

Registration Form

Collections O&M CEU Training Course
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Pretreatment ___ Collection ___ Wastewater Treatment ___

Other _____

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

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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.

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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.

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Collections O&M Answer Key

Name _____ Phone _____

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

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

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| 79. A B C D | 110. A B C D | 141. A B C D | 172. A B C D |
| 80. A B C D | 111. A B C D | 142. A B C D | 173. A B C D |
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| 84. A B C D | 115. A B C D | 146. A B C D | 177. A B C D |
| 85. A B C D | 116. A B C D | 147. A B C D | 178. A B C D |
| 86. A B C D | 117. A B C D | 148. A B C D | 179. A B C D |
| 87. A B C D | 118. A B C D | 149. A B C D | 180. A B C D |
| 88. A B C D | 119. A B C D | 150. A B C D | 181. A B C D |
| 89. A B C D | 120. A B C D | 151. A B C D | 182. A B C D |
| 90. A B C D | 121. A B C D | 152. A B C D | 183. A B C D |
| 91. A B C D | 122. A B C D | 153. A B C D | 184. A B C D |
| 92. A B C D | 123. A B C D | 154. A B C D | 185. A B C D |
| 93. A B C D | 124. A B C D | 155. A B C D | 186. A B C D |
| 94. A B C D | 125. A B C D | 156. A B C D | 187. A B C D |
| 95. A B C D | 126. A B C D | 157. A B C D | 188. A B C D |
| 96. A B C D | 127. A B C D | 158. A B C D | 189. A B C D |
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| 104. A B C D | 135. A B C D | 166. A B C D | 197. A B C D |
| 105. A B C D | 136. A B C D | 167. A B C D | 198. A B C D |
| 106. A B C D | 137. A B C D | 168. A B C D | 199. A B C D |
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Please write down any questions you were not able to find the answers or that have errors.

Collections O&M CEU Training Assignment

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

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

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

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

Collection Systems Section

Collection System Defined

- 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
- Large-scale public sewer systems (municipal wastewater treatment plants) are centralized systems.
A. True B. False
- 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
- Homes and other buildings that are not served by public sewer systems depend on _____ septic systems to treat and dispose of wastewater.
A. Decentralized C. Remote
B. Centralized D. None of the above
- Which of the following are the most common wastewater treatment system used in rural areas?
A. Decentralized C. Onsite
B. Centralized D. None of the above
- Most decentralized systems are _____ systems (wastewater is treated underground near where it is generated).
A. Decentralized C. Onsite
B. Centralized D. None of the above
- Centralized systems are more inexpensive, allow for greater control, require fewer people, and produce only one discharge to monitor instead of several. However, _____ systems can be useful, and this option should be evaluated on a case-by-case basis.
A. Decentralized C. Onsite
B. Centralized D. None of the above

8. Wastewater in _____ systems can also be treated by a small, private wastewater treatment plant. These plants can have similar treatment processes and equipment as centralized systems but on a smaller scale.

- A. Decentralized
- B. Centralized
- C. Onsite
- D. None of the above

9. Which of the following are designed to collect both sanitary wastewater and storm water runoff?

- A. Combined sewer systems
- B. Wastewater collection system
- C. Wastewater management
- D. None of the above

10. During wet weather, the combined sanitary waste and _____ can overflow and discharge untreated wastewater directly to a surface water through a combined sewer overflow (CSO).

- A. Storm water
- B. Combined sewers
- C. POTW
- D. None of the above

11. During dry weather, _____ carry sanitary waste to a POTW.

- A. Storm water
- B. Combined sewers
- C. POTW
- D. None of the above

Collection System Operators' Purpose

12. Collection system operators are charged with protecting public health and the environment, and therefore must have documented proof of their certifications in the respective _____.

- A. POTW
- B. Wastewater collection system
- C. Wastewater management system
- D. None of the above

13. Which of the following are generally broken out into three different categories: sanitary sewers, storm sewers, and combined sewers?

- A. Storm water
- B. Combined sewers
- C. Centralized sewer systems
- D. None of the above

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

- A. Sanitary sewers
- B. Combined sewers
- C. Wastewater management
- D. None of the above

15. Storm sewers are not designed to quickly get rainwater off the streets during rain events.

- A. True
- B. False

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

- A. True
- B. False

17. Underground sanitary sewer pipes can clog or break, causing unplanned "overflows" of raw sewage that flood basements and streets.

- A. True
- B. False

18. Combined sewers deliver both wastewater and storm water in the same pipe. Most of the time, combined sewers transport the wastewater and storm water to a treatment plant.
A. True B. False
19. The maintenance of the sewer system is a semi-continuous cycle.
A. True B. False
20. As sections of the system age, problems such as corroded concrete pipe, cracked tile, lost joint integrity, grease, and heavy root intrusion must be constantly monitored and repaired.
A. True B. False
21. Technology has developed collection system maintenance with such tools as television camera assisted line inspection equipment, jet-cleaning trucks, and improvements in pump design. Because of the increasing complexity of wastewater collection systems, collection system maintenance is evolving into a highly skilled trade.
A. True B. False
22. Leaking, overflowing, and insufficient wastewater collection systems cannot release untreated wastewater into receiving waters.
A. True B. False
23. The public often takes the wastewater collection system for granted. In truth, these operators must work hard to keep it functioning properly.
A. True B. False
24. When there is too much rain, combined sewer systems cannot handle the extra volume and designed "overflows" of raw sewage into streams and rivers occur. The great majority of sewer systems have separated, not combined, sanitary and storm water pipes.
A. True B. False
25. Outdated pump stations, undersized to carry sewage from newly developed subdivisions or commercial areas, will not create any potential overflow hazards, adversely affecting human health and degrading the water quality of receiving waters.
A. True B. False

Understanding Gravity Sanitary Sewers

26. 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 C. Flow velocities and design depths of flow
B. Peak flow of population D. None of the above
27. Sewer systems are designed to maintain proper flow velocities with?
A. Stormwater inflow C. Minimum head loss
B. Maximum head loss D. None of the above
28. Which of the following may find it necessary to dissipate excess potential energy?
A. Flow velocities C. Higher elevations in the system
B. Wastewater D. None of the above

29. Which of the following is determined largely by population served, density of population, and water consumption?

- A. Design flow(s)
- B. Flow
- C. Inflow
- D. None of the above

30. Sanitary sewers should be designed for?

- A. Peak flow of population
- B. Flow velocities
- C. SSOs, surcharged lines, basement backups
- D. None of the above

31. Which of the following is strongly discouraged and should be designed separate from the sanitary system?

- A. Stormwater inflow
- B. Both wet and dry weather flows
- C. Low pressure
- D. None of the above

32. Most of the time the flow surface is exposed to the atmosphere within the sewer and it functions as?

- A. An open channel
- B. Peak flow of population
- C. Flow velocities and design depths of flow
- D. None of the above

33. Which of the following creates low pressure in the sewer system?

- A. Surge
- B. Stormwater inflow
- C. Dry weather flows
- D. None of the above

34. In order to plan a sewer system, many factors are considered. The purpose of this topic is to aid in the understanding of?

- A. I/I
- B. Peak flow of population
- C. Flow velocities and design depths of flow
- D. None of the above

Sewer System Capacity Evaluation - Testing and Inspection

35. The collection system owner or operator should have a program in place to periodically evaluate this _____ in both wet and dry weather flows and ensure the capacity is maintained as it was designed.

- A. Design flow(s)
- B. Stormwater inflow
- C. Capacity of the sewer system
- D. None of the above

36. The capacity evaluation program evaluation starts with an inventory and characterization of the?

- A. System components
- B. Stormwater inflow
- C. Flow velocities and design depths of flow
- D. None of the above

Capacity Limitations

37. The next stage in the capacity evaluation is to identify the location of wet weather related _____, surcharged lines, basement backups, and any other areas of known capacity limitations.

- A. Peak flow of population
- B. Wastewater
- C. SSOs
- D. None of the above

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

38. The reviewer should establish that the capacity evaluation includes an estimate peak flows experienced in the system, an estimate of the capacity of this _____, and identifies the major sources of I/I that contribute to hydraulic overloading events.

- A. Design flow(s)
- B. Key system components
- C. Both wet and dry weather flows
- D. None of the above

39. The capacity evaluation should also make use of a hydraulic model; this will help identify areas that need to alleviate?

- A. Peak flow of population
- B. Capacity limitations
- C. SSOs, surcharged lines, basement backups
- D. None of the above

Flow Monitoring

40. Flow monitoring provides information on dry weather flows as well as areas of the collection system potentially affected by?

- A. I/I
- B. Flow measurement
- C. Flow velocities and design depths of flow
- D. None of the above

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

- A. I/I
- B. Flow measurement
- C. Flow velocities and design depths of flow
- D. None of the above

Flow Monitoring Plan

42. Checks should include taking independent water level, cleaning accumulated debris and silt from the flow meter area, downloading data, and checking the desiccant and battery state. Records of each inspection should be maintained.

- A. True
- B. False

Flow Measurements

43. Many collection system owners or operators add a third classification: rainfall induced infiltration (RII).

- A. True
- B. False

44. 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

45. Which of the following is the seepage of groundwater into pipes or manholes through defects such as cracks, broken joints, etc?

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

46. 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?

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

47. Although not from piped sources, _____ tends to act more like inflow than infiltration.

- A. RII
- B. Infiltration
- C. Inflow
- D. None of the above

48. Other methods of inspecting flows may be employed, such as visually monitoring manholes during low-flow periods to determine areas with?
- A. Infiltration
 - B. RII
 - C. Excessive I/I
 - D. None of the above

Infiltration and Inflow Sub-Section

49. 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

50. Which of the following occurs when surface water such as storm water enters the sewer system through roof downspout connections, holes in manhole covers, illegal plumbing connections, or other defects?
- A. Inflow
 - B. Infiltration
 - C. Maximum flow capacity of wastewater
 - D. None of the above

Identifying sources of I/I

51. 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

Efficient Identification of Excessive I/I

52. Areas with high wet weather flows should then be subject to?
- A. High wet weather flows
 - B. Stormwater and rainwater
 - C. Inspection and rehabilitation activities
 - D. None of the above

Sewer System Testing

53. 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
54. Building inspections are sometimes conducted as part of a smoke testing program and, in some cases, may be the only way to find?
- A. Gutters
 - B. Stormwater Manholes
 - C. Illegal connections
 - D. None of the above
55. If traces of the smoke or its odor enter the building, it is an indication that this term may also be entering.
- A. Smoke
 - B. Sources of I/I
 - C. Gases from the sewer system
 - D. None of the above

Dye Testing

56. 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

57. Which of the following can be used to identify structurally damaged manholes that might create potential I/I problems?

- A. Smoke testing
- B. Prober
- C. Dyed water testing
- D. None of the above

Sewer System Inspection

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

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

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

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

Low Pressure System Description and Operation

Vacuum Sewers

60. When the wastewater level reaches a certain level, sensors within the holding tank opens this term that allows the contents of the tank to be sucked into the network of collection piping.

- A. Vacuum sewer system(s)
- B. Vacuum valve
- C. Vacuum collection and transportation systems
- D. None of the above

61. Which of the following are small buildings that house a large storage tank and a system of vacuum pumps?

- A. Interface valve
- B. Vacuum stations
- C. Vacuum within the vacuum mains
- D. None of the above

Vacuum Lines

62. Which of the following are installed in narrow trenches in a saw tooth profile for grade and uphill transport?

- A. Vacuum sewer system(s)
- B. Vacuum service lines
- C. Vacuum pump(s)
- D. None of the above

63. Unlike gravity sewers that must be laid at a minimum slope to obtain a 2 ft./sec. scouring velocity, vacuum has a flatter slope since a high scouring velocity is a feature of transporting?

- A. Vacuum sewage
- B. High scouring velocity
- C. Vacuum pump(s)
- D. None of the above

Line Sizes

64. Which of the following can extend or reduce this range. Longer distances are possible depending on local topography?

- A. Elevation changes
- B. Vacuum pump(s)
- C. Collection tank
- D. None of the above

Vacuum Station

65. The vacuum station is similar in function to a lift station in a gravity sewer system. Sewage pumps transfer the sewage from the?

- A. Elevation changes
- B. Vacuum pump(s)
- C. Collection tank
- D. None of the above

Vacuum Pumps

66. Which of the following typically run 2 to 3 hours each per day and don't need to run continuously since the vacuum interface valves are normally closed?

- A. Elevation changes
- B. Vacuum pump(s)
- C. Collection tank
- D. None of the above

67. Which of the following are sized to increase the system vacuum from 16" to 20" Hg in three minutes or less?

- A. Elevation changes
- B. Vacuum pump(s)
- C. Collection tank
- D. None of the above

68. Which of the following connect individually to the collection tank, effectively dividing the system into zones?

- A. Vacuum sewer system(s)
- B. The incoming vacuum lines
- C. Vacuum pump(s)
- D. None of the above

Manhole Sub-Section

69. There should be a baseline for manhole inspections (e.g., once every year) with problematic manholes being inspected more frequently.

- A. True
- B. False

70. 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

71. Manholes should undergo routine inspection typically every one to three years.

- A. True
- B. False

Sewer System Inspection Techniques

72. 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

73. 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

74. An allowance for unavoidable infiltration of surface and subsurface water into the lines is sometimes added to the peak flow to obtain the design flow.

- A. True
- B. False

75. When designing a wastewater system, the design engineer begins by first determining the amount of money that is available.

- A. True
- B. False

76. 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

77. Which of the following is 500 gallons per inch of pipe diameter per mile of sewer per day?
 A. Design flow C. Water per person in the area to be served
 B. Infiltration allowance D. None of the above
78. A typical infiltration allowance is _____ gallons per inch of pipe diameter per mile of sewer per day.
 A. 500 C. 10
 B. 1000 D. None of the above
79. From the types of sewage and the estimated design flow, the engineer can then tentatively select the types, sizes, slopes, and _____ of the piping to be used for the system.
 A. Ground elevations C. Soil analysis
 B. Distances below grade D. None of the above
80. Upon acceptance of the preliminary designs, final design may begin. During this phase, adjustments to the preliminary design should be made as necessary, based upon additional surveys, soil analysis, or other design factors. The final designs should include a general map of the area that shows the locations of _____.
 A. Ground elevations C. All sewer lines and structures
 B. Grades D. None of the above
81. Engineers should include detailed plans and profiles of the sewers showing ground elevations, _____, and the locations of any appurtenances and structures, such as manholes and lift stations.
 A. Pipe sizes and slopes C. Soil analysis
 B. Grade D. None of the above
82. Which of the following are also included for those appurtenances and structures?
 A. Ground elevations C. Construction plans and details
 B. Grade D. None of the above

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

83. 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
84. Which of the following may be made of grout?
 A. Mortar joints C. A no-hub joint
 B. Compression joints D. None of the above
85. Which of the following eliminate the use of oakum and mortar joints for sewer mains?
 A. Mortar joints C. Speed seal joints
 B. Compression joints D. None of the above

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

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

87. The benefits of camera inspection include not requiring _____ and little equipment and set-up time is required.

- A. Capacity evaluation
- B. Trench safety
- C. Confined space entry
- D. None of the above

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

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

Closed Circuit Television (CCTV) Inspections

89. 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

90. A benefit of which of the following is that a permanent visual record is captured for subsequent reviews?

- A. Sewer system cleaning
- B. Trenchless technologies
- C. CCTV inspection
- D. None of the above

Sewer Flow Measurements

91. 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

92. Which of the following is stormwater that enters the collection system through defects that lie so close to the ground surface that they are easily reached?

- A. RII
- B. Inflow
- C. Infiltration
- D. None of the above

93. Which of the following performed for the purpose of quantifying I/I are typically separated into three components: base flow, infiltration, and inflow?

- A. Base flow
- B. Infiltration
- C. Flow Measurements
- D. None of the above

Sewer Flow Capacity

94. The minimum velocity is necessary to prevent the?

- A. Deposition of solids
- B. Infiltration
- C. Stoppages
- D. None of the above

Sewer Line Mapping

95. 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

96. Collection system maps should have a numbering system which uniquely identifies all manholes and?

- A. Engineering endeavors
- B. Sewer cleanouts
- C. Quality sanitary sewer designs
- D. None of the above

97. Which of the following should have permanently assigned numbers and never be renumbered. Maps should also indicate the property served and reference its cleanout?

- A. Introduction of flows
- B. Inspection
- C. Manholes and sewer cleanouts
- D. None of the above

98. Which of the following should indicate the diameter, the length between the centers of manholes, and the slope or direction of flow?

- A. Engineering endeavors
- B. Sewer line maps
- C. Quality sanitary sewer designs
- D. None of the above

99. All maps should have this term and was drafted and the date of the last revision?

- A. Overflow points
- B. Introduction of flows
- C. Date the map
- D. None of the above

Geographic Information System (GIS)

100. If a GIS program is being used by the owner or operator, the reviewer should ask if the program is capable of accepting information from the?

- A. Overflow points
- B. Inspection
- C. Owner or operator's management program
- D. None of the above

101. Reviewers should check to see that maps and plans are available to the personnel in the office and to field personnel or contractors involved in all?

- A. Engineering endeavors
- B. Sewer line maps
- C. Quality sanitary sewer designs
- D. None of the above

New Sewer Construction

102. Which of the following keep costs and problems associated with operations, maintenance, and construction to a minimum?

- A. Engineering endeavors
- B. Sewer cleanouts
- C. Quality sanitary sewer designs
- D. None of the above

Collection Systems O&M Section 90-100 QUESTIONS

103. 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

104. Which of the following activities of the collection system has been delayed or omitted, primarily for political or financial reasons?

- A. Routine preventative
- B. Routine operations
- C. Planned operation and preventive maintenance
- D. None of the above

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

Sewer Cleaning and Inspection

106. As sewer system networks age, the risk of deterioration, _____, and collapses becomes a major concern.
A. Sanitary sewer overflow(s) C. Blockages
B. Rehabilitation D. None of the above
107. Which of the following are essential to maintaining a properly functioning system; these activities further a community's reinvestment into its wastewater infrastructure?
A. CCTV cleaning C. Cleaning and inspecting sewer lines
B. Rod straitening program(s) D. None of the above

Inspection Techniques

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

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

109. Which of the following are the most frequently used most cost efficient in the long term, and most effective method to inspect the internal condition of a sewer?
A. Television (TV) inspections C. Inspection program(s)
B. Lamping D. None of the above
110. Which of the following are vital in fully understanding the condition of a sewer system?
A. Visual inspections C. Walk-through or internal inspection
B. Operators D. None of the above
111. Which of the following should pay specific attention to sunken areas in the groundcover above a sewer line and areas with ponding water?
A. Cameras C. Sonar
B. Operators D. None of the above
112. For large sewer lines, a _____ is recommended. This inspection requires the operator to enter a manhole, the channel, and the pipeline, and assess the condition of the manhole frame, cover, and chimney, and the sewer walls above the flow line.
A. Visual inspections C. Walk-through or internal inspection
B. Operators D. None of the above
113. Which of the following of manholes and pipelines are comprised of surface and internal inspections?
A. Visual inspections C. Walk-through or internal inspection
B. Operators D. None of the above

Smoke Testing of Sewers is Done to Determine:

114. 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

115. Location of uncharted manholes and _____

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

116. _____ that buildings or residences are connected to the sanitary sewer

- A. Dye testing
- B. Proof
- C. Illegal connections
- D. None of the above

117. _____ such as roof leaders or downspouts, yard drains and industrial drains

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

118. _____ can be used to verify connections of drains to sanitary or storm sewers.

- A. Dye testing
- B. Proof
- C. Illegal connections
- D. None of the above

119. _____ can be used to verify the findings of smoke testing.

- A. Dye testing
- B. Proof
- C. Illegal connections
- D. None of the above

Identify the Cleaning Method

120. 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

121. 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

122. 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

123. A threaded rubber cleaning ball that spins and scrubs the pipe interior as flow increases in the sewer line. Removes deposits of settled inorganic material and grease build-up. Most effective in sewers ranging in size from 5-24 inches.

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

124. Introduces a heavy flow of water into the line at a manhole. Removes floatables and some sand and grit. Most effective when used in combination with other mechanical operations, such as rodding or bucket machine cleaning.

- A. Jetting
- 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:

125. _____ - 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

126. _____ - 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

127. 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

128. _____ - depth to groundwater, depth to bedrock, soil properties (classification, strength, porosity, compressibility, frost susceptibility, erodibility, and pH).

- A. Age
- B. Subsurface conditions
- C. Pipe diameter/volume conveyed
- D. None of the above

129. _____ - Hydrogen Sulfide (H₂S) is responsible for corroding sewers, structures, and equipment used in wastewater collection systems. The interior conditions of the pipes need to be monitored and treatment needs to be implemented to prevent the growth of slime bacteria and the production of H₂S gases.

- A. Corrosion potential
- B. Subsurface conditions
- C. Pipe diameter/volume conveyed
- D. None of the above

130. _____ - older systems have a greater risk of deterioration than newly constructed sewers.

- A. Age
- B. Subsurface conditions
- C. Pipe diameter/volume conveyed
- D. None of the above

131. _____ - pipes constructed of materials that are susceptible to corrosion have a greater potential of deterioration and potential collapse. Non-reinforced concrete pipes, brick pipes, and asbestos cement pipes are examples of pipes susceptible to corrosion.

- A. Construction material
- B. Subsurface conditions
- C. Pipe diameter/volume conveyed
- D. None of the above

Limitations of Cleaning Methods

132. Which of the following will normally utilize a variety of cleaning methods including jetting, high velocity cleaning, rodding, bucket machining, and using stop trucks?

- A. Backups into residences
- B. Variety of cleaning methods
- C. The collection system
- D. None of the above

133. To control roots, most collection system operators use?

- A. Steep-grade hill areas
- B. Variety of cleaning methods
- C. A vapor rooter eradication system
- 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:

134. 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

135. Which of the following is caused by the retention of solids in the system for long periods resulting in, among other things, wastewater turning septic and producing hydrogen sulfide?

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

136. Which of the following is where the sewer needs to be cleaned before inspection. This requirement most often occurs when using in-sewer CCTV inspection techniques?

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

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

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

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

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

139. 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

140. Traditionally used in larger-diameter sewers, which method involves manually excavating the material and placing it in buckets for removal? As the sewer system can be hazardous, the technique now is used infrequently. High-pressure jet equipment also can be used manually in larger sewers.

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

141. Which is a technique where custom buckets are dragged through the sewer and the material deposited into skips?
 A. Cutting C. Dragging
 B. Rodding D. None of the above
142. Which method depends on the ability of high-velocity jets of water to dislodge materials from the pipe walls and transport them down the sewer?
 A. Jet Rodding C. Cutting
 B. Dragging D. None of the above
143. The distance from the access point is limited to approximately 60 ft in this method.
 A. Cutting C. Manual or Mechanical Digging
 B. Rodding D. None of the above
144. Which of the following uses water under high pressure is fed through a hose to a nozzle containing a rosette of jets sited so the majority of flow is ejected in the opposite direction of the flow in the hose?
 A. Cutting C. Manual or Mechanical Digging
 B. Jet Rodding D. None of the above
145. Which of the following the main limitation of this technique is that cautions need to be used in areas with basement fixtures and in steep-grade hill areas?
 A. Jetting C. Kite or Bag
 B. Bucket machine(s) D. None of the above
146. Balling - Balling cannot be used effectively in pipes with _____ or protruding service connections because the ball can become distorted.
 A. Backups into residences C. Bad offset joints
 B. Completely plugged D. None of the above
147. Which of the following cleaning larger lines, the manholes need to be designed to a larger size in order to receive and retrieve the equipment?
 A. Bucket machine(s) C. Scooter
 B. Jetting D. None of the above
148. Bucket Machine- This device has been known to damage sewers and the set-up of this equipment is?
 A. Good for steep-grade hill areas C. Time-consuming
 B. Able to backups into residences D. None of the above
149. Which of the following is not very effective in removing heavy solids?
 A. Jetting C. Kite or Bag
 B. Flushing D. None of the above
150. Which of the following causes backups into residences have been known to occur when this method has been used by inexperienced operators?
 A. Jetting C. High Velocity Cleaner
 B. Chemicals' effectiveness D. None of the above

151. Which of the following when using this method, use caution in locations with basement fixtures and steep-grade hill areas?

- A. Bucket machine(s)
- B. Kite or Bag
- C. Scooter
- D. None of the above

Sewer – Hydraulic Cleaning Sub-Section

152. 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

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

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

Sewer Cleaning Methods

154. Chemical cleaning can facilitate the control of odors, grease buildup, root growth, corrosion, and insect and?

- A. Deposition of solids
- B. Infiltration
- C. Rodent infestation
- D. None of the above

Sewer Cleaning Records

155. 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. Both infiltration and inflow or I/I
- B. Potential problem areas
- C. General I/I source areas
- D. None of the above

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

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

Parts and Equipment Inventory

157. 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

158. 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

159. 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

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

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

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

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

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

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

Sewer System Rehabilitation

163. 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

164. Manholes should not be neglected in this program.

- A. Debris discharged
- B. Rehabilitation
- C. Cracks or loose joints in the sewer pipe
- D. None of the above

165. Manhole covers can allow significant inflow to enter the system because they are often located in the?

- A. Sanitary sewer service line
- B. Rehabilitation program
- C. Path of surface runoff
- D. None of the above

166. Manholes themselves can also be this term from cracks in the barrel of the manhole.

- A. A significant source of infiltration
- B. Non-structural repairs
- C. Warm, moist, nutrient rich atmosphere
- D. None of the above

Tree Roots vs. Sanitary Sewer Lines

Root Growth in Pipes

167. 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

168. The flow of warm water inside the sanitary sewer service pipe causes water with this _____ surrounding the pipe.

- A. A significant source of infiltration
- B. Non-structural repairs
- C. Vapor to escape to the cold soil
- D. None of the above

169. Tree roots are attracted to the water vapor leaving the pipe and they follow the vapor trail to the source of the moisture, which are usually in?

- A. Sanitary sewer service line
- B. Cracks or loose joints
- C. Exert considerable pressure
- D. None of the above

170. Upon reaching the crack or pipe joint, this term will penetrate the opening to reach the nutrients and moisture inside the pipe.

- A. A significant source of infiltration
- B. Severity of I/I
- C. Tree roots
- D. None of the above

Problems Caused by Roots Inside Sewers

171. 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

172. As roots continue to grow, they expand and exert considerable pressure _____ where they entered the pipe.

- A. Sanitary sewer service line
- B. Cracks or loose joints in the sewer pipe
- C. At the crack or joint
- D. None of the above

173. Which of the following term and pipes that are structurally damaged will require replacement?

- A. A significant source of infiltration
- B. Non-structural repairs
- C. Severe root intrusion
- D. None of the above

Tree Roots in Sewer

174. 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

Pipes Susceptible to Root Damage

175. Clay tile pipe that was commonly installed by developers and private contractors until the late 1980's is easily penetrated and?

- A. Root intrusion
- B. Damaged by tree roots
- C. Sanitary sewer service backup(s)
- D. None of the above

Root Growth Control

176. 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

Smoking out Sewer Leaks

177. Which of the following is an effective method of documenting sources of inflow and should be part of any CMOM program?

- A. Taste testing
- B. Smoke testing
- C. Video techniques
- D. None of the above

Necessary Equipment

178. If you've used this term and found that smoke frequently backs up to the surface, this may be your problem.

- A. High CFM blowers
- B. Smoke testing
- C. Video inspection
- D. None of the above

Blowers

179. Blocking off sections of line is usually a good idea with any type of smoke, but becomes almost a necessity when using?

- A. Smoke fluid
- B. Dye
- C. One dozen smoke candles
- D. None of the above

Collection Rules and Regulation Section

Clean Water Act (Rule) Summary

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

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

- A. OSHA
- B. Clean water legislation
- C. Environmental Protection Agency (EPA)
- D. None of the above

181. Which of the following gave the authority to set effluent standards on an industry basis and continued the requirements to set water quality standards for all contaminants in surface waters?

- A. EPA
- B. Congress
- C. Public notification program(s)
- D. None of the above

182. The _____ makes it unlawful for any person to discharge any pollutant from a point source into navigable waters unless a permit (NPDES) is obtained under the Act?

- A. CWA
- B. EPA
- C. OSHA
- D. None of the above

What are Sanitary Sewer Overflows?

183. Sanitary Sewer Overflows (SSOs) are discharges of raw sewage from?

- A. Deteriorating Sewer Systems
- B. Pipe Failure(s)
- C. Municipal sanitary sewer systems
- D. None of the above

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

- A. Pipe Failure(s)
- B. Destructive compounds
- C. SSOs
- D. None of the above

Why do Sewers Overflow?

185. Which of the following occasionally occur in almost every sewer system, even though systems are intended to collect and contain all the sewage?

- A. SSOs
- B. Undersized Systems
- C. Poor sewer collection system management
- D. None of the above

Problems that Can Cause Chronic SSOs Include:

186. Which of the following is too much rainfall or snowmelt infiltrating through the ground into leaky sanitary sewers?

- A. Infiltration and Inflow (I&I)
- B. Destructive compounds
- C. Sanitary Sewer Overflows or (SSOs)
- D. None of the above

187. Which of the following represents sewers and pumps are too small to carry sewage from newly-developed subdivisions or commercial areas?

- A. Undersized Systems
- B. Sewer Service Connections
- C. Oversized Systems
- D. None of the above

188. Which of the following: blocked, broken or cracked pipes, tree roots grow into the sewer, sections of pipe settle or shift?

- A. Deteriorating Sewer System
- B. Pipe Failure(s)
- C. Badly connected sewer service lines
- D. None of the above

189. Which of the following discharges occur at sewer service connections to houses and other buildings; some cities estimate that as much as 60% of overflows comes from the service lines?

- A. Undersized Systems
- B. Sewer Service Connections
- C. Back-ups and sewer overflows
- D. None of the above

190. Which of the following is improper installation, improper maintenance; widespread problems that can be expensive to fix develop over time?

- A. Deteriorating Sewer System
- B. Sanitary Sewer Overflows or (SSOs)
- C. Badly connected sewer service lines
- D. None of the above

Why are SSOs a Problem?

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

- A. Deteriorating Sewer System
- B. SSOs
- C. Badly connected sewer service lines
- D. None of the above

Combined Sewer Overflows

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

- A. Combined sewer systems
- B. Decentralized sewer systems
- C. Centralized sewer systems
- D. None of the above

193. A SSO is a release of untreated wastewater before the flow reaches a treatment plant. SSOs pose a significant threat to public health and?

- A. Dissolved organics
- B. Water quality
- C. Certain compounds and undesirable solids
- D. None of the above

Purpose of CMOM Programs

194. The CMOM approach helps the owner or operator provide a high level of service to customers and reduce _____.

- A. Performance goals
- B. Overflows and backups
- C. Regulatory noncompliance
- D. None of the above

195. On a periodic basis, utility activities should be reviewed and adjusted to better meet the _____.

- A. Performance goals
- B. Overflows and backups
- C. Regulatory noncompliance
- D. None of the above

196. Information collection and management practices are used to track how the elements of the CMOM program are meeting _____, and whether overall system efficiency is improving.

- A. Maintenance planning
- B. Performance goals
- C. A matter of policy
- D. None of the above

The Elements of a Proper CMOM Program

Purposeful

197. Which of the following when present and properly maintained, they support customer service and protect system assets, public health, and water quality?

- A. MOM programs
- B. Combined sewer systems
- C. Publicly Owned Treatment Works (POTW)
- D. None of the above

Goal-Oriented

198. Which of the following have goals directed toward their individual purposes. Progress toward these goals is measurable, and the goals are attainable?

- A. MOM program(s)
- B. Combined sewer system(s)
- C. Proper MOM programs
- D. None of the above

What are the elements of a proper Self-Audit?

Initial Assessment

199. Begin by performing a general assessment of the utility, and prioritizing the order of programs to be audited. Which of the following may be useful references in making this assessment?

- A. Program goal
- B. Water quality
- C. NPDES Compliance Inspection Manual and Guidance
- D. None of the above

How can SSOs be Reduced or Eliminated?

200. Which of the following include those occurring from unpreventable vandalism, some types of blockages, extreme rainstorms, and acts of nature such as earthquakes or floods?

- A. Utility's plan/schedule
- B. SSOs
- C. Unavoidable SSOs
- D. None of the above

When Finished with Your Assignment

REQUIRED DOCUMENTS

Please scan the **Registration Page, Answer Key, Survey and Driver's License** and email it to 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.