

Registration Form

**Sewer and Septic Construction 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*

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Email \_\_\_\_\_ Fax (\_\_\_\_) \_\_\_\_\_

Phone:  
Home (\_\_\_\_) \_\_\_\_\_ Work (\_\_\_\_) \_\_\_\_\_

License or Operator ID # \_\_\_\_\_

*Please circle/check which certification you are applying the course CEU's.*  
Wastewater Collection \_\_\_\_\_ Wastewater Treatment \_\_\_\_\_ Onsite Installer \_\_\_\_\_  
Other \_\_\_\_\_

Technical Learning College TLC PO Box 3060, Chino Valley, AZ 86323  
Toll Free (866) 557-1746 Fax (928) 272-0747 [info@tlch2o.com](mailto:info@tlch2o.com)

If you've paid on the Internet, please write your Customer# \_\_\_\_\_

Please invoice me, my PO# \_\_\_\_\_

Please pay with your credit card on our website under Bookstore or Buy Now. Or call us and provide your credit card information.

*We will stop mailing the certificate of completion so we need either your fax number or e-mail address. We will e-mail the certificate to you, if no e-mail address; we will fax it to you.*

## **DISCLAIMER NOTICE**

I understand that it is my responsibility to ensure that this CEU course is either approved or accepted in my State for CEU credit. I understand State laws and rules change on a frequent basis and I believe this course is currently accepted in my State for CEU or contact hour credit, if it is not, I will not hold Technical Learning College responsible. I fully understand that this type of study program deals with dangerous, changing conditions and various laws and that I will not hold Technical Learning College, Technical Learning Consultants, Inc. (TLC) liable in any fashion for any errors, omissions, advice, suggestions or neglect contained in this CEU education training course or for any violation or injury, death, neglect, damage or loss of your license or certification caused in any fashion by this CEU education training or course material suggestion or error or my lack of submitting paperwork. It is my responsibility to call or contact TLC if I need help or assistance and double-check to ensure my registration page and assignment has been received and graded. It is my responsibility to ensure all information is correct and to abide with all rules and regulations.

**State Approval Listing Link**, check to see if your State accepts or has pre-approved this course. Not all States are listed. Not all courses are listed. If the course is not accepted for CEU credit, we will give you the course free if you ask your State to accept it for credit.

## **State Approval Listing URL...**

<http://www.abctlc.com/downloads/PDF/CEU%20State%20Approvals.pdf>

*You can obtain a printed version of the course manual from TLC for an additional \$169.95 plus shipping charges.*

## **AFFIDAVIT OF EXAM COMPLETION**

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

## **Grading Information**

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

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

**Do not solely depend on TLC's Approval list for it may be outdated.**

**Some States and many employers require the final exam to be proctored.**

<http://www.abctlc.com/downloads/PDF/PROCTORFORM.pdf>

**All downloads are electronically tracked and monitored for security purposes.**

## CERTIFICATION OF COURSE PROCTOR

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 and Septic Construction 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? \_\_\_\_\_

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

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

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

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*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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**Signature**

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

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

**SEWER AND SEPTIC CEU TRAINING COURSE  
CUSTOMER SERVICE RESPONSE CARD**

NAME: \_\_\_\_\_

E-MAIL \_\_\_\_\_ PHONE \_\_\_\_\_

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

Please rate the difficulty of your course.

Very Easy    0    1    2    3    4    5    Very Difficult

Please rate the difficulty of the testing process.

Very Easy    0    1    2    3    4    5    Very Difficult

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

Very Similar    0    1    2    3    4    5    Very Different

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

What would you do to improve the Course? \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

How about the price of the course?

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

How was your customer service?

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

Any other concerns or comments.

\_\_\_\_\_  
\_\_\_\_\_

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

## **When Finished with Your Assignment...**

### **REQUIRED DOCUMENTS**

Please scan the **Registration Page, Answer Key, Proctoring report, Survey and Driver's License** and email these documents to [info@TLCH2O.com](mailto:info@TLCH2O.com).

### **IPhone Scanning Instructions**

If you are unable to scan, take a photo of these documents with your **iPhone** and send these photos to TLC, [info@TLCH2O.com](mailto:info@TLCH2O.com).

### **FAX**

If you are unable to scan and email, please fax these documents to TLC, if you fax, call to confirm that we received your paperwork. **(928) 468-0675**

### **Rush Grading Service**

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

## **Sewer and Septic Construction 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.***

### **Collection Systems Section**

#### **Collection System and its Purpose**

1. In accumulation to what homes and businesses flush down the drain, the system also collects excess groundwater, infiltration liquids, and inflow water.  
A. True                    B. False
2. Wastewater collection is an incomplete liquid waste removal system.  
A. True                    B. False
3. The fluid waste distributed through this system is about 78% water. The waste floats on, is carried along by, and goes into suspension or solution in water.  
A. True                    B. False
4. "Wastewater" is a more precise description and has become the standard term for this fluid waste because it encompasses the total slurry of wastes in water that is gathered from homes and businesses.  
A. True                    B. False

#### **Collection System Defined**

5. Decentralized systems are public sewer systems that serve established towns and cities and transport wastewater to a central location for treatment.  
A. True                    B. False
6. Centralized systems do not connect to a public sewer system. Wastewater may be treated on site or may be discharged to a private treatment plant.  
A. True                    B. False
7. Large-scale public sewer systems (municipal wastewater treatment plants) are centralized systems.  
A. True                    B. False

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

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

### Understanding Gravity Sanitary Sewers

9. 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
10. Sewer systems are designed to maintain proper flow velocities with?
- A. Stormwater inflow
  - B. Maximum head loss
  - C. Minimum head loss
  - D. None of the above
11. 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

### Flow Measurements

12. Base flow is generally taken to mean the wastewater generated without any?
- A. Deposition of solids
  - B. Infiltration
  - C. Any I/I component
  - D. None of the above

### Infiltration and Inflow Sub-Section

13. 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

### Determining I/I

14. Flow monitoring and flow modeling provide measurements and data used to determine estimates of?
- A. I/I
  - B. Infiltration
  - C. Maximum flow capacity of wastewater
  - D. None of the above

### Identifying sources of I/I

15. Visual inspection - accessible pipes, gutter and plumbing connections, and manholes are visually inspected for?
- A. Excessive I/I
  - B. High wet weather flows
  - C. Faults
  - D. None of the above

### Sewer System Testing

16. 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

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

17. Two commonly implemented sewer testing techniques include?  
A. I/I  
B. Stormwater and rainwater  
C. Smoke testing and dyed water testing  
D. None of the above

### **Dye Testing**

18. 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

### **Manhole Sub-Section**

19. Manholes should undergo routine inspection typically every one to three years.  
A. True  
B. False
20. There should be a baseline for manhole inspections (e.g., once every year) with problematic manholes being inspected more frequently.  
A. True  
B. False
21. The reviewer should conduct visual observation at a small but representative number of manholes for the items listed: various pipeline inspection techniques, the most common include: lamping, camera inspection, sonar, and CCTV.  
A. True  
B. False

### **Sewer System Inspection Techniques**

22. 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
23. 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**

24. When designing a wastewater system, the design engineer begins by first determining the amount of money that is available.  
A. True  
B. False
25. The design engineer bases his design on the average daily use of solids per person in the area to be served.  
A. True  
B. False

### **Lead and Oakum Joint, Compression Joint and No-Hub Joints**

26. In lead and oakum joints, oakum is packed into the hub completely around the joint, and melted lead is poured over it.  
A. True  
B. False
27. Which of the following may be made of grout?  
A. Mortar joints  
B. Compression joints  
C. A no-hub joint  
D. None of the above

28. Which of the following eliminate the use of oakum and mortar joints for sewer mains?
- A. Mortar joints
  - B. Compression joints
  - C. Speed seal joints
  - D. None of the above

**Closed Circuit Television (CCTV) Inspections  
Camera Inspection**

29. Which of the following involves lowering a still camera into a manhole?
- A. Lamping
  - B. Sonar
  - C. Lighting
  - D. None of the above

**Closed Circuit Television (CCTV) Inspections**

30. 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
  - B. Sonar
  - C. CCTV inspections
  - D. None of the above

**Sewer Flow Measurements**

31. Which of the following is the water that enters the sewer through direct connections such as roof leaders, direct connections from storm drains or yard, area, and foundation drains, the holes in and around the rim of manhole covers, etc?
- A. RII
  - B. Inflow
  - C. Infiltration
  - D. None of the above

32. Normal illegal connections found are roof drains tied directly into the system, abandoned customer sewer lines that were not properly capped, as well as an occasional broken sewer line.
- A. True
  - B. False

**Sewer Flow Capacity**

33. Most sewers are designed with the capacity to flow quarter full for less than 15 inches in diameter; larger sewers are designed to flow at half flow.
- A. True
  - B. False

**Sewer Line Mapping**

34. Which of the following and repairs are unlikely if mapping is not adequate?
- A. Introduction of flows
  - B. Inspection
  - C. Efficient collection system maintenance
  - D. None of the above

**New Sewer Construction**

35. Which of the following keep costs and problems associated with operations, maintenance, and construction to a minimum?
- A. Engineering endeavors
  - B. Sewer cleanouts
  - C. Sanitary sewer designs
  - D. None of the above
36. The owner or operator should have standards for new construction, procedures for reviewing designs and protocols for inspection, start-up, testing, and approval of new construction. The procedures should provide documentation of all activities, especially inspection.
- A. True
  - B. False

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

## Collection Systems O&M Section

37. 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 operations
- B. Routine operation
- C. Operation and maintenance
- D. None of the above

### Sewer Cleaning and Inspection

38. As sewer system networks age, the risk of deterioration, \_\_\_\_\_, and collapses becomes a major concern.

- A. Sanitary sewer overflow(s)
- B. Rehabilitation
- C. Blockages
- D. None of the above

### Inspection Techniques

39. Which of the following are required to determine current sewer conditions and to aid in planning a maintenance strategy?

- A. Documentation of inspections
- B. Inspection programs
- C. Cleaning and inspecting sewer lines
- D. None of the above

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

40. 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
- B. Lamping
- C. Inspection program(s)
- D. None of the above

### Smoke Testing of Sewers is Done to Determine:

41. Location of \_\_\_\_\_ due to settling of foundations, manholes and other structures

- A. Broken sewers
- B. Diversion points
- C. Illegal connections
- D. None of the above

### Identify the Cleaning Method

42. 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
- B. Flushing
- C. Kites, Bags, and Poly Pigs
- D. None of the above

43. Round, rubber-rimmed, hinged metal shield that is mounted on a steel framework on small wheels. The shield works as a plug to build a head of water. Scours the inner walls of the pipe lines. Effective in removing heavy debris and cleaning grease from line.

- A. Scooter
- B. Hydraulic Balling
- C. Mechanical Rodding
- D. None of the above

44. Similar in function to the ball. Rigid rims on bag and kite induce a scouring action. Effective in moving accumulations of decayed debris and grease downstream.

- A. Jetting
- B. Flushing
- C. Kites, Bags, and Poly Pigs
- 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:

45. \_\_\_\_\_ - frequency and location; 80 percent of problems occur in 25 percent of the system.

- A. Problems
- B. Location
- C. Cleaning and repairs
- D. None of the above

46. \_\_\_\_\_ - pipes located on shallow slopes or in flood prone areas have a higher priority.

- A. Problems
- B. Location
- C. Cleaning and repairs
- D. None of the above

47. Force main vs. gravity-force mains have a higher priority than gravity, size for size, due to the complexity of the \_\_\_\_\_.

- A. Problems
- B. Location
- C. Cleaning and repairs
- 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:

48. 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
- B. Pollution
- C. Blockages
- D. None of the above

49. Which of the following is where it is necessary to clean the sewers immediately before the sewer being rehabilitated?

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

50. The distance from the access point is limited to approximately 60 ft in this method.

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

51. Which method is generally a manual push-pull technique used to clear blockages in smaller-diameter, shallow sewer systems typically not exceeding 10 in. in diameter or 6 ft. in depth?

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

52. Which method generally is used for removing roots from sewers? High-pressure water jet cutters have been developed for removing even more solid intrusions, such as intruding connections. Care is required to eliminate damage to the existing sewer structure.

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

53. 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
- B. Jet Rodding
- C. Manual or Mechanical Digging
- D. None of the above

**Sewer – Hydraulic Cleaning Sub-Section**

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

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

**Sewer Cleaning Methods**

55. Mechanical cleaning uses physical devices to scrape, cut, or pull?

- A. Infiltration
- B. Material from the sewer
- C. Sewer cleaning
- D. None of the above

**Sewer Cleaning Records**

56. Which of the following identified should include those due to grease or industrial discharges, hydraulic bottlenecks in the collection system, areas of poor design?

- A. Non-structural repairs
- B. Potential problem areas
- C. Normal flowing drainage system
- D. None of the above

**Parts and Equipment Inventory**

57. 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**

58. 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**

59. 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

**Sewer System Rehabilitation**

60. 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

61. There are many rehabilitation methods; the choice of methods depends on pipe size, type, location, dimensional changes, sewer flow, material deposition, surface conditions, and?

- A. A serious source of I/I
- B. Non-structural repairs
- C. Severity of I/I
- D. None of the above

### Root Growth in Pipes

62. Roots require oxygen to grow, they do not grow in this term or where high ground water conditions prevail.

- A. Debris discharged
- B. Pipes that are full of water
- C. Cracks or loose joints in the sewer pipe
- D. None of the above

### Problems Caused by Roots Inside Sewers

63. 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
- B. Non-structural repairs
- C. Slow flowing drainage system
- D. None of the above

### Tree Roots in Sewer

64. 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
- B. Inflow and infiltration (I&I)
- C. Damaged sewer pipes
- D. None of the above

### Root Growth Control

65. The common method of removing roots from \_\_\_\_\_ involves the use of augers, root saws, and high-pressure flushers.

- A. Root intrusion
- B. Sanitary sewer service pipes
- C. Sanitary sewer service backup(s)
- D. None of the above

66. The use of products such as copper sulfate and sodium hydroxide are not recommended because of negative environmental impacts on the?

- A. Root intrusion
- B. Sewer service
- C. Downstream receiving water
- D. None of the above

### Smoking out Sewer Leaks

67. The smoke travels the path of least resistance and quickly shows up at sites that allow?

- A. Surface water inflow
- B. CFM
- C. Sources of exfiltration
- D. None of the above

## Fats, Oils and Grease Section

68. Sewer backups and overflows will occur on streets, properties and even in customers' homes and/or businesses are caused because of improper disposal of fats, oils and grease.

- A. True
- B. False

69. Ponds, streams or rivers will be contaminated due to \_\_\_\_\_ and will also impact the environment negatively.

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

### Food Service Establishments (FSEs)

70. Because of the amount of grease used in cooking, \_\_\_\_\_ are a significant source of fats, oil and grease (FOG).

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

71. 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

72. 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 pumps                D. None of the above

### **pH Section**

73. Pure water has a pH very close to?  
A. 7                      C. 7.7  
B. 7.5                    D. None of the Above

74. pH is defined as the decimal logarithm of the reciprocal of the \_\_\_\_\_,  $a_{H^+}$ , in a solution.  
A. Hydrogen ion activity                      C. Brønsted–Lowry acid–base theory  
B. Acid-base behavior                         D. None of the Above

75. Which of the following terms may be used to measure pH, by making use of the fact that their color changes with pH?  
A. Indicators                      C. A set of non-linear simultaneous equations  
B. Spectrophotometer                         D. None of the Above

### **Pumps and Lift Stations Section**

#### **Lift Stations**

76. Which of the following are designed to operate continuously to keep sewerage from backing up through the system?  
A. Lift Station                      C. Submersible pump(s)  
B. Dry well                         D. None of the above

77. Which of the following identifies potential problems instantaneously and take the proper steps to rectify the situation before it becomes a public health risk?  
A. Telemetry                      C. Pumping valve  
B. Checker                         D. None of the above

#### **A Lift Station contains 4 main Components:**

78. A wet well - usually \_\_\_\_\_ + ft. in depth and \_\_\_\_\_ ft. in diameter - that houses two submersible pumps of varying horsepower, discharging piping and floats that operate the pumps and keep a set level in the well.  
A. 8 & 15                      C. 4 & 15  
B. 15 & 8                         D. None of the above

79. Which of the following houses the piping and valves that prevent backflow in the station, and can lock connection used to bypass the submersibles in an emergency situation?  
A. Pumping station panel                      C. Supervisory panel  
B. Dry well                         D. None of the above

80. A "Log Book" or "Station Book" which contains the records and maps of the?  
A. Lift Station's area      C. Pumping Station location  
B. Dry well area              D. None of the above

**Collection Systems, Lift Stations**

81. Which of the following include a wastewater receiving well, often equipped with a screen or grinding to remove coarse materials?

- A. Key elements of lift stations      C. Dry-pit or dry-well  
B. Key elements of dry well          D. None of the above

82. Which of the following are often installed in an enclosed structure?

- A. Lift station equipment and systems      C. Submersible station(s)  
B. Key elements of dry well                  D. None of the above

83. Centrifugal pumps are commonly used in?

- A. Wet-well                      C. Pump station control  
B. Lift station(s)      D. None of the above

84. A more sophisticated control operation involves the use of?

- A. Squirrel motors                      C. Variable speed drives  
B. Non-adjustable speed drives      D. None of the above

85. Which of the following houses pumps and valves are housed in a pump room (dry pit or dry-well), that are easily accessible?

- A. Dry-well lift stations                  C. Trapped air column, or bubbler system  
B. Submersible lift station(s)      D. None of the above

86. Which of the following is a separate chamber attached or located adjacent to the dry-well structure?

- A. Wet-well                      C. Dry-pit or dry-well and submersible lift stations  
B. Lift station(s)      D. None of the above

87. Which of the following do not have a separate pump room; the lift station header piping, associated valves, and flow meters are located in a separate dry vault at grade for easy access?

- A. Lift station(s)                      C. Dry-pit or dry-well and submersible lift stations  
B. Submersible lift station(s)      D. None of the above

88. Which of the following include sealed pumps that operate submerged in the wet-well?

- A. Submersible lift station(s)      C. Dry-pit  
B. Lift station(s)                      D. None of the above

89. Which of the following allow easy access for routine visual inspection and maintenance?

- A. Submersible pump(s)                  C. Dry-well lift stations  
B. Submersible lift station(s)      D. None of the above

90. Which of the following do not usually include large aboveground structures and tend to blend in with their surrounding environment in residential areas?

- A. Submersible lift station(s)      C. Operation and maintenance building  
B. Dry-well lift stations                  D. None of the above

### **Applicability**

91. Which of the following are used to move wastewater from lower to higher elevation, particularly where the elevation of the source is not sufficient for gravity flow and/or when the use of gravity conveyance will result in excessive excavation depths and high sewer construction costs?

- A. Lift station(s)
- B. Submersible lift station(s)
- C. Dry-pit or dry-well and submersible lift stations
- D. None of the above

### **Current Status**

92. Which of the following are widely used in wastewater conveyance systems?

- A. Wet-well
- B. Lift station(s)
- C. Pump station control
- D. None of the above

93. Which of the following is often used to optimize pump performance and minimize power use?

- A. Variable speed pumping
- B. D-C Motors
- C. A-C Motors
- D. None of the above

### **Advantages**

94. Which of the following are used to reduce the capital cost of sewer system construction?

- A. Wet-well
- B. Lift station(s)
- C. Pump station control
- D. None of the above

95. Which of the following size is dependent on the minimum pipe slope and flow?

- A. Lift station configuration
- B. Gravity sewer lines
- C. Wet-well maximum detention time
- D. None of the above

### **Disadvantages**

96. Which of the following also require a significant amount of power, are sometimes expensive to upgrade, and may create public concerns and negative public reaction?

- A. Gravity wastewater conveyance
- B. Lift station(s)
- C. Dry well
- D. None of the above

97. Which of the following can be eliminated or reduced by selecting alternative sewer routes or extending a gravity sewer using direction drilling or other state-of-the-art deep excavation methods?

- A. Gravity sewer
- B. Wastewater pumping
- C. Gravity wastewater conveyance
- D. None of the above

### **Wet-Well**

98. Which of the following depends on the type of lift station configuration and the type of pump controls?

- A. Lift station configuration
- B. Wet-well design
- C. Wet-well maximum detention time
- D. None of the above

99. Wet-wells are typically designed large enough to prevent rapid pump cycling but small enough to prevent a long detention time and associated?

- A. Wastewater quality
- B. Odor release
- C. Drainage
- D. None of the above

### Wastewater Pumps

100. In small stations, with maximum inflows of less than \_\_\_\_\_ gallons per minute, two pumps are customarily installed, with each unit able to meet the maximum influent rate.

- A. 1500                      C. 700
- B. 500                        D. None of the above

101. Large lift stations, the size and number of pumps should be selected so that the range of this \_\_\_\_\_ can be met without starting and stopping pumps too frequently and without excessive wet-well storage.

- A. Head-losses    C. Influent flow rates
- B. Head capacity D. None of the above

102. For pump stations with \_\_\_\_\_, the single pump flow approach is usually the most suitable.

- A. Head-losses                      C. High head-losses
- B. Wet-well storage                D. None of the above

103. Parallel pumping is not as effective for such stations because two pumps operating together yield only?

- A. Slightly higher flows than one pump    C. An alternative option
- B. Wear and tear                              D. None of the above

104. Which of the following is to be achieved with multiple pumps in parallel?

- A. Peak flow            C. Low-flow/high head conditions
- B. Head-losses    D. None of the above

105. Parallel peak pumping is typically used in large lift stations with relatively?

- A. Low or moderate head(s)    C. Flat system head curve(s)
- B. Wear and tear                      D. None of the above

106. Several types of centrifugal pumps are used in wastewater lift stations, these pumps are well suited for?

- A. Head capacity                      C. Low-flow/high head conditions
- B. Wet-well storage                D. None of the above

107. In angle-flow pump is appropriate for pumping against?

- A. Low or moderate head(s)    C. Maximum influent rate
- B. Wear and tear                      D. None of the above

108. Mixed flow pumps are most viable for pumping large quantities of wastewater at?

- A. Head-losses                      C. Low head
- B. Head capacity                      D. None of the above

### Ventilation

109. Ventilation and heating are required if this \_\_\_\_\_ includes an area routinely entered by personnel.

- A. Lift station                      C. Motor control center (MCC) rooms
- B. Ventilation systems    D. None of the above

110. Which of the following is particularly important to prevent the collection of toxic and/or explosive gases?

- A. Ventilation
- B. Dry-well ventilation codes
- C. Motor control center (MCC) rooms
- D. None of the above

**Odor Control**

111. Odor control is frequently required for lift stations, a relatively simple and widely used odor control alternative is minimizing?

- A. Chemical flatulence
- B. Ventilation turbulence
- C. Wet-well turbulence
- D. None of the above

**Performance**

112. The overall performance of a lift station depends on the?

- A. Overall efficiency
- B. Efficiency
- C. Performance of the pump(s)
- D. None of the above

113. Which of the following is the quantity of liquid pumped per unit of time, typically measured as gallons per minute or million gallons per day?

- A. Capacity (flow rate)
- B. Efficiency
- C. Head
- D. None of the above

**Operation and Maintenance**

114. Which of the following includes observation of pumps, motors and drives for unusual noise, vibration, heating and leakage, check of pump suction?

- A. Lift station inspection
- B. Lift station operation
- C. Scrubber system
- D. None of the above

**ONSITE SEWAGE FACILITIES (OSSF) ONSITE SYSTEMS SECTION**

115. 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

**Onsite Sewage Facilities (OSSF)**

116. Onsite/decentralized wastewater treatment systems, commonly called septic system(s), treat sewage from homes and businesses that are not connected to a \_\_\_\_\_.

- A. Decentralized sewer system(s)
- B. Municipal wastewater treatment
- C. Centralized wastewater treatment plant
- D. None of the above

117. 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

118. 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

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

### Types of Sewer Systems

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

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

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

123. Leaking, overflowing, and insufficient \_\_\_\_\_can release untreated wastewater into receiving waters.
- A. Wastewater collection systems
  - B. Combined sewers
  - C. Storm sewers
  - D. None of the above

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

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

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

126. EPA promotes \_\_\_\_\_to strengthen onsite wastewater management
- A. Homeowner awareness
  - B. Voluntary policies and guidance
  - C. State-of-the-art research
  - D. None of the above

### Key Terms

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

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

129. Which of following is any onsite wastewater treatment system DEQ or the Commission approves for use in lieu of the standard subsurface system?

- A. Alternative System
- B. Aerobic System
- C. Aerobic Sewage Treatment Facility
- D. None of the above

130. Which of following is may include anaerobic processes as part of the treatment system?

- A. Alternative System
- B. Aerobic System
- C. Aerobic Sewage Treatment Facility
- D. None of the above

### Onsite Treatment Processes Options

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

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

### Key Considerations

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

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

### Basic Onsite Treatment Processes

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

- A. Individual and clustered wastewater systems
- B. Centralized wastewater tank
- C. Collection storage
- D. None of the above

### Primary Treatment

134. 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

135. 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.

136. 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

137. 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

138. 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

139. 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

### Septic System Basics Described

140. Most tanks are split into two compartments and have pipe baffles and an outlet filter to ensure the \_\_\_\_\_ stay in the tank.

- A. Solids
- B. Liquids
- C. Biologic process
- D. None of the above

141. The \_\_\_\_\_ process begins in the tank where the effluent separates into layers and begins the process of decomposition.

- A. Physical
- B. Natural
- C. Biologic
- D. None of the above

### Types of Systems – General

142. Standard gravity systems require \_\_\_\_\_ feet of "good" soil under the trenches while pressure distribution systems only require \_\_\_\_\_ feet.

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

143. 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
- B. 2
- C. 3
- D. None of the above

### Conventional Septic Systems Typically have three Main Components.

144. 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 than they build up?

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

145. 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
- B. A drain field
- C. A pressure distribution system
- D. None of the above

### Pressure Distribution

146. 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
- B. Septic system design
- C. A pressure distribution system
- D. None of the above

147. A minimum of \_\_\_\_\_ feet of properly drained soil is required under the trenches.

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

148. 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
- B. The tank and drainfield size
- C. A pressure distribution system
- D. None of the above

### Conventional Septic Systems

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

- A. The tank effluent
- B. The quantity of contaminants
- C. Conventional treatment systems
- D. None of the above

150. 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
- B. 24-36
- C. 12-36
- D. None of the above

151. 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
- B. A soil absorption field
- C. Volumes of treated wastewater
- D. None of the above

152. \_\_\_\_\_ facilitates aerobic treatment and filtration of the remaining contaminants.

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

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

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

### Basic Onsite Wastewater Treatment Systems and Components

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

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

### Septic Tanks

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

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

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

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

### Septic/Sewage Tank Removal

157. \_\_\_\_\_ need to be properly abandoned to prevent them from becoming a safety hazard.

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

### Septic Treatment

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

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

159. 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)
- B. Volatile fatty acid(s)
- C. Quiescent wastewater column
- D. None of the above

160. Gases dislodge \_\_\_\_\_ in the sludge blanket so they can escape in the water column.

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

### Typical SWIS Performance

161. Results from numerous studies have shown that septic tanks (SWISs) achieve high removal rates of many pollutants of concerns with the notable exception of \_\_\_\_\_.

- A. Nitrogen
- B. Nitrate(s)
- C. Phosphorous and metals
- D. None of the above

162. Biochemical oxygen demand (BOD), suspended solids, fecal bacteria indicators and surfactants are effectively removed within \_\_\_\_\_ feet of unsaturated, aerobic soil.

- A. 2-5
- B. 1-4
- C. 2-6
- D. None of the above

163. Which of the following and metals are removed by adsorption, ion exchange and precipitation?

- A. Nitrogen
- B. Nitrate(s)
- C. Phosphorous
- D. None of the above

164. The retention capacity of the soil is finite and will vary with different types of soil mineralogy, \_\_\_\_\_, Redox potential and cation exchange capacity.

- A. Nitrogen
- B. Nitrate(s)
- C. pH
- D. None of the above

### Septic Pretreatment Components

165. 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
- B. Advanced systems
- C. Gravity flow systems
- D. None of the above

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

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

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

167. 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
- B. Media filter(s)
- C. Vegetative submerged bed(s)
- D. None of the above

### Cluster System Applications

168. A cluster system is designed to collect wastewater from \_\_\_\_\_ homes.

- A. Three to fifty
- B. Two to one hundred
- C. Two to several hundred
- D. None of the above

169. 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)
- B. Individual and clustered systems
- C. Infiltration area protection
- D. None of the above

170. Treatment facilities serving clustered buildings may range from a communal septic tank and \_\_\_\_\_ to a more advanced treatment system.

- A. Soil dispersal system
- B. Infiltration area protection
- C. Individual and clustered systems
- D. None of the above

### Septic System Failures

171. Which of the following failures are a major source of groundwater pollution?

- A. Soil dispersal system
- B. Septic system
- C. Individual and clustered systems
- D. None of the above

172. 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
- B. Bacteria and viruses
- C. Individual and clustered systems
- D. None of the above
- E. Waterborne pollution

### Advanced (Tertiary) Systems Introduction

173. 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
- B. Septic tank effluent
- C. Infiltrative surface
- D. None of the above

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

- A. Gravity flow systems
- B. Septic tank effluent
- C. Advanced systems
- D. None of the above

175. 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
- B. Septic tank effluent
- C. Infiltrative surface
- D. None of the above

176. \_\_\_\_\_ allows the soil to drain between doses, improving soil oxygen transfer.

- A. The dose/rest cycle
- B. Septic tank effluent
- C. Infiltrative surface
- D. None of the above

177. 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
- B. Septic tank effluent
- C. Advanced treatment units/processes
- D. None of the above

178. 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)
- B. The dose/rest cycle
- C. Pressurized distribution methods
- D. None of the above

179. 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
- B. Modified dispersal area
- C. Pressure drip dispersal of the effluent
- D. None of the above

### Advanced Onsite Wastewater Treatment Systems and Components

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

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

- A. Pressure distribution
- B. Septic system
- C. A septic tank or prefabricated treatment unit
- D. None of the above

181. 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
- B. lay dispersal field
- C. Modified dispersal area
- D. None of the above

182. 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)
- B. ATU(s)
- C. Infiltrative surface
- D. None of the above

### Mound Systems

183. 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
- B. Aerobic treatment units (ATUs)
- C. Sand
- D. None of the above

184. \_\_\_\_\_ feature effluent dispersal piping placed at natural grade, with the mound consisting mostly of cover soil for the piping.

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

185. 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)
- B. ATU(s)
- C. Distribution lines
- D. None of the above

### Aerobic Treatment Units

186. \_\_\_\_\_) 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
- B. Aerobic treatment units (ATUs)
- C. Effluent flows from the tank
- D. None of the above

187. When \_\_\_\_\_ is supplied, the rate of microbial activity and related treatment processes accelerates.

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

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

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

189. \_\_\_\_\_ 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)
- B. ATU(s)
- C. Septic tank effluent
- D. None of the above

### Media Filters

190. \_\_\_\_\_ 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)
- B. ATU(s)
- C. Septic tank effluent
- D. None of the above

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

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

192. Sand is the most commonly used \_\_\_\_\_, but clean gravel, crushed glass, textile strips, peat, and tire crumbs are also used, depending on site restrictions and state/local regulations.

- A. Media
- B. Septic tank effluent
- C. Soil dispersal field
- D. None of the above

193. In single-pass or intermittent filter (ISF) design, \_\_\_\_\_ is pump-dosed uniformly onto the media at regular intervals 12 to 48 times per day.

- A. Media
- B. Septic tank effluent
- C. Sand
- D. None of the above

194. As the effluent trickles through the \_\_\_\_\_, suspended and some colloidal particles are filtered, and bacteria growing on the media aerobically treat organic wastewater.

- A. Media
- B. Septic tank effluent
- C. Sand
- D. None of the above

195. Effluent that percolates through the media bed is discharged to the \_\_\_\_\_.

- A. Septic tank effluent
- B. Soil dispersal field
- C. Aerobic treatment units (ATUs)
- D. None of the above

## ONSITE OPERATION AND MAINTENANCE SECTION

### System Operation and Maintenance Requirements

196. 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

197. 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
- B. Hydraulic successes
- C. Soil limitations
- D. None of the above

198. 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
- B. Failure(s)
- C. Pollutant inputs
- D. None of the above

### Septic System Failures

199. Septic system failures are a major source of \_\_\_\_\_.

- A. Groundwater pollution
- B. Hydraulic failures
- C. Failure(s)
- D. None of the above

200. \_\_\_\_\_ 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
- B. Failure(s)
- C. Suspended growth treatment unit
- D. None of the above

### Regular Maintenance

201. Verification of \_\_\_\_\_ contracts, operator expertise, and reporting requirements for system maintenance such as tank pumping and repairs should be included in the approval process.

- A. Drainage features
- B. Installation specifications
- C. System maintenance
- D. None of the above

### These records should reflect:

202. 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
- B. 300
- C. 20
- D. None of the above

203. 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
- B. 12 hours or more
- C. Week or more
- D. None of the above

### Individual Wastewater Systems

204. 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

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

### Septic System Evaluation Guideline

#### Enhanced Treatment Systems

206. \_\_\_\_\_ have proven to be effective in situations where conventional systems are not appropriate.
- A. Treatment performance
  - C. Wastewater treatment system(s)
  - B. Several wastewater alternative technologies
  - D. None of the above

#### Enhanced Wastewater Treatment

207. 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)
  - C. Higher level of treatment
  - B. O&M requirement(s)
  - D. None of the above

208. 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
  - C. Conventional systems
  - B. O&M requirement(s)
  - D. None of the above

#### Perforated Pipe

209. Perforated pipe is laid in the bottom of upslope trenches excavated into the restrictive horizon. A durable, porous medium is placed around the piping and up to a level above the estimated \_\_\_\_\_.
- A. Low-saturated zone
  - C. Seasonally high-saturated zone
  - B. An outfall for the drain
  - D. None of the above

210. 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
  - C. Drainage enhancements
  - B. An outfall for the drain
  - D. None of the above

211. 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

212. 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

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

214. 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
- B. Outlet locations
- C. Plume and ground water
- D. None of the above

215. If not done, ground water that seeps around the \_\_\_\_\_ can render the drain ineffective.

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

### Inspections and Maintenance Requirements

216. 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
- B. 3
- C. 4
- D. None of the above

217. 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
- B. 1/3
- C. 1/4
- D. None of the above

### SWIS Designs

218. There are several different designs for \_\_\_\_\_. They include trenches, beds, seepage pits, at grade systems, and mounds.

- A. Seepage pits
- B. SWISs
- C. Secondary infiltrative surface
- D. None of the above

219. SWIS applications differ in their geometry and location in the \_\_\_\_\_.

- A. Sidewall infiltration
- B. Soil profile
- C. Infiltration surface(s)
- D. None of the above

220. \_\_\_\_\_ have a large length-to-width ratio, while beds have a wide, rectangular or square geometry.

- A. Seepage pits
- B. Infiltration surface
- C. Trenches
- D. None of the above

### Maintenance Inspections

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

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

222. 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
- B. Advances in technology
- C. Operation and maintenance inspection programs
- D. None of the above

223. \_\_\_\_\_ 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
  - B. Advances in technology
  - C. Operation and maintenance inspection programs
  - D. None of the above

### Maintenance of Systems

224. A key part of \_\_\_\_\_ is to track the maintenance of systems. The only way to ensure that maintenance contracts are kept in effect and that systems are monitored when required is for the management entity or regulatory authority to have a structured reporting program.
- A. An O&M program
  - B. Advances in technology
  - C. Alternative and enhanced wastewater technologies
  - D. None of the above
225. 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)
  - B. Enhanced system(s)
  - C. O&M activities
  - D. None of the above

### Standard Leach Field Septic System Inspection

226. As the septic system is used, there is an accumulation of solids in the tank, which is sometime referred to as \_\_\_\_\_.
- A. Slime
  - B. Sludge
  - C. Long-term biochemical oxygen demand
  - D. None of the above
227. 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
  - B. Sludge - Scum
  - C. Solids - Scum
  - D. None of the above
228. Up to \_\_\_\_\_% of the solids retained in the tank will decompose over time.
- A. 25
  - B. 50
  - C. 40
  - D. None of the above
229. \_\_\_\_\_ measure the rate at which clean water disperses through a disposal trench into the soil.
- A. Groundwater levels
  - B. Gravitational force
  - C. Percolation tests
  - D. None of the above
230. Several factors may reduce observed percolation rates when the drain field receives \_\_\_\_\_.
- A. Groundwater levels
  - B. Gravitational force
  - C. Anoxic septic tank effluent
  - D. None of the above
231. 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
  - B. Wastewater
  - C. Insoluble particles small enough
  - D. None of the above

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

### Septic Management Considerations

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

### Aerobic Treatment Units (ATUs)

234. 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
  - B. Sewage tank
  - C. Size of the household and the size of the tank
  - D. None of the above

### Gravity Effluent Distribution Devices

235. Divide and/or transport the liquid effluent from a \_\_\_\_\_ to absorption trenches for dispersal into the soil. These devices include distribution boxes, drop boxes, and step-downs.
- A. Proper maintenance
  - B. Pressure manifold(s)
  - C. Septic tank or ATU
  - D. None of the above

### Gravity Laterals

236. A system of trenches excavated along ground contours used to distribute effluent by gravity flow from a \_\_\_\_\_ and apply the effluent to the soil infiltrative surface.
- A. Sand/media filter(s)
  - B. Septic tank or ATU
  - C. Onsite system
  - D. None of the above
237. Generally, \_\_\_\_\_-inch deep trenches are used; however, with approval trenches can be up to \_\_\_\_\_ inches deep.
- A. 18-30
  - B. 16-36
  - C. 12-24
  - D. None of the above

### Dosed Gravity Systems

238. \_\_\_\_\_ can be used to more equally divide effluent between gravity lateral trenches or to proportion effluent to unequal length trenches; however, effluent is still moved along the length of a trench by gravity.
- A. Necessary pumping frequency
  - B. An advanced OWTS
  - C. Pressure manifold(s)
  - D. None of the above

### Impacts of Effluent on Groundwater

239. The first way is when effluent ponds on the soil surface, causing a wet seepy area. The second obvious way that \_\_\_\_\_ can fail is to have effluent backing up into the dwelling. It is also important to prevent a third, and less obvious, type of failure, which is contamination of the ground or surface waters.
- A. Septic system
  - B. Distribution media
  - C. Soil treatment trench
  - D. None of the above

### Soil Treatment Processes

240. The soil treatment and \_\_\_\_\_ provides for the final treatment and dispersal of septic tank effluent.

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

### Biomat

241. 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
- B. Biomat
- C. Dispersal zone
- D. None of the above

### Sewage Treatment Utilizing Soil

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

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

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

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

### Site Evaluations

244. 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

### Assure System Performance

245. 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

246. 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

247. 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

### Improving OSSF Treatment through Performance Requirements

248. Most onsite wastewater treatment systems are of the conventional type, consisting of a septic tank and a \_\_\_\_\_.

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

249. \_\_\_\_\_ 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
- C. Subsurface wastewater infiltration system (SWIS)
- B. Site limitations
- D. None of the above

250. \_\_\_\_\_ 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

### Performance-Based Standards

251. 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

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

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

### Management Considerations

253. All \_\_\_\_\_ systems require management. Management services can be provided by an outside contractor or responsible management entity.

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

254. 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

255. 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

### Permitting and Approval Process

256. State and local governments vary considerably in their approach to approving \_\_\_\_\_ and issuing installation and operation permits.

Consultation with the property owner regarding final design components.

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

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

- A. System drawings
- B. Installation specifications
- C. System maintenance
- D. None of the above

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

- A. Regular maintenance
- B. Septic system
- C. Ingress and egress pathways
- D. None of the above

259. 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
- B. Installation specifications
- C. Minimum setbacks met
- D. None of the above

### Summary

#### OSSF Maintenance

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

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

261. 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)
- B. Tank
- C. Onsite system
- D. None of the above

262. 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
- B. 4.5
- C. 2.6
- D. None of the above

#### Permit

263. 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
- B. Type of human sewage
- C. O & M costs
- D. None of the above

264. Of these considerations, often the most limiting is the \_\_\_\_\_ or site and space limitations.

- A. Soil resource
- B. Type of human sewage
- C. O & M costs
- D. None of the above

265. 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
  - B. Lagoon
  - C. An advanced OWTS
  - D. None of the above

## SUBSURFACE WASTEWATER INFILTRATION CONSTRUCTION SECTION

### Construction Section

266. Correct wastewater treatment system construction and/or installation practices are critical to the performance of individual and \_\_\_\_\_.
- A. Pressure distribution
  - B. Declustered systems
  - C. Clustered systems
  - D. None of the above
267. 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
  - B. Material specifications
  - C. Uphill dispersal piping
  - D. None of the above
268. 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
  - B. Infiltration area protection
  - C. Individual and declustered systems
  - D. None of the above

### Background and Use of Onsite Wastewater Treatment Systems

269. Only about \_\_\_\_\_ of the land area in the United States has soils suited for conventional subsurface soil absorption fields.
- A. 10 percent
  - B. 1/3
  - C. 1/4
  - D. None of the above
270. System densities in some areas exceed the capacity of even suitable soils to assimilate wastewater flows and retain and transform their \_\_\_\_\_.
- A. Nitrates
  - B. Phosphorus compounds
  - C. Contaminants
  - D. None of the above
271. 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
  - B. Phosphorus
  - C. Contaminants
  - D. None of the above

### Septic Site Preparation and Excavation Practices

272. Overhead power lines, steep slopes, and excavations at the installation site can all present serious \_\_\_\_\_.
- A. Safety hazard(s)
  - B. Disturbance(s)
  - C. Excavation(s)
  - D. None of the above

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

- A. Safety hazard(s)
- B. Disturbance
- C. Excavation(s)
- D. None of the above

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

- A. Compaction
- B. Infiltration
- C. Excavation
- D. None of the above

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

- A. Compaction
- B. Moisture
- C. Excavation
- D. None of the above

276. Grubbing of the site (mechanically raking away roots) should be avoided. If the site is to be filled, the surface should be moldboard- or chisel-plowed parallel to the contour (usually to a depth of seven to ten inches) when the soil is sufficiently dry to ensure maximum vertical \_\_\_\_\_.

- A. Compaction
- B. Infiltration
- C. Permeability
- D. None of the above

277. 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
- B. Disturbance
- C. Infiltration
- D. None of the above

### Field Construction Practices

278. Changes in construction practices over the past 25 years have led to improvements in the performance of \_\_\_\_\_.

- A. Individual wastewater system(s)
- B. System design
- C. Long-term system performance
- D. None of the above

279. \_\_\_\_\_ in infiltration trenches should be scarified and the surface gently raked prior to installing the gravel or gravel-less piping/chambers.

- A. Compaction
- B. Smearred soil surfaces
- C. Excavation
- D. None of the above

280. 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)
- B. System design
- C. Long-term system performance
- D. None of the above

281. It might be necessary to remove as much as four inches of soil to regain the natural soil porosity and \_\_\_\_\_.

- A. Permeability
- B. Disturbance
- C. Horizon
- D. None of the above

282. 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

283. 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

### Management Considerations

284. All \_\_\_\_\_ programs should carefully consider construction and installation elements to ensure the proper operation of onsite systems. These programs should include permits, inspections, and installer training requirements.

- A. System design
- C. Onsite management
- B. Infiltration area
- D. None of the above

### Construction Phases

#### Preparation Phase

285. 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

286. \_\_\_\_\_ 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

287. If work will be delayed, flag off or otherwise protect the \_\_\_\_\_.

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

#### Project Execution

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

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

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

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

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

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

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

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

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

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

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

- A. Infiltration area
- B. Inlet/outlet orientation
- C. Cleanouts and inspection ports
- D. None of the above

### Soil Texture

Identify the missing term.

294. When moist, a thin ribbon or 1/8 inch or smaller wire formed between thumb and finger will withstand considerable movement and deformation.

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

295. Consists of large amounts of clay and moderate to small amounts of sand and silt. It breaks into very hard clods or lumps when dry. When moist, a thin, long ribbon or 1/16-inch wire can be molded with ease. Fingerprints will show on the soil, and a dull to bright polish is made on the soil by a shovel.

- A. Silt Loam
- B. Clay
- C. Loam
- D. None of the above

296. Consists of an even mixture of the different sizes of sand and of silt and clay. It is easily crumbled when dry and has a slightly gritty, yet fairly smooth feel. It is slightly plastic.

- A. Silt Loam
- B. Clay
- C. Loam
- D. None of the above

297. Consists of a moderate amount of clay, a large amount of silt, and a small amount of sand. It breaks into moderately hard clods or lumps when dry.

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

298. 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

299. 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

300. 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

301. 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

302. 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

303. 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

304. 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
- B. Loamy Sand
- C. Silty Clay
- D. None of the above

305. 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
- B. Clay
- C. Loam
- D. None of the above

306. 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
- B. Clay
- C. Loam
- D. None of the above

307. 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
- B. Clay
- C. Loam
- D. None of the above

308. 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
- B. Loamy Sand
- C. Silty Clay
- D. None of the above

309. 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
  - B. Clay
  - C. Loam
  - D. None of the above

### Percolation Tests

310. 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
- B. Measuring the water level drop
- C. An inappropriately high loading rate
- D. None of the above

311. Maryland and a number of other states also require the use of percolation tests and \_\_\_\_\_ for repairs to existing septic systems that are malfunctioning.

- A. Critical factors
- B. Site evaluations
- C. Effluent application rate(s)
- D. None of the above

312. A percolation test has limitations. The test does not reveal limiting conditions in the soil profile and can provide \_\_\_\_\_, leading to an inappropriately high loading rate.

- A. Allowable hydraulic loading rates
- B. Specific level and timing
- C. False readings during dry conditions
- D. None of the above

313. States and communities once relied solely on these tests to determine \_\_\_\_\_.

- A. Critical factors
- B. Percolation test(s)
- C. Effluent application rate(s)
- D. None of the above

314. The limitations of the test have caused many state and local agencies to either eliminate this test altogether or to require additional tests that must be conducted during a \_\_\_\_\_ to determine limiting site conditions and to estimate allowable hydraulic loading rates.

- A. Allowable hydraulic loading rates
- B. Specific level and timing
- C. Site evaluation
- D. None of the above

### Fixed Film and Suspended Growth Advanced Treatment Systems

315. Fixed film and suspended growth advanced treatment systems provide an effluent of higher quality than \_\_\_\_\_.

- A. Conventional septic tank discharges
- B. Percolation test(s)
- C. Effluent application rate(s)
- D. None of the above

316. \_\_\_\_\_ allow marginal soils to more easily absorb and treat wastewater.

- A. Allowable hydraulic loading rates
- B. Higher levels of treatment
- C. An inappropriately high loading rate
- D. None of the above

317. Regular operation and maintenance attention for these systems is critical to maintaining performance and \_\_\_\_\_ over the long term.

- A. Critical factors
- B. Ensuring system operation
- C. Effluent application rate(s)
- D. None of the above

318. The site evaluator needs to understand and analyze all of these critical factors when recommending \_\_\_\_\_.

- A. Allowable hydraulic loading rates
- B. An alternative or advanced treatment system
- C. An inappropriately high loading rate
- D. None of the above

319. \_\_\_\_\_ may also need to be considered when planning large wastewater treatment systems or clustered facilities.

- A. Critical factors
- B. Several additional site evaluation factors
- C. Effluent application rate(s)
- D. None of the above

**Perc Condition Terms Associated with Saturation**

320. 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

321. 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

322. 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

323. 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

324. 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

325. 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

326. 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

327. 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

328. 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

329. The upper surface layer has a dark color with a value of 3 or less and a chroma of 1 or less immediately underlain by a layer with a chroma of 2 or less.

- A. Dark Colored Shrink-Swell Soils
- B. Salt-Affected Soils
- C. Soils with a Dark Surface
- D. None of the above

330. Soil horizons in which iron/manganese oxides or organic matter or both have been stripped from the matrix, exposing the primary base color of soil materials.

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

### **Septic Tank Construction Considerations**

331. 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

332. 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

333. Tanks constructed of fiberglass/reinforced polyester (FRP) usually have a wall thickness of about 1/4 inch (6 millimeters). Most are gel or resin coated to provide a smooth finish and prevent glass fibers from becoming exposed, which can cause \_\_\_\_\_.

- A. Wicking
- B. Watertightness
- C. Cracking or collapsing
- D. None of the above

334. 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

335. 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

336. 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

337. 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
- B. Clean and dry
- C. Watertight and flexible
- D. None of the above

### Watertightness

338. 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
- B. Watertightness
- C. Infiltration
- D. None of the above

339. \_\_\_\_\_ 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
- B. Watertightness
- C. Infiltration
- D. None of the above

340. Tank joints should be designed for \_\_\_\_\_.

- A. Properly sealed
- B. Clean and dryness
- C. Watertightness
- D. None of the above

341. 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

342. 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

### Location

343. 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

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

345. 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    C. 4  
B. 3    D. None of the above

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

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

### Joint Watertightness

347. The joints should be clean and dry before applying the joint sealer. Only \_\_\_\_\_ joint sealers should be used.

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

### Flotation Prevention

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

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

### Placement of the Infiltration Surface

349. 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

350. 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

351. 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

## Confined Space Section

### Confined Space Entry Program

#### Scope

352. According to the text, you are required to recognize \_\_\_\_\_ associated with confined spaces.

- A. Internal configurations
- B. Permit-Required Confined Spaces
- C. The dangers and hazards
- D. None of the above

#### Definitions

##### Confined space:

353. A confined space is large enough or so configured that an employee can \_\_\_\_\_.

- A. Have sufficient oxygen
- B. Bodily enter and perform work
- C. Recognize serious safety or health hazards
- D. None of the above

354. A confined space has limited or restricted means for \_\_\_\_\_.

- A. An internal configuration
- B. Entry or exit
- C. Hazardous atmosphere
- D. None of the above

355. A confined space is not designed for \_\_\_\_\_.

- A. An internal configuration
- B. Hazardous atmospheres
- C. Continuous employee occupancy
- D. None of the above

356. A permit required confined space (permit space) contains or has a potential to contain a \_\_\_\_\_.

- A. Recognized configuration
- B. Hazardous atmosphere
- C. Have sufficient oxygen
- D. None of the above

357. A permit required confined space (permit space) contains a material that has \_\_\_\_\_.

- A. Authorized entrants
- B. Hazardous atmospheres
- C. The potential for engulfing an entrant
- D. None of the above

358. A permit required confined space (permit space) has an internal configuration such that \_\_\_\_\_ could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section.
- A. An entrant
  - B. Hazardous atmosphere
  - C. An internal configuration
  - D. None of the above

### Confined Space Hazards

359. Fatalities and injuries constantly occur among construction workers who are required to enter \_\_\_\_\_.
- A. An internal configuration
  - B. Hazardous atmosphere
  - C. Confined spaces
  - D. None of the above
360. Workers encounter both inherent and \_\_\_\_\_ within confined workspaces.
- A. An internal configuration
  - B. Induced hazards
  - C. Hazardous atmosphere
  - D. None of the above

### Inherent Hazards

361. \_\_\_\_\_ are associated with specific types of equipment and the interactions among them. These hazards can be electrical, thermal, chemical, mechanical, etc.
- A. Inherent hazards
  - B. Hazardous atmospheres
  - C. Recognized serious safety or health hazards
  - D. None of the above
362. Inherent hazards include high voltage, radiation generated by equipment, \_\_\_\_\_, omission of protective features, high or low temperatures, high noise levels, and high-pressure vessels and lines.
- A. Defective design
  - B. Hazardous atmosphere
  - C. An internal configuration
  - D. None of the above
363. Inherent hazards usually cannot be eliminated without degrading or shutting down the system or equipment. Therefore, emphasis must be placed on \_\_\_\_\_.
- A. Hazard control methods
  - B. Hazardous atmospheres
  - C. Continuous employee occupancy
  - D. None of the above

### Induced Hazards

364. \_\_\_\_\_ result from a multitude of incorrect decisions and actions that occur during the actual construction process.
- A. Induced hazards
  - B. Below-grade locations
  - C. Build-up of explosive gases
  - D. None of the above
365. Some examples of induced hazards are: omission of protective features, physical arrangements that may cause unintentional worker contact with electrical energy sources, oxygen-deficient atmospheres created at the bottom of pits or shafts, lack of safety factors in structural strength, and \_\_\_\_\_.
- A. Common confined spaces
  - B. Flammable atmospheres
  - C. Extreme temperatures
  - D. None of the above

### Manholes

366. Manholes are necessary to provide a means of entry into and exit from vaults, tanks, and pits, but these confined spaces may present \_\_\_\_\_ which could cause injuries and fatalities.

- A. Serious hazards
- B. Ventilation ducts
- C. Sumps
- D. None of the above

### Pipe Assemblies

367. The pipe assembly is one of the \_\_\_\_\_ encountered throughout the construction site,

- A. Electrical shock risks
- B. Ventilation ducts
- C. Most frequently unrecognized types of confined spaces
- D. None of the above

### Ventilation Ducts

368. Ventilation ducts create a \_\_\_\_\_ which moves heated and cooled air and exhaust fumes to desired locations in the plant.

- A. Collection place
- B. Complex network
- C. Shortcut to other areas
- D. None of the above

### Tanks

369. Tanks are \_\_\_\_\_ that are used for a variety of purposes, including the storage of water and chemicals.

- A. Nitrogen purge locations
- B. Collection places
- C. Another type of confined workspace
- D. None of the above

### Sumps

370. Workers may encounter \_\_\_\_\_ when entering sumps.

- A. Nitrogen purge or dry air
- B. Problems with pumps
- C. An oxygen-deficient atmosphere
- D. None of the above

### Unusual Conditions

371. The \_\_\_\_\_ associated with the outer confined space and those of the inner confined space both require testing, monitoring, and control.

- A. Potential hazards
- B. Access passages
- C. Manholes
- D. None of the above

372. Often, only the outer space is evaluated for potential hazards. Workers are also faced with \_\_\_\_\_ when they enter the inner space.

- A. Poor lighting
- B. Excavations
- C. Potentially hazardous conditions
- D. None of the above

373. Workers entering a vessel inside an access pit should do so only after both spaces have been evaluated and \_\_\_\_\_.

- A. Purged
- B. Accessed
- C. Proper control measures established
- D. None of the above

### Hazards in One Space Entering another Space

374. According to the text, during an examination of \_\_\_\_\_, situations are often encountered which are not always easy to evaluate or control.

- A. Tanks
- B. Excavations
- C. Confined spaces in construction
- D. None of the above

375. A room that classifies as a confined space may be relatively safe for work. However, access passages from other areas outside or adjacent to the room could, at some point, allow the transfer of \_\_\_\_\_ into the "safe" room.
- A. Hazardous agents
  - B. Equipment and tools
  - C. Unauthorized workers
  - D. None of the above

**Permitted Confined Space Entry Program**

376. Subpart P (of OSHA's Construction Regulations) applies to all \_\_\_\_\_ in the earth's surface.
- A. Open excavations
  - B. Vaults
  - C. Pits
  - D. None of the above

**Permit Required Confined Space Entry General Rules**

377. According to the text, only authorized and trained employees may enter a \_\_\_\_\_ or act as safety watchmen/attendants.
- A. Hazard
  - B. Pipe
  - C. Confined space
  - D. None of the above
378. Employees are not permitted to smoke \_\_\_\_\_ or near the entrance/exit area.
- A. Near air and oxygen monitors
  - B. During a side entry
  - C. In a confined space
  - D. None of the above
379. Air and oxygen monitoring will check the levels of oxygen, explosive gasses, and carbon monoxide. Entry will not be permitted if explosive gas is detected above one-half the \_\_\_\_\_.
- A. Nitrogen level
  - B. Argon level
  - C. Lower Explosive Limit (LEL)
  - D. None of the above

380. When covers are removed, all \_\_\_\_\_ will be protected by a barricade to prevent injuries to others.
- A. Air and oxygen monitoring
  - B. Side entries
  - C. Openings to confined spaces
  - D. None of the above

**Confined Space Duties and Responsibilities**

**Employees**

381. Employees must not \_\_\_\_\_ that have not been evaluated for safety concerns.
- A. Follow program requirements
  - B. Report hazards
  - C. Enter any confined spaces
  - D. None of the above

**Entry Supervisor**

382. Entry supervisors must coordinate all entry procedures, tests, \_\_\_\_\_, equipment, and other activities related to the permit space entry.
- A. Publicity
  - B. News media
  - C. Permits
  - D. None of the above
383. Before endorsing the permit and allowing entry to begin, the \_\_\_\_\_ must check that all appropriate entries have been made on the permit, all tests specified by the permit have been conducted, and that all procedures and equipment specified by the permit are in place.
- A. Entry supervisor
  - B. Attendant
  - C. Unauthorized persons
  - D. None of the above

### Entry Attendants

384. A responsibility of the entry attendant is to remain outside the permit space during entry operations until \_\_\_\_\_.

- A. Assistance is requested
- B. Safety equipment arrives
- C. Relieved by another attendant
- D. None of the above

385. A responsibility of the entry attendant is to \_\_\_\_\_ as necessary to monitor entrant status and alert entrants of the need to evacuate.

- A. Communicate with entrants
- B. Encourage entrants
- C. Check the work progress
- D. None of the above

386. A responsibility of the entry attendant is to summon rescue and other emergency services as soon as the attendant \_\_\_\_\_ to escape the permit space hazards.

- A. Identifies entrant status
- B. Gets approval to summon rescue
- C. Determines the entrants need assistance
- D. Accurately unauthorizes entrants

### Special Considerations During A Permit Required Entry

387. 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
- B. Attendants
- C. Unauthorized persons
- D. None of the above

### Unauthorized Persons

388. Actions must be taken when \_\_\_\_\_ approach or enter a permit space while entry is under way.

- A. Authorized workers
- B. Rescue Workers
- C. Unauthorized persons
- D. None of the above

389. \_\_\_\_\_ must be warned to stay away from the permit space,

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

### Entrants

390. According to the text, all \_\_\_\_\_ must be authorized by the entry supervisor to enter permit spaces, have received the required training, have used the proper equipment, and observed the entry procedures and permit requirements

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

391. Entrants are required to know the \_\_\_\_\_ that may be faced during entry.

- A. Spaces
- B. Hazards
- C. Unauthorized persons
- D. None of the above

392. Entrants are required to communicate with the \_\_\_\_\_ as necessary to enable the attendant to monitor their status and alert them of the need to evacuate the space if necessary.

- A. Inspectors
- B. Attendant
- C. Unauthorized persons
- D. None of the above

## Permit Required Confined Space Entry General Rules

### Confined Space Entry Permits

393. According to the text, Confined Space Entry Permits must be completed before any employee \_\_\_\_\_.

- A. Begins work
- B. Leaves the permit space
- C. Enters a permit-required confined space
- D. None of the above

### Other Hazards

#### Flammable Atmospheres

394. Enriched oxygen atmospheres, vaporization of flammable liquids, byproducts of work, and chemical reactions can all create \_\_\_\_\_.

- A. Confined spaces
- B. Chemical reactions
- C. A flammable atmosphere
- D. None of the above

395. Lighter than air gases may rise and develop a \_\_\_\_\_ if trapped above the opening in a closed top tank.

- A. Toxic cloud
- B. Toxic atmosphere
- C. Flammable concentration
- D. None of the above

396. Flammable or explosive conditions within a confined space can be generated from the \_\_\_\_\_.

- A. Atmosphere
- B. Chemical reactions
- C. Byproducts of work procedures
- D. None of the above

397. In a dry state, compounds such as acetylene-metal compounds, peroxides, and nitrates have the potential to explode upon percussion or exposure to \_\_\_\_\_.

- A. Toxic fumes
- B. Increased temperature
- C. High charges of static electricity
- D. None of the above

#### Toxic Atmospheres

398. The entire spectrum of gases, vapors, and finely-divided airborne dust in industry can be regarded as \_\_\_\_\_.

- A. High charges of static electricity
- B. Toxic in a confined space
- C. Spontaneous chemical reactions
- D. None of the above

399. The sources of toxic atmospheres encountered may arise from: 1. The manufacturing process; 2. The product stored; or 3. The \_\_\_\_\_ in the confined space.

- A. Toxic fumes
- B. Operation performed
- C. Decomposition of organic matter
- D. None of the above

400. Carbon monoxide results as a product of \_\_\_\_\_ when silo gas forms in grain storage elevators.

- A. Organic materials
- B. CO<sub>2</sub>
- C. Decomposition
- D. None of the above

## **When Finished with Your Assignment...**

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