the above

Background and Use of Onsite Wastewater Treatment Systems
212. Only about _____ of the land area in the United States has soils suited for conventional subsurface soil absorption fields.
A. 10 percent C. 1/4
B. 1/3 D. None of the above

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Field Construction Practices

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

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

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

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

232. Consequences of the removal of this amount of soil over the entire infiltration surface can be significant. It will reduce the separation distance to the restrictive horizon and could place the infiltration surface in an unacceptable soil_____.
A. Permeability C. Horizon
B. Disturbance D. None of the above

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

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

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

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

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

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

Project Execution

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

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

239. When moist, a thin ribbon or 1/8-inch wire can be formed between thumb and finger that will sustain its weight and will withstand gentle movement.

A. Sandy Loam
B. Silty Clay Loam
C. Soil Texture
D. None of the above

240. Consists largely of sand, but has enough silt and clay present to give it a small amount of stability.

A. Sandy Loam
B. Silty Clay Loam
C. Soil Texture
D. None of the above

241. Individual sand grains can be readily seen and felt. Squeezed in the hand when dry, this soil will readily fall apart when the pressure is released.

A. Sandy Loam
B. Silty Clay Loam
C. Soil Texture
D. None of the above

242. Squeezed when moist, it forms a cast that will not only hold its shape when the pressure is released but will withstand careful handling without breaking. The stability of the moist cast differentiates this soil from sand.

A. Sandy Loam
B. Silty Clay Loam
C. Soil Texture
D. None of the above

243. Means the amount of each soil separate in a soil mixture. Field methods for judging the texture of a soil consist of forming a cast of soil, both dry and moist, in the hand and pressing a ball of moist soil between thumb and finger.

A. Sandy Loam
B. Silty Clay Loam
C. Soil Texture
D. None of the above

244. Individual grains can be seen and felt readily. Squeezed in the hand when dry, this soil will fall apart when the pressure is released.

A. Sand
B. Loamy Sand
C. Silty Clay
D. None of the above

245. Squeezed when moist, it will form a cast that will hold its shape when the pressure is released but will crumble when touched.

A. Sand
B. Loamy Sand
C. Silty Clay
D. None of the above

246. Consists primarily of sand, but has enough silt and clay to make it somewhat cohesive. The individual sand grains can readily be seen and felt.

A. Sand
B. Loamy Sand
C. Silty Clay
D. None of the above

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

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

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

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

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

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

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

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

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

Perc Condition Terms Associated with Saturation

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

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

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

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

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

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

259. The stripped areas and trans-located oxides or organic matter form a diffuse splotchy pattern of two or more colors.

A. Dark Colored Shrink-Swell Soils
B. Salt-Affected Soils
C. Iron Stripping and Staining in Sandy Soils
D. None of the above

260. Soils in arid and semi-arid areas that have visible accumulations of soluble salts at or near the ground surface.

A. Dark Colored Shrink-Swell Soils
B. Salt-Affected Soils
C. Iron Stripping and Staining in Sandy Soils
D. None of the above

261. Vertisols whose colors have values of 3 or less and chromas of 1 or less. Iron concentrations may be present but are not diagnostic of conditions associated with saturation.

A. Dark Colored Shrink-Swell Soils
B. Salt-Affected Soils
C. Iron Stripping and Staining in Sandy Soils
D. None of the above

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

262. Means soil morphological properties that may indicate the presence of a water table that persists long enough to impair system function and create a potential health hazard.
A. Conditions Associated with Saturation
B. Dark Colored Soils with Organic Matter Accumulation
C. Depleted Matrix without Iron Concentrations
D. None of the above

263. Soil horizons whose matrix chroma is 3 or more in which there are some visible iron depletions having a value 4 or more and a chroma of 2 or less. Iron-manganese concentrations as soft masses or pore linings may be present but are not diagnostic of conditions associated with saturation.
A. High Chroma Matrix with Iron Depletions
B. Depleted Matrix with Iron Concentrations
C. Depleted Matrix without Iron Concentrations
D. None of the above

264. Soil horizons whose color has a value of 4 or more and a chroma of 2 or less with hues that are often, but not exclusively, on the grey pages of the Munsell Color Book. On exposure to air, yellow colors form within 24 hours as some of the ferrous iron oxidizes.
A. Dark Colored Shrink-Swell Soils
B. Salt-Affected Soils
C. Reduced Matrix
D. None of the above

Septic Tank Construction Considerations
265. Important construction considerations include tank location, bedding and backfilling, watertightness, and_____, especially with non-concrete tanks.
A. Wicking
B. Watertightness
C. Flotation prevention
D. None of the above

Construction Materials
266. Septic tanks smaller than _____ gallons are typically pre-manufactured; larger tanks are constructed in place.
A. 6,000
B. 12,000
C. 10,000
D. None of the above

267. Polyethylene tanks are more flexible than FRP tanks and can _____if not properly designed.
A. Deform to a shape of structural weakness
B. Deform to watertightness
C. Deform to cracking or collapsing
D. None of the above

268. Some plastics (e.g., polyvinyl chloride, polyethylene, but not nylon) are virtually unaffected by_____.
A. Acids and hydrogen sulfide
B. Watertightness
C. Cracking or collapsing
D. None of the above

269. Tanks must be properly designed, reinforced, and constructed of the proper mix of materials so they can meet_____.
A. Wicking
B. Watertightness
C. Anticipated loads without cracking or collapsing
D. None of the above

270. All joints must be _____to accommodate soil conditions. For concrete tank manufacturing, a "best practices manual" can be purchased from the National Pre-Cast Concrete Association (NPCA,1998).
A. Sealed properly C. Watertight and flexible
B. Clean and dry D. None of the above

Watertightness
271. Leaks, whether exfiltrating or infiltrating, are serious. _____of clear water to the tank from the building storm sewer or ground water adds to the hydraulic load of the system and can upset subsequent treatment processes.
A. Exfiltration C. Infiltration
B. Watertightness D. None of the above

272. _____ can threaten ground water quality with partially treated wastewater and can lower the
liquid level below the outlet baffle so it and subsequent processes can become fouled with scum. In addition, leaks can cause the tank to collapse.
A. Exfiltration C. Infiltration
B. Watertightness D. None of the above

273. Tank joints should be designed for _____.
A. Properly sealed C. Watertightness
B. Clean and dryness D. None of the above

274. Manway covers should have similar joints. High-quality, preformed joint sealers should be used to achieve a watertight seal. They should be workable over a wide temperature range and should adhere to clean, dry surfaces; they must_____.
A. Be sealed properly C. Be cured, a watertightness test
B. Not shrink, harden, or oxidize D. None of the above

275. Seals should meet the _____and other requirements prescribed by the seal manufacturer. Pipe and inspection port joints should have cast-in rubber boots or compression seals.
A. Minimum compression C. Watertightness
B. Maximum compression D. None of the above

276. Septic tanks should be tested for _____ using hydrostatic or vacuum tests, and manway risers and inspection ports should be included in the test.
A. Minimum compression C. Watertightness
B. Maximum compression D. None of the above

Location
277. The tank should be located where it can be accessed easily for septage removal and sited away from _____ where water can collect. Local codes must be consulted regarding minimum horizontal setback distances from buildings, property boundaries, wells, water lines, and the like.
A. Imported granular material C. Drainage swales or depressions
B. High organic content D. None of the above

Bedding and Backfilling

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

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

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

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

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

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

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

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

282. In fine-textured soils such as silts, silt loams, clay loams, and clay, _____ should be used. This is a must where freeze and thaw cycles are common because the soil movement during such cycles can work tank joints open. This is a significant concern when using plastic and fiberglass tanks.

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

283. _____and backfilling requirements vary with the shape and material of the tank. The manufacturer should be consulted for acceptable materials and procedures.

A. Tank and its contents
B. Effluent line
C. The specific bedding
D. None of the above

Joint Watertightness

284. The joints should be clean and dry before applying the joint sealer. Only _____joint sealers should be used.

A. High-quality
B. Clean and dry
C. Cured
D. None of the above

Flotation Prevention

285. If the tank is set where the soil can be saturated, tank flotation may occur, particularly when the tank is empty (e.g., recently pumped dose tanks or septic tank after septage removal). Tank manufacturers should be consulted for_____.

A. Tank and its contents
B. Appropriate anti-flotation devices
C. Shape and material of the tank
D. None of the above

Placement of the Infiltration Surface

286. Placement of a SWIS infiltration surface may be below, at, or _____ (in an in-ground trench, at grade, or elevated in a mound system).

A. Original soil profile
B. SWIS infiltration surface
C. Above the existing ground surface
D. None of the above

287. Actual placement relative to _____at the site is determined by desired separation from a limiting condition.

A. Original soil profile
B. SWIS infiltration surface
C. A limiting condition
D. None of the above

288. Treatment by removal of additional pollutants during movement through soils and the potential for excessive ground water mounding will control the _____from a limiting condition.

A. Minimum separation distance
B. SWIS infiltration surface
C. A limiting condition
D. None of the above

Separation Distance from a Limiting Condition

289. Placement of the infiltration surface in the soil profile is determined by _____.

A. Infiltration surface in the soil profile
B. Treatment and hydraulic performance requirements
C. An adequate hydraulic gradient across the infiltration zone
D. None of the above

290. Most current onsite wastewater system codes require minimum separation distances of at least _____inches from the seasonally high water table or saturated zone irrespective of soil characteristics.

A. 18
B. 12 to 24
C. 12 to 14
D. None of the above

291. Generally, _____ foot separation distances have proven to be adequate in removing most fecal coliforms in septic tank effluent.

A. 8 -12
B. 2 to 8
C. 2 to 4
D. None of the above

292. A few studies have shown that separation distances of _____inches are sufficient to achieve good fecal coliform removal if the wastewater receives additional pretreatment prior to soil application.

A. 12 to 18
B. 12 to 24
C. 12 to 14
D. None of the above

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

Collection Systems Section

Collection System Defined

293. Large-scale public sewer systems (municipal wastewater treatment plants) are centralized systems.
A. True B. False

294. Homes and other buildings that are not served by public sewer systems depend on _____ septic systems to treat and dispose of wastewater.
A. Decentralized C. Remote
B. Centralized D. None of the above

295. Most decentralized systems are _____ systems (wastewater is treated underground near where it is generated).
A. Decentralized C. Onsite
B. Centralized D. None of the above

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

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

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

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

Collection System Operators' Purpose

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

301. Which of the following and the professionals who maintain it operate at such a high level of efficiency, problems are very infrequent?
A. POTW
B. Wastewater collection system
C. Wastewater management
D. None of the above

Understanding Gravity Sanitary Sewers
302. Sanitary sewers are planned to transport the wastewater by utilizing the _____ provided by the natural elevation of the earth resulting in a downstream flow.
A. Potential energy
B. Peak flow of population
C. Flow velocities and design depths of flow
D. None of the above

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

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

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

Capacity Limitations
306. The next stage in the capacity evaluation is to identify the location of wet weather related _____, surcharged lines, basement backups, and any other areas of known capacity limitations.
A. Peak flow of population
B. Wastewater
C. SSOs
D. None of the above

Flow Monitoring
307. Flow monitoring provides information on dry weather flows as well as areas of the collection system potentially affected by?
A. I/I
B. Flow measurement
C. Flow velocities and design depths of flow
D. None of the above

Infiltration and Inflow Sub-Section
308. Which of the following occurs when groundwater enters the sewer system through cracks, holes, faulty connections, or other openings?
A. Inflow
B. Infiltration
C. Maximum flow capacity of wastewater
D. None of the above

309. Which of the following 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. Maximum flow capacity of wastewater
D. None of the above

Identifying sources of I/I

310. Smoke testing – smoke is pumped into sewer pipes. Its reappearance aboveground indicates points of ?

A. I/I
B. Stormwater and rainwater
C. Illegal plumbing, drains, and roof downspouts
D. None of the above

Repairing I/I Sources

311. Repair techniques include manhole wall spraying, Insituform pipe relining, manhole frame and lid replacement, and disconnecting?

A. High wet weather flows
B. Stormwater and rainwater
C. Illegal plumbing, drains, and roof downspouts
D. None of the above

Efficient Identification of Excessive I/I

312. The owner or operator should have in place a program for the efficient identification of?

A. Excessive I/I
B. Sources of I/I
C. Faults
D. None of the above

Sewer System Testing

313. Sewer system testing techniques are often used to identify leaks that allows this term into the sewer system and determine the location of illicit connections and other sources of stormwater inflow?

A. Exfiltration
B. Sources of I/I
C. Unwanted infiltration
D. None of the above

Dye Testing

314. Dyed water testing may be used to establish this term to the sewer.

A. Potential problem areas
B. I/I problems
C. Connection of a fixture or appurtenance
D. None of the above

Sewer System Inspection

315. Which of the following and pipelines are the first line of defense in the identification of existing or potential problem areas?

A. The presence of roots
B. Potential problem areas
C. Visual inspection of manholes
D. None of the above

316. Visual inspections provide additional information concerning the accuracy of system mapping, the presence and?

A. Potential problem areas
B. The presence of roots
C. Degree of I/I problems
D. None of the above

Sewer System Inspection Techniques

317. There are a number of inspection techniques that may be employed to inspect a sewer system. The reviewer should determine if an inspection program includes frequency and schedule of inspections and procedures to record the results.

A. True B. False

318. Sewer system cleaning should always be considered before inspection is performed in order to provide adequate clearance and inspection results.

A. True B. False

More on Manholes

319. The average daily flow (based on the average utilization) is multiplied by a peak flow factor to obtain the?

A. Design flow C. Water per person in the area to be served
B. Infiltration allowance D. None of the above

320. Which of the following is 500 gallons per inch of pipe diameter per mile of sewer per day?

A. Design flow C. Water per person in the area to be served
B. Infiltration allowance D. None of the above

321. A typical infiltration allowance is _____ gallons per inch of pipe diameter per mile of sewer per day.

A. 500 C. 10
B. 1000 D. None of the above

322. From the types of sewage and the estimated design flow, the engineer can then tentatively select the types, sizes, slopes, and _____of the piping to be used for the system.

A. Ground elevations C. Soil analysis
B. Distances below grade D. None of the above

Closed Circuit Television (CCTV) Inspections
Camera Inspection

323. Camera inspection is more comprehensive than _____ in that more of the sewer can be viewed.

A. Lamping C. Lighting
B. Sonar D. None of the above

324. This technique also does not fully capture the invert of the pipe and its condition. Sonar is a newer technology deployed similarly to?

A. CCTV cameras C. Camera inspection
B. Radar D. None of the above

325. Which of the following emits a pulse that bounces off the walls of the sewer?

A. Sonar C. Radar
B. Trenchless technologies D. None of the above

326. Sewer scanner and evaluation is similar to sonar in that a more complete image of a pipe can be made than with?

A. Lamping C. CCTV
B. Sonar D. None of the above

Closed Circuit Television (CCTV) Inspections

327. Which of the following may be done on a routine basis as part of the preventive maintenance program, as well as part of an investigation into the cause of I/I?

A. Lamping C. CCTV inspections
B. Sonar D. None of the above

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

Collection Systems O&M Section

328. Which of the following of wastewater collection systems activities on a trouble or emergency basis has been the usual procedure and policy in many systems?
A. Routine preventative C. Operation and maintenance
B. Routine operation D. None of the above

329. Which of the following activities of the collection system has been delayed or omitted, primarily for political or financial reasons?
A. Routine preventative C. Planned operation and preventive maintenance
B. Routine operations D. None of the above

330. Which of the following activities for wastewater collection lines shall be performed by the system's personnel and outside contractors?
A. Routine preventative C. Planned operation
B. Routine operations D. None of the above

331. Which of the following activities including cleaning and removing roots from small and large diameter lines?
A. Routine preventative C. Routine operations and maintenance
B. Routine operations D. None of the above

332. The system's goal should be a minimum of cleaning between _____% of the sewers every year.
A. 10-20 C. 30-40
B. 20-30 D. None of the above

Sewer Cleaning and Inspection

333. As sewer system networks age, the risk of deterioration, this _____, and collapses becomes a major concern.
A. Sanitary sewer overflow(s) C. Blockages
B. Rehabilitation D. None of the above

334. Which of the following are essential to maintaining a properly functioning system; these activities further a community's reinvestment into its wastewater infrastructure?
A. CCTV cleaning C. Cleaning and inspecting sewer lines
B. Rod straitening program(s) D. None of the above

Inspection Techniques

335. Which of the following are required to determine current sewer conditions and to aid in planning a maintenance strategy?
A. Documentation of inspections C. Cleaning and inspecting sewer lines
B. Inspection programs D. None of the above

Most sewer lines are inspected using one or more of the following techniques:

336. Which of the following are the most frequently used most cost efficient in the long term, and most effective method to inspect the internal condition of a sewer?
A. Television (TV) inspections C. Inspection program(s)
B. Lamping D. None of the above

337. Which of the following in smaller sewers are attached to a sled, to which a parachute or droge is attached and floated from one manhole to the next?
A. Slick C. The cable and camera
B. Kite D. None of the above

338. Which of the following produce a video record of the inspection that can be used for future reference?
A. CCTV inspection(s) C. Polaroid still photographs
B. Inspection program(s) D. None of the above

339. Which of the following are vital in fully understanding the condition of a sewer system?
A. Visual inspections C. Walk-through or internal inspection
B. Operators D. None of the above

340. Which of the following should pay specific attention to sunken areas in the groundcover above a sewer line and areas with ponding water?
A. Cameras C. Sonar
B. Operators D. None of the above

341. Inspections of manholes and pipelines are comprised of surface and internal inspections and operators should pay specific attention to sunken areas in the groundcover above a sewer line and areas with ponding water.
A. True B. False

342. When entering a manhole or sewer line, it is very important to observe the latest Occupational Safety and Health Administration confined space regulations.
A. True B. False

343. If entering the manhole is not feasible, mirrors can be used. Mirrors are usually placed at two adjacent manholes to reflect the interior of the sewer line.
A. True B. False

344. Lamping inspections are commonly used in high priority pipes, which tend to be pipes that are less than 100 years old.
A. True B. False

Smoke Testing of Sewers is Done to Determine:
345. Location of _____ due to settling of foundations, manholes and other structures
A. Broken sewers C. Illegal connections
B. Diversion points D. None of the above

346. Location of uncharted manholes and _____
A. Broken sewers C. Illegal connections
B. Diversion points D. None of the above

347. _____ that buildings or residences are connected to the sanitary sewer
A. Dye testing C. Illegal connections
B. Proof D. None of the above

348. _____ such as roof leaders or downspouts, yard drains and industrial drains
A. Broken sewers C. Illegal connections
B. Diversion points D. None of the above

349. _____ can be used to verify connections of drains to sanitary or storm sewers.
A. Dye testing C. Illegal connections
B. Proof D. None of the above

350. _____ can be used to verify the findings of smoke testing.
A. Dye testing C. Illegal connections
B. Proof D. None of the above

Identify the Cleaning Method

351. Directs high velocities of water against pipe walls. Removes debris and grease build-up, clears blockages, and cuts roots within small diameter pipes. Efficient for routine cleaning of small diameter, low flow sewers.
A. Jetting C. Kites, Bags, and Poly Pigs
B. Flushing D. None of the above

352. A threaded rubber cleaning ball that spins and scrubs the pipe interior as flow increases in the sewer line. Removes deposits of settled inorganic material and grease build-up. Most effective in sewers ranging in size from 5-24 inches.
A. Scooter C. Mechanical Rodding
B. Hydraulic Balling D. None of the above

353. Introduces a heavy flow of water into the line at a manhole. Removes floatables and some sand and grit. Most effective when used in combination with other mechanical operations, such as rodding or bucket machine cleaning.
A. Jetting C. Kites, Bags, and Poly Pigs
B. Flushing D. None of the above

More on Sewer Cleaning Procedures

A maintenance plan attempts to develop a strategy and priority for maintaining pipes based on several of the following factors:

354. _____- frequency and location; 80 percent of problems occur in 25 percent of the system.
A. Problems C. Cleaning and repairs
B. Location D. None of the above

355. _____- pipes located on shallow slopes or in flood prone areas have a higher priority.
A. Problems C. Cleaning and repairs
B. Location D. None of the above

356. Force main vs. gravity-force mains have a higher priority than gravity, size for size, due to the complexity of the _____.
A. Problems C. Cleaning and repairs
B. Location D. None of the above

Limitations of Cleaning Methods

357. The cleaning and inspection crews will usually consist of two members to operate each of the?

A. Flush and vacuum systems C. Combination trucks and TV trucks
B. Chemicals' effectiveness D. None of the above

Detailed Cleaning Methods

The purpose of sewer cleaning is to remove foreign material from the sewer and generally is undertaken to alleviate one of the following conditions:

358. Which of the following is caused by either the premature operation of combined wastewater overflows because of downstream restrictions to hydraulic capacity or pollution caused by the washing through and discharge of debris from overflows during storms?

A. Odor C. Blockages
B. Pollution D. None of the above

359. Which of the following is semisolid obstructions resulting in a virtual cessation of flow?

A. Odor C. Blockages
B. Pollution D. None of the above

360. Which of the following is in some cases, sediment, roots, intrusions, grease, encrustation and other foreign material restrict the capacity of a sewer, causing surcharge or flooding? Cleaning the sewer may alleviate these problems permanently, or at least temporarily.

A. Sewer rehabilitation C. Hydraulic capacity
B. Sewer inspections D. None of the above

361. Which method depends on the ability of high-velocity jets of water to dislodge materials from the pipe walls and transport them down the sewer?

A. Jet Rodding C. Cutting
B. Dragging D. None of the above

362. Which of the following uses water under high pressure is fed through a hose to a nozzle containing a rosette of jets sited so the majority of flow is ejected in the opposite direction of the flow in the hose?

A. Cutting C. Manual or Mechanical Digging
B. Jet Rodding D. None of the above

Sewer – Hydraulic Cleaning Sub-Section

363. The purpose of sewer cleaning is to remove accumulated material from the sewer. Cleaning helps to prevent?

A. Velocity C. Blockage(s)
B. Infiltration D. None of the above

364. Which of the following in gravity sewers are usually caused by a structural defect, poor design, poor construction, an accumulation of material in the pipe?

A. Stoppages C. Inflow
B. Infiltration D. None of the above

Sewer Cleaning Records

365. The owner or operator should also be able to identify the number of stoppages experienced per mile of sewer pipe. If the system is experiencing a steady increase in stoppages, the reviewer should try to determine the cause (i.e., lack of preventive maintenance funding, deterioration of the sewers due to age, an increase in?

A. Grease producing activities
B. Breakdown or malfunction
C. Maximum flow capacity of wastewater
D. None of the above

Parts and Equipment Inventory

366. The inventory should be based on the equipment manufacturer's recommendations, supplemented by historical experience with?

A. Both infiltration and inflow or I/I
B. Potential problem areas
C. Maintenance and equipment problems
D. None of the above

367. Without such an inventory, the collection system may experience long down times or periods of inefficient operation in the event of a?

A. Problem collection system areas
B. Infiltration
C. Breakdown or malfunction
D. None of the above

Sewer Maintenance - Advantages and Disadvantages

Advantages and Disadvantages

368. According to the text, one benefit of implementing a sewer maintenance program is the reduction of?

A. SSOs
B. Rehabilitation
C. Fire hazard
D. None of the above

Visual Inspection

369. In smaller sewers, the scope of problems does provide information needed to make decisions on?

A. SSOs
B. Rehabilitation
C. Sewer line cleaning
D. None of the above

370. Sewer line cleaning is prioritized based on the age of the pipe and the frequency of the problems within it, many cities use rodding and?

A. Visual inspection(s)
B. Rehabilitation
C. Pressurized cleaning methods to maintain the pipes
D. None of the above

371. Which of the following are rarely used because cleaning by this method tends to be time consuming?

A. Bucket machine(s)
B. Jetting
C. Scooter
D. None of the above

372. Most cities that use chemicals into the cleaning program may hire an expert crew, adopting a new program, and instituting a detention time to ensure the?

A. Results
B. Chemicals' effectiveness
C. Cost
D. None of the above

Sewer System Rehabilitation

373. The collection system owner or operator should have a?

A. Sewer sampling system program
B. Problem solving unit
C. Sewer rehabilitation program
D. None of the above

Tree Roots vs. Sanitary Sewer Lines
Root Growth in Pipes
374. Roots require oxygen to grow, they do not grow in this term or where high ground water conditions prevail.
A. Debris discharged C. Cracks or loose joints in the sewer pipe
B. Pipes that are full of water D. None of the above

375. The flow of warm water inside the sanitary sewer service pipe causes water with this _____ surrounding the pipe.
A. A significant source of infiltration C. Vapor to escape to the cold soil
B. Non-structural repairs D. None of the above

376. Tree roots are attracted to the water vapor leaving the pipe and they follow the vapor trail to the source of the moisture, which are usually in?
A. Sanitary sewer service line C. Exert considerable pressure
B. Cracks or loose joints D. None of the above

377. Upon reaching the crack or pipe joint, this term will penetrate the opening to reach the nutrients and moisture inside the pipe.
A. A significant source of infiltration C. Tree roots
B. Severity of I/I D. None of the above

Problems Caused by Roots Inside Sewers
378. Homeowners will notice the first signs of this term by hearing gurgling noises from toilet bowls and observing wet areas around floor drains after completing the laundry.
A. A significant source of infiltration C. Slow flowing drainage system
B. Non-structural repairs D. None of the above

Tree Roots in Sewer
379. Roots from trees growing on private property and on parkways throughout the City are responsible for many of the sanitary sewer service backups and?
A. Drought conditions C. Damaged sewer pipes
B. Inflow and infiltration (I&I) D. None of the above

380. The replacement cost of a sanitary sewer service line as a result of _____ may be very expensive.
A. Damage from tree roots C. The common method of removing roots
B. Tree roots D. None of the above

Root Growth Control
381. The common method of removing roots from _____ involves the use of augers, root saws, and high-pressure flushers.
A. Root intrusion C. Sanitary sewer service backup(s)
B. Sanitary sewer service pipes D. None of the above

382. The use of products such as copper sulfate and sodium hydroxide are not recommended because of negative environmental impacts on the?
A. Root intrusion C. Downstream receiving water
B. Sewer service D. None of the above

Smoking out Sewer Leaks

383. Although video inspection and other techniques are certainly important components of _____, research has shown that approximately 65% of all extraneous stormwater inflow enters the system from somewhere other than the main line.

A. An I&I survey C. Video inspection and other techniques
B. Smoke testing D. None of the above

384. Smoke travels throughout the system, identifying problems in all connected lines, even sections of line that were not known to exist, or thought to be independent or unconnected. Best results are obtained during dry weather, which allows smoke better opportunity to travel to the surface.

A. True B. False

Fats, Oils and Grease Section

385. Ponds, streams or rivers will be contaminated due to _____ and will also impact the environment negatively.

A. Sewer backup(s) C. Management Practices (MPs)
B. Overflow(s) D. None of the above

Food Service Establishments (FSEs)

386. Because of the amount of grease used in cooking, _____are a significant source of fats, oil and grease (FOG).

A. Sewer system infiltration C. Food Service Establishments (FSEs)
B. Customer(s) Inflow D. None of the above

387. To assist improper handling and disposal of FOG _____ are generally developed to assist restaurants and other FSEs with instruction and compliance.

A. CSO/SSO C. POTW Commercial FOG Program
B. POTWs D. None of the above

388. According to the text, the _____ can handle properly disposed wastes, but to work effectively, sewer systems need to be properly maintained, from the drain to the treatment plant.

A. Vactor C. POTW's sewer system
B. Honey pumpers D. None of the above

Confined Space Section

Permitted Confined Space Entry Program

389. Subpart P (of OSHA's Construction Regulations) applies to all _____ in the earth's surface.

A. Open excavations C. Pits
B. Vaults D. None of the above

390. According to the text, all trenches are _____.

A. Too narrow for work C. Safe for short-term work
B. Excavations D. None of the above

391. According to the text, all excavations are _____.

A. Permit-required C. Access passages
B. Not trenches D. None of the above

Permit Required Confined Space Entry General Rules

392. According to the text, only authorized and trained employees may enter a _____ or act as safety watchmen/attendants.

A. Hazard
C. Confined space
B. Pipe
D. None of the above

393. Employees are not permitted to smoke _____ or near the entrance/exit area.

A. Near air and oxygen monitors
C. In a confined space
B. During a side entry
D. None of the above

394. A watchmen or attendant must be present at all times during _____.

A. Confined space entries
C. Air monitoring
B. Access passages
D. None of the above

395. According to the text, constant visual or voice communication will be maintained between the safety watchmen and employees entering _____.

A. Inner spaces
C. A confined space
B. Access passages
D. None of the Above

Confined Space Duties and Responsibilities

Employees

396. Employees must not _____ that have not been evaluated for safety concerns.

A. Follow program requirements
C. Enter any confined spaces
B. Report hazards
D. None of the above

Entry Supervisor

397. Entry supervisors must coordinate all entry procedures, tests, _____, equipment, and other activities related to the permit space entry.

A. Publicity
C. Permits
B. News media
D. None of the above

Entry Attendants

398. A responsibility of the entry attendant is to be aware of _____ of hazard exposure on entrants.

A. The attendants' primary duty
C. Possible behavioral effects
B. Worker training
D. None of the above

Special Considerations During A Permit Required Entry

399. If the _____ leave the confined space for any significant period of time, the atmosphere of the confined space must be retested before the workers are allowed to reenter the confined space.

A. Workers
C. Unauthorized persons
B. Attendants
D. None of the above

Unauthorized Persons

400. _____ must be warned to stay away from the permit space,

A. Authorized workers
C. Entrants
B. Unauthorized persons
D. None of the above