

*Registration form*

**Sewer and Septic Construction CEU Training Course \$200.00**  
**48 HOUR RUSH ORDER PROCESSING FEE ADDITIONAL \$50.00**

**Start and finish dates:** \_\_\_\_\_

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

**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 ( )** \_\_\_\_\_

**Operator ID #** \_\_\_\_\_ **Exp Date** \_\_\_\_\_

**Class/Grade** \_\_\_\_\_

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

Wastewater Collection \_\_\_\_\_ Wastewater Treatment \_\_\_\_\_ Onsite Installer \_\_\_\_\_

Other \_\_\_\_\_

***Your certificate will be e-mailed to you in about two weeks.***

Technical Learning College  
PO Box 420, Payson AZ 85547-0420  
(928) 468-0665 Fax (928) 272-0747 Back-up Fax (928) 468-0675  
Toll Free (866) 557-1746  
[info@tlch2o.com](mailto:info@tlch2o.com)

**Discover card** \_\_\_\_\_ **CCV code on card** \_\_\_\_\_

**American Express**  
**Master Card / Visa Card #** \_\_\_\_\_ **Exp. Date** \_\_\_\_\_

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

**Please invoice me, My PO #** \_\_\_\_\_

***We will stop mailing the certificate of completion so we need your e-mail address. We will e-mail the certificate to you, if no e-mail address; we will mail 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 also understand that this type of study program deals with dangerous conditions and that I will not hold Technical Learning College, Technical Learning Consultants, Inc. (TLC) liable for any errors or omissions or advice contained in this CEU education training course or for any violation or injury caused by this CEU education training course material. I will 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.

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.

Professional Engineers; Most states will accept our courses for credit but we do not officially list the States or Agencies. Please check your State for approval.

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

<http://www.tlch2o.com/PDF/CEU%20State%20Approvals.pdf>

*You can obtain a printed version of the course manual from TLC for an additional \$79.95 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.

## **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.

# Sewer/Septic Construction Answer Key

Name \_\_\_\_\_

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

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

- |               |               |                |                |
|---------------|---------------|----------------|----------------|
| 1. A B C D E  | 41. A B C D E | 81. A B C D E  | 121. A B C D E |
| 2. A B C D E  | 42. A B C D E | 82. A B C D E  | 122. A B C D E |
| 3. A B C D E  | 43. A B C D E | 83. A B C D E  | 123. A B C D E |
| 4. A B C D E  | 44. A B C D E | 84. A B C D E  | 124. A B C D E |
| 5. A B C D E  | 45. A B C D E | 85. A B C D E  | 125. A B C D E |
| 6. A B C D E  | 46. A B C D E | 86. A B C D E  | 126. A B C D E |
| 7. A B C D E  | 47. A B C D E | 87. A B C D E  | 127. A B C D E |
| 8. A B C D E  | 48. A B C D E | 88. A B C D E  | 128. A B C D E |
| 9. A B C D E  | 49. A B C D E | 89. A B C D E  | 129. A B C D E |
| 10. A B C D E | 50. A B C D E | 90. A B C D E  | 130. A B C D E |
| 11. A B C D E | 51. A B C D E | 91. A B C D E  | 131. A B C D E |
| 12. A B C D E | 52. A B C D E | 92. A B C D E  | 132. A B C D E |
| 13. A B C D E | 53. A B C D E | 93. A B C D E  | 133. A B C D E |
| 14. A B C D E | 54. A B C D E | 94. A B C D E  | 134. A B C D E |
| 15. A B C D E | 55. A B C D E | 95. A B C D E  | 135. A B C D E |
| 16. A B C D E | 56. A B C D E | 96. A B C D E  | 136. A B C D E |
| 17. A B C D E | 57. A B C D E | 97. A B C D E  | 137. A B C D E |
| 18. A B C D E | 58. A B C D E | 98. A B C D E  | 138. A B C D E |
| 19. A B C D E | 59. A B C D E | 99. A B C D E  | 139. A B C D E |
| 20. A B C D E | 60. A B C D E | 100. A B C D E | 140. A B C D E |
| 21. A B C D E | 61. A B C D E | 101. A B C D E | 141. A B C D E |
| 22. A B C D E | 62. A B C D E | 102. A B C D E | 142. A B C D E |
| 23. A B C D E | 63. A B C D E | 103. A B C D E | 143. A B C D E |
| 24. A B C D E | 64. A B C D E | 104. A B C D E | 144. A B C D E |
| 25. A B C D E | 65. A B C D E | 105. A B C D E | 145. A B C D E |
| 26. A B C D E | 66. A B C D E | 106. A B C D E | 146. A B C D E |
| 27. A B C D E | 67. A B C D E | 107. A B C D E | 147. A B C D E |
| 28. A B C D E | 68. A B C D E | 108. A B C D E | 148. A B C D E |
| 29. A B C D E | 69. A B C D E | 109. A B C D E | 149. A B C D E |
| 30. A B C D E | 70. A B C D E | 110. A B C D E | 150. A B C D E |
| 31. A B C D E | 71. A B C D E | 111. A B C D E | 151. A B C D E |
| 32. A B C D E | 72. A B C D E | 112. A B C D E | 152. A B C D E |
| 33. A B C D E | 73. A B C D E | 113. A B C D E | 153. A B C D E |
| 34. A B C D E | 74. A B C D E | 114. A B C D E | 154. A B C D E |
| 35. A B C D E | 75. A B C D E | 115. A B C D E | 155. A B C D E |
| 36. A B C D E | 76. A B C D E | 116. A B C D E | 156. A B C D E |
| 37. A B C D E | 77. A B C D E | 117. A B C D E | 157. A B C D E |
| 38. A B C D E | 78. A B C D E | 118. A B C D E | 158. A B C D E |
| 39. A B C D E | 79. A B C D E | 119. A B C D E | 159. A B C D E |
| 40. A B C D E | 80. A B C D E | 120. A B C D E | 160. A B C D E |

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|----------------|----------------|----------------|----------------|
| 161. A B C D E | 196. A B C D E | 231. A B C D E | 266. A B C D E |
| 162. A B C D E | 197. A B C D E | 232. A B C D E | 267. A B C D E |
| 163. A B C D E | 198. A B C D E | 233. A B C D E | 268. A B C D E |
| 164. A B C D E | 199. A B C D E | 234. A B C D E | 269. A B C D E |
| 165. A B C D E | 200. A B C D E | 235. A B C D E | 270. A B C D E |
| 166. A B C D E | 201. A B C D E | 236. A B C D E | 271. A B C D E |
| 167. A B C D E | 202. A B C D E | 237. A B C D E | 272. A B C D E |
| 168. A B C D E | 203. A B C D E | 238. A B C D E | 273. A B C D E |
| 169. A B C D E | 204. A B C D E | 239. A B C D E | 274. A B C D E |
| 170. A B C D E | 205. A B C D E | 240. A B C D E | 275. A B C D E |
| 171. A B C D E | 206. A B C D E | 241. A B C D E | 276. A B C D E |
| 172. A B C D E | 207. A B C D E | 242. A B C D E | 277. A B C D E |
| 173. A B C D E | 208. A B C D E | 243. A B C D E | 278. A B C D E |
| 174. A B C D E | 209. A B C D E | 244. A B C D E | 279. A B C D E |
| 175. A B C D E | 210. A B C D E | 245. A B C D E | 280. A B C D E |
| 176. A B C D E | 211. A B C D E | 246. A B C D E | 281. A B C D E |
| 177. A B C D E | 212. A B C D E | 247. A B C D E | 282. A B C D E |
| 178. A B C D E | 213. A B C D E | 248. A B C D E | 283. A B C D E |
| 179. A B C D E | 214. A B C D E | 249. A B C D E | 284. A B C D E |
| 180. A B C D E | 215. A B C D E | 250. A B C D E | 285. A B C D E |
| 181. A B C D E | 216. A B C D E | 251. A B C D E | 286. A B C D E |
| 182. A B C D E | 217. A B C D E | 252. A B C D E | 287. A B C D E |
| 183. A B C D E | 218. A B C D E | 253. A B C D E | 288. A B C D E |
| 184. A B C D E | 219. A B C D E | 254. A B C D E | 289. A B C D E |
| 185. A B C D E | 220. A B C D E | 255. A B C D E | 290. A B C D E |
| 186. A B C D E | 221. A B C D E | 256. A B C D E | 291. A B C D E |
| 187. A B C D E | 222. A B C D E | 257. A B C D E | 292. A B C D E |
| 188. A B C D E | 223. A B C D E | 258. A B C D E | 293. A B C D E |
| 189. A B C D E | 224. A B C D E | 259. A B C D E | 294. A B C D E |
| 190. A B C D E | 225. A B C D E | 260. A B C D E | 295. A B C D E |
| 191. A B C D E | 226. A B C D E | 261. A B C D E | 296. A B C D E |
| 192. A B C D E | 227. A B C D E | 262. A B C D E | 297. A B C D E |
| 193. A B C D E | 228. A B C D E | 263. A B C D E | 298. A B C D E |
| 194. A B C D E | 229. A B C D E | 264. A B C D E | 299. A B C D E |
| 195. A B C D E | 230. A B C D E | 265. A B C D E | 300. A B C D E |

**Please fax the answer key to TLC  
(928) 272-0747**

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Thank you...

**SEWER AND SEPTIC CONSTRUCTION  
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.***

1. Please rate the difficulty of your course.  
Very Easy    0    1    2    3    4    5    Very Difficult
2. Please rate the difficulty of the testing process.  
Very Easy    0    1    2    3    4    5    Very Difficult
3. Please rate the subject matter on the exam to your actual field or work.  
Very Similar    0    1    2    3    4    5    Very Different

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

5. What would you do to improve the Course?

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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.

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## Sewer and Septic Construction CEU Training Course Assignment

You will have 90 days from the start of this assignment to successfully complete it with a score of 70%. If you should need any assistance, please call or e-mail the Student Service Department, please fax or e-mail all concerns and the final test to TLC.

***You are expected to circle the correct answer on the enclosed answer key. Please include your name and address on your exam. The key is in the front.***

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

1. \_\_\_\_\_ and evaluation is an experimental technology where a 360 degree scanner produces a full digital photograph of the interior of the pipe.
  - A. Sonar technique
  - B. Still camera
  - C. Sewer scanner
  - D. Camera inspection
  - E. None of the Above
  
2. This \_\_\_\_\_ technique is similar to sonar in that a more complete image of a pipe can be made than with CCTV, but not all types of sewer defects may be identified as readily (i.e., infiltration, corrosion).
  - A. Sonar technique
  - B. Still camera
  - C. Sewer scanner
  - D. Camera inspection
  - E. None of the Above
  
3. \_\_\_\_\_ inspections are a helpful tool for early detection of potential problems.
  - A. Rehabilitation program
  - B. Structural repairs
  - C. CCTV inspections
  - D. Confined space entry
  - E. None of the Above
  
4. This technique involves a \_\_\_\_\_ with a light which is self-propelled or pulled down the pipe. As it moves it records the interior of the pipe.
  - A. Rehabilitation program
  - B. Structural repairs
  - C. CCTV
  - D. Confined space entry
  - E. None of the Above
  
5. CCTV inspections may be done on a routine basis as part of the \_\_\_\_\_ program as well as part of an investigation into the cause of I/I.
  - A. Rehabilitation program
  - B. Structural repairs
  - C. CCTV inspections
  - D. Confined space entry
  - E. None of the Above

**You can utilize the search or find function to help located the question and answer in the electronic version of the book.**

6. \_\_\_\_\_, however, eliminates the hazards associated with confined space entry. The output is displayed on a monitor and videotaped.
- A. Rehabilitation program
  - B. Structural repairs
  - C. CCTV
  - D. Confined space entry
  - E. None of the Above
7. A benefit of \_\_\_\_\_ is that a permanent visual record is captured for subsequent reviews.
- A. Rehabilitation program
  - B. Structural repairs
  - C. CCTV inspections
  - D. Confined space entry
  - E. None of the Above
8. The collection system owner or operator should have a sewer \_\_\_\_\_.
- A. Rehabilitation program
  - B. Structural repairs
  - C. CCTV inspections
  - D. Confined space entry
  - E. None of the Above
9. The objective of \_\_\_\_\_ is to maintain the overall viability of a collection system.
- A. Rehabilitation program
  - B. Structural repairs
  - C. CCTV inspections
  - D. Confined space entry
  - E. None of the Above
10. The \_\_\_\_\_ should build on information obtained as a result of all forms of maintenance and observations made as part of the capacity evaluation and asset inventory to assure the continued ability of the system to provide sales and service at the least cost.
- A. Rehabilitation program
  - B. Structural repairs
  - C. CCTV inspections
  - D. Confined space entry
  - E. None of the Above
11. There are many \_\_\_\_\_ the choice of methods depends on pipe size, type, location, dimensional changes, sewer flow, material deposition, surface conditions, severity of I/I, and other physical factors.
- A. Rehabilitation methods
  - B. Structural repairs
  - C. CCTV inspections
  - D. Confined space entry
  - E. None of the Above
12. Non-\_\_\_\_\_ typically involve the sealing of leaking joints in otherwise sound pipe.
- A. Rehabilitation program
  - B. Structural repairs
  - C. CCTV inspections
  - D. Confined space entry
  - E. None of the Above

13. \_\_\_\_\_ involve either the replacement of all or a portion of a sewer line, or the lining of the sewer.
- A. Rehabilitation program
  - B. Structural repairs
  - C. CCTV inspections
  - D. Confined space entry
  - E. None of the Above
14. These repairs can be carried out by excavating usually for repairs limited to one or two pipe segments (these are known as point repairs) or by \_\_\_\_\_ (in which repair is carried out via existing manholes or a limited number of access excavations).
- A. Rehabilitation program
  - B. Structural repairs
  - C. CCTV inspections
  - D. Confined space entry
  - E. None of the Above
15. The rehabilitation program should identify the methods that have been used in the past, their success rating and methods to be used in the future.
- A. Rehabilitation program
  - B. Structural repairs
  - C. CCTV inspections
  - D. Confined space entry
  - E. None of the Above
16. A reviewer who wants further guidance on methods of \_\_\_\_\_ may consult the owner's or operator's policies regarding service lateral rehabilitation since service laterals can constitute a serious source of I/I.
- A. Rehabilitation
  - B. Structural repairs
  - C. CCTV inspections
  - D. Confined space entry
  - E. None of the Above
17. Manholes should not be neglected in the \_\_\_\_\_.
- A. Rehabilitation program
  - B. Structural repairs
  - C. CCTV inspections
  - D. Confined space entry
  - E. None of the Above
18. Manhole covers can allow significant inflow to enter the system because they are often \_\_\_\_\_ in the path of surface runoff.
- A. Capacity
  - B. Location
  - C. Located
  - D. Conditions
  - E. None of the Above
19. Manholes themselves can also be a significant source of infiltration from cracks in the barrel of the manhole. The owner or operator should be able to produce documentation on the \_\_\_\_\_ and methods used for sewer rehabilitation.
- A. Capacity
  - B. Location
  - C. Located
  - D. Conditions
  - E. None of the Above

20. The reviewer should compare the rehabilitation accomplished with that recommended by the \_\_\_\_\_ evaluation program.

- A. Capacity
- B. Location
- C. Located
- D. Conditions
- E. None of the Above

### **Tree Roots vs. Sanitary Sewer Lines**

21. Roots require oxygen to grow, they do not grow in pipes that are full of water or where high ground water \_\_\_\_\_ prevail.

- A. Capacity
- B. Location
- C. Located
- D. Conditions
- E. None of the Above

22. Roots \_\_\_\_\_ in the warm, moist nutrient rich atmosphere above the water surface inside sanitary sewers.

- A. Penetrate
- B. Thrive
- C. Attracted
- D. Grow
- E. None of the Above

23. The flow of warm water inside the sanitary sewer service pipe \_\_\_\_\_ to escape to the cold soil surrounding the pipe.

- A. Penetrate
- B. Thrive
- C. Attracted
- D. Grow
- E. None of the Above

24. Tree roots are \_\_\_\_\_ to the water vapor leaving the pipe and they follow the vapor trail to the source of the moisture, which are usually cracks or loose joints in the sewer pipe.

- A. Penetrate
- B. Thrive
- C. Attracted
- D. Grow
- E. None of the Above

25. Upon reaching the crack or pipe joint, tree roots will \_\_\_\_\_ the opening to reach the nutrients and moisture inside the pipe. This phenomenon continues in winter even though trees appear to be dormant.

- A. Penetrate
- B. Thrive
- C. Attracted
- D. Grow
- E. None of the Above

26. Once inside the pipe, roots will continue to \_\_\_\_\_ and if not disturbed, they will completely fill the pipe with multiple hair-like root masses at each point of entry.

- A. Penetrate
- B. Thrive
- C. Attracted
- D. Grow
- E. None of the Above

27. The root mass inside the pipe \_\_\_\_\_ with grease, tissue paper, and other debris discharged from the residence or business.
- Exert considerable pressure
  - Becomes matted
  - Observing wet areas
  - Break the pipe
  - None of the Above
28. Homeowners will notice the first signs of a slow flowing drainage system by hearing \_\_\_\_\_ from toilet bowls and observing wet areas around floor drains after completing the laundry.
- Exert considerable pressure
  - Becomes matted
  - Observing wet areas
  - Break the pipe
  - None of the Above
29. A complete blockage \_\_\_\_\_ if no remedial action is taken to remove the roots/blockage.
- Exert considerable pressure
  - Becomes matted
  - Observing wet areas
  - Break the pipe
  - None of the Above
30. As roots continue to grow, they expand and \_\_\_\_\_ at the crack or joint where they entered the pipe.
- Exert considerable pressure
  - Becomes matted
  - Observing wet areas
  - Break the pipe
  - None of the Above
31. The force exerted by the root growth will \_\_\_\_\_ and may result in total collapse of the pipe.
- Exert considerable pressure
  - Becomes matted
  - Observing wet areas
  - Break the pipe
  - None of the Above
32. Severe root intrusion and pipes that are structurally damaged will \_\_\_\_\_.
- Exert considerable pressure
  - Becomes matted
  - Observing wet areas
  - Break the pipe
  - None of the Above
33. Tree roots \_\_\_\_\_ sewer pipes are generally the most expensive sewer maintenance item experienced by City residents.
- Exert considerable pressure
  - Becomes matted
  - Observing wet areas
  - Break the pipe
  - None of the Above

34. Roots from trees growing on private property and on parkways throughout the City are responsible for many of the \_\_\_\_\_ and damaged sewer pipes.
- Exert considerable pressure
  - Sanitary sewer service backups
  - Observing wet areas
  - Break the pipe
  - None of the Above
35. Homeowners should be aware of the location of their sewer service and refrain from \_\_\_\_\_ and hedges near the sewer lines.
- Exert considerable pressure
  - Becomes matted
  - Observing wet areas
  - Break the pipe
  - None of the Above
36. The \_\_\_\_\_ of a sanitary sewer service line as a result of damage from tree roots may be very expensive.
- Exert considerable pressure
  - Replacement cost
  - Observing wet areas
  - Break the pipe
  - None of the Above
37. When designing a wastewater system, the design engineer begins by first determining the \_\_\_\_\_ of sewage to be handled. This is accomplished through a careful study of the area to be served.
- Begins by first determining
  - Types and quantities
  - Select the types, sizes, slopes, and distances
  - Acceptance of the preliminary designs
  - None of the Above
38. Use is greater in the summer than in the winter and greater during the morning and evening than it is in the middle of the day or at night. Therefore, the average daily flow (based on the average utilization) is multiplied by a peak flow factor \_\_\_\_\_.
- Begins by first determining
  - To obtain the design flow
  - Select the types, sizes, slopes, and distances
  - Acceptance of the preliminary designs
  - None of the Above
39. Typical peak flow factors range from 4 to 6 for small areas down to 1.5 to 2.5 for larger areas. An allowance for unavoidable infiltration of surface and subsurface water into the lines is sometimes added to the peak flow \_\_\_\_\_.
- Begins by first determining
  - To obtain the design flow
  - Select the types, sizes, slopes, and distances
  - Acceptance of the preliminary designs
  - None of the Above

40. A typical infiltration allowance is 500 gallons per inch of pipe diameter per mile of sewer per day. From the types of sewage and the estimated design flow, the engineer can then tentatively \_\_\_\_\_below grade of the piping to be used for the system.

- A. Begins by first determining
- B. To obtain the design flow
- C. Select the types, sizes, slopes, and distances
- D. Acceptance of the preliminary designs
- E. None of the Above

41. Upon acceptance of the preliminary designs, final design may begin. During this phase, adjustments to the preliminary design \_\_\_\_\_, 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 all sewer lines and structures.

- A. Begins by first determining
- B. Should be made as necessary
- C. Select the types, sizes, slopes, and distances
- D. Acceptance of the preliminary designs
- E. None of the Above

42. They also \_\_\_\_\_plans and profiles of the sewers showing ground elevations, pipe sizes and slopes, and the locations of any appurtenances and structures, such as should be made as necessary.

- A. Begins by first determining
- B. To obtain the design flow
- C. Select the types, sizes, slopes, and distances
- D. Acceptance of the preliminary designs
- E. None of the Above

43. Construction plans and details are \_\_\_\_\_for those appurtenances and structures.

- A. Begins by first determining
- B. To obtain the design flow
- C. Select the types, sizes, slopes, and distances
- D. Acceptance of the preliminary designs
- E. None of the Above

44. \_\_\_\_\_ These types of joints are used to connect cast-iron soil pipes (**CISP**) and fittings.

- A. Speed Seal Joints
- B. Mortar or Bituminous Joints
- C. Compression joints
- D. Lead and Oakum Joint, Compression Joint and No-Hub Joints
- E. None of the Above

45. In lead and oakum joints, oakum (made of hemp impregnated with bituminous compound and loosely twisted or spun into a rope or yarn) is packed into the hub completely around the joint, and \_\_\_\_\_ is poured over it.

- A. Speed Seal Joints
- B. Mortar or Bituminous Joints
- C. Compression joints
- D. Lead and Oakum Joint, OR Compression Joint OR No-Hub Joints
- E. None of the Above

46. In \_\_\_\_\_, an assembly tool is used to force the spigot end of the pipe or fitting into the lubricated gasket inside the hub.

- A. Speed Seal Joints
- B. Mortar or Bituminous Joints
- C. Compression joints
- D. None of the Above

47. A \_\_\_\_\_ uses a gasket on the end of one pipe and a stainless steel shield and clamp assembly on the end of the other pipe.
- A. Speed Seal Joints
  - B. Mortar or Bituminous Joints
  - C. Compression joints
  - D. No-Hub Joints
  - E. None of the Above
48. \_\_\_\_\_ This type of joint is common to vitrified clay and concrete pipes and fittings. Mortar joints may be made of grout (a mixture of cement, sand, and water).
- A. Speed Seal Joints
  - B. Mortar or Bituminous Joints
  - C. Compression joints
  - D. Lead and Oakum Joint, OR Compression Joint OR No-Hub Joints
  - E. None of the Above
49. The use of \_\_\_\_\_ in joining vitrified clay pipe has become widespread.
- A. Speed Seal Joints
  - B. Mortar or Bituminous Joints
  - C. Compression joints
  - D. Lead and Oakum Joint, Compression Joint and No-Hub Joints
  - E. None of the Above
50. \_\_\_\_\_ eliminate the use of oakum and mortar joints for sewer mains. This type of seal is made a part of the vitrified pipe joint when manufactured. It is made of polyvinyl chloride and is called a plastisol joint connection
- A. Speed Seal Joints
  - B. Mortar or Bituminous Joints
  - C. Compression joints
  - D. Lead and Oakum Joint, Compression Joint and No-Hub Joints
  - E. None of the Above
51. The \_\_\_\_\_ utilizes both a high pressure stream of water and a vacuum system to clean and remove built up debris from sewer lines.
- A. Televising Van
  - B. Sewer vacuum truck
  - C. Versatile vehicles
  - D. None of the Above
52. These \_\_\_\_\_ are also used to clean lift station wet wells, stormwater catch basins and to perform excavations to locate broken water or sewer lines. It reduces repair times and costs by over 50%.
- A. Televising Van
  - B. Sewer vacuum truck
  - C. Versatile vehicles
  - D. None of the Above
53. The \_\_\_\_\_ should be equipped with two cameras, one color camera for televising main sanitary lines and one black & white camera for televising house services (connection from the main sanitary line to a house).
- A. Televising Van
  - B. Sewer vacuum truck
  - C. Versatile vehicles
  - D. None of the Above

### **Safety Section**

54. The relative strength and capacity of walls of a trench is known as?
- A. Wales
  - B. Personal Protective Equipment
  - C. Registered Professional Engineer
  - D. Voids
  - E. None of the above
55. Pumps, pipe or channel used to drain off rain or groundwater from inside the trench.
- A. Wales
  - B. Personal Protective Equipment
  - C. Registered Professional Engineer
  - D. Voids
  - E. None of the above
56. Any man-made cut, cavity trench or depression in an earth surface, formed by earth removal.
- A. Hole
  - B. Excavation
  - C. Digging
  - D. None of the above
57. A long narrow opening or crack in the rock or soil. This term is often a sign of trench wall failure.
- A. Fissure
  - B. Excavation
  - C. Servicing and/or maintenance
  - D. Setting up
  - E. None of the above
58. Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or un-jamming of machines or equipment and making adjustments or tool changes, where the employee may be exposed to the unexpected energization or startup of the equipment or release of hazardous energy.
- A. Fissure
  - B. Excavation
  - C. LOTO
  - D. Setting up
  - E. None of the above
59. Any work performed to prepare a machine or equipment to perform its normal production operation.
- A. Fissure
  - B. Excavation
  - C. Servicing and/or maintenance
  - D. Setting up
  - E. None of the above
60. The placement of a tagout device on an energy isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed is called.
- A. Sand fuse
  - B. Lockout/Tagout Procedures
  - C. Safety device
  - D. None of the above

61. A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy isolating device in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.
- A. Fissure
  - B. Excavation
  - C. Servicing and/or maintenance
  - D. Setting up
  - E. None of the above
62. A type C soil with small, loose grains of disintegrated rock.
- A. Sand
  - B. Rock
  - C. Tagout device
  - D. Dirt
  - E. None of the above
63. Granular soil with enough silt and clay to make it slightly cohesive.
- A. Sand
  - B. Soil
  - C. Rock
  - D. Hot tap
  - E. None of the above
64. Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.
- A. Sand
  - B. Tagout
  - C. Tagout device
  - D. Hot tap
  - E. None of the above
65. A procedure used in the repair, maintenance and services activities which involves welding on a piece of equipment (pipelines, vessels or tanks) under pressure, in order to install connections or appurtenances Commonly used to replace or add sections of pipeline without the interruption of service for air, gas, water, steam, and petrochemical distribution systems.
- A. Sand
  - B. Tagout
  - C. Tagout device
  - D. Hot tap
  - E. None of the above
66. The placement of a lockout device on an energy isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.
- A. Lockout procedure
  - B. Safety procedure
  - C. Tagout device
  - D. None of the above
67. A device that utilizes a positive means such as a lock, either key or combination type, to hold an energy isolating device in the safe position and prevent the energizing of a machine or equipment. Included are blank flanges and bolted slip blinds.
- A. Lockout/Tagout device
  - B. Lock
  - C. Tagout device
  - D. Unplug
  - E. Normal production operations

68. The utilization of a machine or equipment to perform its intended production function.
- A. Lockout device
  - B. Tagout
  - C. Tagout device
  - D. Lockout
  - E. Normal production operations
69. A soil which contains fine particles and is very smooth.
- A. Silty Clay
  - B. Silt
  - C. None of the above
70. A plastic soil that will appear rough or broken when rubbed over the thumb and finger.
- A. Silty Clay
  - B. Silt
  - C. Sand
  - D. Dirt
  - E. Mud
71. The process of cutting back the sides of a trench to avoid a cave-in.
- A. Silty Clay
  - B. Silt
  - C. Sloping
  - D. Sloughing
  - E. Braces
72. A loose soil begins to run in from the lower part of the wall into the excavation. It is the first step to a wall collapse.
- A. Silty Clay
  - B. Silt
  - C. Sloping
  - D. Sloughing
  - E. Native soil
73. Visible warning barriers that keep vehicles and pedestrians from entering a construction site.
- A. Flashing lights
  - B. Silt
  - C. Sloping
  - D. Sloughing
  - E. None of the above
74. Devices that hold or fasten two or more parts together or in place. Braces are diagonal or horizontal, they may be made of wood or metal.
- A. Silty Clay
  - B. Silt
  - C. Sloping
  - D. Sloughing
  - E. Braces
75. A system of braces which applies pressure against trench walls to stabilize them. A \_\_\_\_\_ is part of a trench shoring system used to prevent trench walls from collapsing.
- A. Saturation
  - B. Bracing System
  - C. Benching
  - D. Bulge
  - E. Spall

76. A method of cutting back the sides of a trench into horizontal steps to prevent cave-ins.
- A. Saturation
  - B. Bracing System
  - C. Benching
  - D. None of the above
77. An outward swelling in the soil of a trench may be a warning sign of trench failure.
- A. Saturation
  - B. Bracing System
  - C. Benching
  - D. Bulge
  - E. None of the above
78. The process of a soil being filled to capacity with moisture.
- A. Saturation
  - B. Bracing System
  - C. Benching
  - D. Bulge
  - E. Spall
79. A system of classifying soils and rock deposits. Soil must be classified by a qualified person as:  
Stable rock, Type-A, Type-B, Type-C.
- A. Type-A Soil
  - B. Soil Type
  - C. Spoil Pile/Spoilage
  - D. Supports
  - E. Trench Box
80. When a soil begins to crack or flake due to pressure, or from moisture from within the trench.
- A. Saturation
  - B. Bracing System
  - C. Benching
  - D. Bulge
  - E. Spall
81. Rock waste, banks and dumps from the excavation.
- A. Type-A Soil
  - B. Soil Type
  - C. Spoil Pile/Spoilage
  - D. Supports
  - E. Trench Box
82. Part of a shoring system which helps to bear the weight of braces and other parts of the shoring system.
- A. Type-A Soil
  - B. Soil Type
  - C. Spoil Pile/Spoilage
  - D. Supports
  - E. Trench Box
83. A prefabricated moveable box usually constructed of metal plates welded to a heavy steel frame. The box is moved along as work progresses. It is able to withstand the forces imposed on it by a cave-in and thereby protects trench workers.
- A. Type-A Soil
  - B. Soil Type
  - C. Spoil Pile/Spoilage
  - D. Trench Box

84. The most stable and cohesive type of soil while working at a trench site. Examples are clay, silty clay and hardpan.
- Type-A Soil
  - Type-B Soil
  - Spoil Pile/Spoilage
  - Type C Soil
  - None of the above
85. \_\_\_\_\_ is next to the most stable soil. Silt, silt loam, sandy loam, medium clay and unstable rock would be good examples of this soil.
- Type-A Soil
  - Type-B Soil
  - Type-C Soil
  - Supports
  - None of the above
86. The least stable type of soil. Examples of \_\_\_\_\_ soils are gravel, loamy sand, soft clay, submerged silt and heavy unstable rock.
- Type-A Soil
  - Type-B Soil
  - Type-C Soil
  - Supports
  - None of the above
87. Through a variety of tests, a soil's strength is found. The unconfined compressive strength is the soil's measurement of bearing capacity and shearing resistance. Measured as the amount of weight per square foot needed to collapse a soil sample.
- Type-A Soil
  - Type-B Soil
  - Type-C Soil
  - Supports
  - None of the above
88. Vertical members of a trench shoring system placed in contact with the earth. These members usually are not placed in direct contact with one another.
- Hardpan
  - Vibration
  - Sheeting
  - Gravel
  - None of the above
89. When a soil or excavation site trembles and shakes rapidly due to forces such as loud noises or heavy equipment or traffic.
- Hardpan
  - Vibration
  - Grain
  - Gravel
  - Loamy Sand
90. Particles that once were large rocks, but have been broken down through time and the effects of weathering. The size of the grain of a soil determines the stability and cohesiveness of a soil. The larger the grain, the more unstable the soil.
- Hardpan
  - Vibration
  - Grain
  - Gravel
  - Loamy Sand

91. A loose mixture of pebbles and rock fragments, which is coarser than sand.
- A. Hardpan
  - B. Dirt
  - C. Grain
  - D. Gravel
  - E. Loamy Sand
92. A layer of hard subsoil or clay that does not allow water in. \_\_\_\_\_ is classified as a Type A soil.
- A. Hardpan
  - B. Vibration
  - C. Grain
  - D. Gravel
  - E. Loamy Sand
93. The swelling of a soil.
- A. Hardpan
  - B. Vibration
  - C. Grain
  - D. Gravel
  - E. None of the above
94. \_\_\_\_\_ are braces or supports within a shoring system. They are placed against beams to resist the pressure of the earth.
- A. Jacks
  - B. Vibration
  - C. Grain
  - D. Gravel
  - E. Loamy Sand
95. Soil composed of a mixture of sand, clay and silt, with more sand grains than clay or silt. It is classified as a Type C soil.
- A. Hardpan
  - B. Vibration
  - C. Grain
  - D. Gravel
  - E. Loamy Sand
96. Tables and charts approved by a registered professional engineer and used to design and construct a protective system.
- A. Capable of being locked out
  - B. Manufacturer's Tabulated Data
  - C. Affected employee
  - D. None of the above
97. An employee whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.
- A. Affected employee
  - B. Authorized employee
  - C. None of the above

98. A person who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an \_\_\_\_\_ when that employee's duties include performing servicing or maintenance covered under this section.
- A. Capable of being locked out
  - B. Manufacturer's Tabulated Data
  - C. Affected employee
  - D. Authorized employee
  - E. Energy isolating device
99. An \_\_\_\_\_ is capable of being locked out if it has a hasp or other means of attachment to which, or through which, a lock can be affixed, or it has a locking mechanism built into it.
- A. Capable of being locked out
  - B. Manufacturer's Tabulated Data
  - C. Affected employee
  - D. Energy isolating device
  - E. None of the Above
100. \_\_\_\_\_ Connected to an energy source or containing residual or stored energy.
- A. Capable of being locked out
  - B. Manufacturer's Tabulated Data
  - C. Affected employee
  - D. Energy isolating device
  - E. None of the Above

**The second section will come from the text. Use the Find or Search function on your computer.**

101. The Clean Water Act is a 1977 \_\_\_\_\_ to the Federal Water Pollution Control Act of 1972, which set the basic structure for regulating discharges of pollutants to waters of the United States.
- A. Clean Water Act
  - B. Authority
  - C. Unlawful
  - D. Amendment
  - E. None of the Above
102. The law gave EPA the \_\_\_\_\_ to set effluent standards on an industry basis (technology-based) and continued the requirements to set water quality standards for all contaminants in surface waters.
- A. Clean Water Act
  - B. Authority
  - C. Unlawful
  - D. Amendments
  - E. None of the Above
103. The CWA makes it unlawful for any person to discharge any pollutant from a point source into navigable waters unless a permit \_\_\_\_\_ is obtained under the Act.
- A. Clean Water Act
  - B. Authority
  - C. Unlawful
  - D. Amendments
  - E. None of the Above
104. The 1977 \_\_\_\_\_ focused on toxic pollutants. In 1987, the CWA was reauthorized and again focused on toxic substances, authorized citizen suit provisions, and funded sewage treatment plants (**POTW's**) under the Construction Grants Program.
- A. Clean Water Act
  - B. Authority
  - C. Amendments
  - D. None of the Above

105. The \_\_\_\_\_ provisions for the delegation by the EPA of many permitting, administrative, and enforcement aspects of the law to state governments.

- A. Clean Water Act
- B. Authority
- C. Unlawful
- D. Amendments
- E. None of the Above

106. In states with the \_\_\_\_\_ to implement CWA programs, the EPA still retains oversight responsibilities.

- A. Clean Water Act
- B. Authority
- C. Unlawful
- D. Amendments
- E. None of the above

107. The \_\_\_\_\_ focuses on improving the quality of the nation's waters.

- A. Clean Water Act
- B. Authority
- C. Unlawful
- D. Amendments
- E. None of the above

108. Proper function of sanitary sewer systems is vital to \_\_\_\_\_, property, and waterways in the surrounding area.

- A. Clean Water Act
- B. Authority
- C. Unlawful
- D. Amendments
- E. None of the Above

109. Most utilities have a \_\_\_\_\_, operation and maintenance (MOM) plan to ensure their system is in working order.

- A. SSO
- B. Water quality
- C. Management
- D. Sewage
- E. None of the above

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

- A. SSO
- B. Water quality
- C. Management
- D. Sewage
- E. Municipal sewer systems

111. Sanitary sewage overflows (SSOs) release raw \_\_\_\_\_ from the collection system before it can reach a treatment facility.

- A. SSO
- B. Water quality
- C. Management
- D. Sewage
- E. None of the above

112. \_\_\_\_\_ may flow out of manholes, into businesses and homes and eventually ends up in local waterways.

- A. SSO
- B. Water quality
- C. Management
- D. Sewage
- E. Municipal sewer systems

113. The Management, Operation and Maintenance (MOM) Programs Project is a pilot enforcement approach developed by EPA Region 4 to bring municipal sewer systems into full compliance with the Clean Water Act by eliminating \_\_\_\_\_ from municipal sewer systems.

- A. SSO
- B. Water quality
- C. Management
- D. Sewage
- E. Municipal sewer systems

114. A \_\_\_\_\_ is a release of untreated wastewater before the flow reaches a treatment plant.

- A. SSO
- B. Water quality
- C. Management
- D. Sewage
- E. Municipal sewer systems

115. SSOs pose a significant threat to public health and \_\_\_\_\_.

- A. SSO
- B. Water quality
- C. Management
- D. Sewage
- E. Municipal sewer systems

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

- A. SSO
- B. Water quality
- C. Management
- D. MOM
- E. Municipal sewer systems

117. Blockages may be caused by tree roots or a build-up of sediment and other materials (i.e., grease, grit, debris). Structural defects and a flat slope can also cause excessive \_\_\_\_\_. Build-ups can cause pipes to break or collapse.

- A. Infiltration
- B. Inflow
- C. Undersized systems
- D. Structural failure
- E. Deposits of material

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

- A. Infiltration
- B. Inflow
- C. Undersized systems
- D. Structural failure
- E. Deposits of material

119. \_\_\_\_\_ can also occur when excess waters from roof drains, broken pipes and bad connections at sewer service lines infiltrates the sanitary sewer.

- A. Infiltration
- B. Inflow
- C. Undersized systems
- D. Structural failure
- E. None of the above

120. Line/main breaks are a major result of \_\_\_\_\_.

- A. Infiltration
- B. Inflow
- C. Undersized systems
- D. Structural failure
- E. Deposits of material

121. \_\_\_\_\_ do not have large enough pumps or lines to carry all the sewage generated by the buildings attached to them.

- A. Infiltration
- B. Inflow
- C. Undersized systems
- D. Structural failure
- E. None of the above

122. \_\_\_\_\_ can occur at sewer service connections to houses or buildings.

- A. Combined sewer systems
- B. EPA
- C. SSOs
- D. Prohibiting unpermitted discharges
- E. Urban wet weather

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

- A. Combined sewer systems
- B. EPA
- C. SSOs
- D. Prohibiting unpermitted discharges
- E. Urban wet weather

124. \_\_\_\_\_ has found that SSOs caused by poor sewer collection system management pose a substantial health and environmental challenge.

- A. Combined sewer systems
- B. EPA
- C. SSOs
- D. Prohibiting unpermitted discharges
- E. None of the above

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

- A. Combined sewer systems
- B. EPA
- C. SSOs
- D. Prohibiting unpermitted discharges
- E. Urban wet weather

126. The total number of \_\_\_\_\_ that occur nationwide each year is not known. In some areas, they might not be reported or are underreported to EPA and state environmental agencies.

- A. Combined sewer systems
- B. EPA
- C. SSOs
- D. Prohibiting unpermitted discharges
- E. Urban wet weather

127. \_\_\_\_\_ are sewers that are designed to collect rainwater runoff, domestic sewage, and industrial wastewater in the same pipe.

- A. Combined sewer systems
- B. EPA
- C. SSOs
- D. Prohibiting unpermitted discharges
- E. Urban wet weather

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

- A. Combined sewer systems
- B. EPA
- C. SSOs
- D. Prohibiting unpermitted discharges
- E. Urban wet weather

129. CSOs may be thought of as a type of " \_\_\_\_\_ " discharge.

- A. Combined sewer systems
- B. EPA
- C. SSOs
- D. Prohibiting unpermitted discharges
- E. Urban wet weather

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

- A. Self-Audit Review Document
- B. MOM
- C. POTW
- D. Quantified performance measures
- E. Program goal

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

- A. Self-Audit Review Document
- B. MOM
- C. POTW
- D. Quantified performance measures
- E. Program goal

132. Proper \_\_\_\_\_ programs have goals directed toward their individual purposes. Progress toward these goals is measurable, and the goals are attainable.

- A. Self-Audit Review Document
- B. MOM
- C. POTW
- D. Quantified performance measures
- E. Program goal

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

- A. Self-Audit Review Document
- B. MOM
- C. POTW
- D. Quantified performance measures
- E. Program goal

134. An evaluation of the progress toward reaching the goals, or a reassessment of the goals, should be made periodically and based upon the \_\_\_\_\_.

- A. Self-Audit Review Document
- B. MOM
- C. POTW
- D. Quantified performance measures
- E. Program goal

135. The effectiveness a \_\_\_\_\_ program quickly breaks down unless it is available in writing.

- A. Self-Audit Review Document
- B. MOM
- C. POTW
- D. Quantified performance measures
- E. Program goal

136. Personnel turnover and lapses in communication between staff and management can change otherwise proper \_\_\_\_\_ programs to improper ones.

- A. Self-Audit Review Document
- B. MOM
- C. POTW
- D. Quantified performance measures
- E. Program goal

137. Written MOM programs are useful only if they are made readily available to all personnel and \_\_\_\_\_.

- A. Self-Audit Review Document
- B. MOM
- C. Clearly documented
- D. Quantified performance measures
- E. Program goal

138. Appropriate safety, equipment, technical, and program training is an essential for implementing \_\_\_\_\_ programs properly.

- A. Self-Audit Review Document
- B. MOM
- C. POTW
- D. Quantified performance measures
- E. Program goal

139. \_\_\_\_\_ activity at a utility involves its entire wastewater infrastructure.

- A. Self-Audit Review Document
- B. MOM
- C. POTW
- D. Quantified performance measures
- E. Program goal

140. Common utility management activities and operations and maintenance activities associated with sewer systems and pretreatment are listed in the \_\_\_\_\_.

- A. Self-Audit Review Document
- B. MOM
- C. POTW
- D. Quantified performance measures
- E. Program goal

141. If a utility owns treatment works or a pond system, then activities associated with the management, operation, and maintenance of these facilities should also be included in the \_\_\_\_\_.

- A. Audit
- B. MOM
- C. POTW
- D. Quantified performance measures
- E. Program goal

142. Identify the \_\_\_\_\_ programs present and/or needed at the utility, establish performance measures, and develop a schedule for auditing the programs.

- A. Self-Audit Review Document
- B. MOM
- C. POTW
- D. Quantified performance measures
- E. Program goal

143. Evaluate each MOM program against the \_\_\_\_\_ of a proper program.

- A. Self-Audit Review Document
- B. Defined elements
- C. POTW
- D. Quantified performance measures
- E. Program goal

144. Define the utility's plan/schedule to remediate the necessary improvements. This plan should include any short-term or long-term program improvements, and any short-term or \_\_\_\_\_ which need addressing.

- A. Audit results
- B. Financial management
- C. Self-audit results
- D. Long-term capital improvements
- E. Publicly-owned

145. Generate a report of the \_\_\_\_\_, including any deficiencies found and the corresponding improvement plan, which is useful for the utility.

- A. Audit results
- B. Financial management
- C. Self-audit results
- D. Long-term capital improvements
- E. Publicly-owned

146. This report should be capable of serving the utility as a reference when conducting any needed remedial measures, and as a reference to compare current performance with future \_\_\_\_\_.

- A. Audit results
- B. Financial management
- C. Self-audit results
- D. Long-term capital improvements
- E. Publicly-owned

147. Small \_\_\_\_\_wastewater treatment plants which discharge less than 5 million gallons per day are also eligible for the Wastewater Treatment Plant Operator On-Site Assistance Training Program.

- A. Audit results
- B. Financial management
- C. Self-audit results
- D. Long-term capital improvements
- E. Publicly-owned

148. The program provides on-site operator training, \_\_\_\_\_, troubleshooting, and other operation and maintenance assistance.

- A. Audit results
- B. Financial management
- C. Self-audit results
- D. Long-term capital improvements
- E. Publicly-owned

149. Because SSOs contain raw sewage they can carry bacteria, viruses, protozoa (parasitic organisms), \_\_\_\_\_ (intestinal worms), and borroughs (inhaled molds and fungi).

- A. Hepatitis
- B. Helminths
- C. Negligent operation
- D. Master planning
- E. None of the Above

150. The above diseases they may cause range in severity from mild gastroenteritis (causing stomach cramps and diarrhea) to life-threatening ailments such as cholera, dysentery, infections \_\_\_\_\_, and severe gastroenteritis.

- A. Hepatitis
- B. Helminths
- C. Negligent operation
- D. Master planning
- E. None of the Above

151. Many avoidable SSOs are caused by inadequate or \_\_\_\_\_or maintenance, inadequate system capacity, and improper system design and construction.

- A. Hepatitis
- B. Helminths
- C. Negligent operation
- D. Master planning

152. Communities also should address SSOs during sewer system \_\_\_\_\_and facilities planning, or while extending the sewer system into previously unsewered areas.

- A. Hepatitis
- B. Helminths
- C. Negligent operation
- D. Master planning
- E. None of the Above

153. Unavoidable SSOs include those occurring from \_\_\_\_\_, some types of blockages, extreme rainstorms, and acts of nature such as earthquakes or floods.

- A. Hepatitis
- B. Helminths
- C. Negligent operation
- D. Master planning
- E. Unpreventable vandalism

154. If an SSO occurs, sanitary sewer facilities will be required to immediately notify the NPDES \_\_\_\_\_, appropriate health agencies, state authorities, drinking water suppliers, and, if necessary, the general public in the risk area.

- A. Understood
- B. Compliance
- C. Annual report
- D. Permit authority
- E. Record keeping provisions

155. This rule will also require an \_\_\_\_\_ of all overflows, including minor SSOs such as building backups.

- A. Understood
- B. Compliance
- C. Annual report
- D. Permit authority
- E. Record keeping provisions

156. Facilities must post locations of recurrent SSOs and let the public know that the \_\_\_\_\_ is available to them.

- A. Understood
- B. Compliance
- C. Annual report
- D. Permit authority
- E. Record keeping provisions

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

- A. Understood
- B. Compliance
- C. Annual report
- D. Permit authority
- E. Record keeping provisions

158. CMOM regulations will be added to the permit when facilities need to have a permit re-issued. Although a \_\_\_\_\_ deadline has not been set, the EPA recommends that facilities begin to implement "SSO Standard Conditions" right after the proposed rule is published. Considering the time and costs associated with compliance, this may be good advice.

- A. Understood
- B. Compliance
- C. Annual report
- D. Permit authority
- E. None of the above

159. Procedures for \_\_\_\_\_ should be understood and practiced by all personnel in order to ensure safety of the public and the collection system personnel responding.

- A. Overstated
- B. Responding crews
- C. Emergency response plan
- D. Emergency (ies)
- E. None of the Above

160. Procedures should be specific to the type of \_\_\_\_\_ that could occur.

- A. Overstated
- B. Responding crews
- C. Emergency response plan
- D. Emergency (ies)
- E. None of the Above

161. It is important to keep detailed records of all past \_\_\_\_\_ in order to constantly improve response training, as well as the method and timing of future responses.

- A. Overstated
- B. Responding crews
- C. Emergency response plan
- D. Emergency (ies)
- E. None of the Above

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

- A. Overstated
- B. Responding crews
- C. Emergency response plan
- D. Emergency (ies)
- E. None of the Above

163. The crew should be able to rapidly diagnose problems in the field under stress and select the right equipment needed to correct the problem. If resources are limited, consideration should be given to contracting other departments or private industries to respond to some emergency situations, for example, those rare \_\_\_\_\_ that would exceed the capacity of staff.

- A. Overstated
- B. Responding crews
- C. Emergency response plan
- D. Emergency (ies)
- E. None of the Above

164. The importance of maintaining accurate, current maps of the collection system cannot be \_\_\_\_\_.

- A. Overstated
- B. Responding crews
- C. Emergency response plan
- D. Emergency (ies)
- E. None of the above

165. Efficient collection system \_\_\_\_\_ are unlikely if mapping is not adequate.

- A. Uniquely identifies
- B. Clearly indicate
- C. Indicate the diameter
- D. Maintenance and repairs
- E. Never be renumbered

166. Collection system maps should \_\_\_\_\_ the information that personnel need to carry out their assignments

- A. Uniquely identifies
- B. Clearly indicate
- C. Indicate the diameter
- D. Maintenance and repairs
- E. Never be renumbered

167. Sewer line maps should \_\_\_\_\_, the length between the centers of manholes, and the slope or direction of flow.

- A. Uniquely identifies
- B. Clearly indicate
- C. Indicate the diameter
- D. Maintenance and repairs
- E. Never be renumbered

168. Every house, restaurant, business and industry produces waste. Wastewater \_\_\_\_\_ protects public health and the environment by removing this infectious waste and recycling the water.

- A. Collection
- B. Sewage
- C. Wastewater
- D. Sewer

169. A network of interconnected pipes accepts the flow from each building's sewer \_\_\_\_\_ and delivers it to the treatment facilities. In addition to what homes and businesses flush down the drain, the system also collects excess groundwater, infiltration liquids and inflow water.

- A. Connection
- B. Sewage
- C. Wastewater
- D. Sewer

170. Wastewater collection is therefore a comprehensive \_\_\_\_\_ system.

- A. Collection
- B. Sewage
- C. Wastewater
- D. Sewer
- E. None of the Above

171. The \_\_\_\_\_ distributed through this system is about 98% water. The waste floats on, is carried along by, and goes into suspension or solution in water.

- A. Collection
- B. Sewage
- C. Wastewater
- D. Sewer
- E. None of the Above

172. Possible waste includes anything that can be flushed down the drain--\_\_\_\_\_, body fluids, paper products, soaps and detergents, foods, fats, oil, grease, paints, chemicals, hazardous materials, solvents, disposable and flushable items; the list is almost infinite.

- A. Collection
- B. Sewage
- C. Wastewater
- D. Sewer
- E. None of the Above

173. This mixture of water and wastes is called "\_\_\_\_\_." In the past, it was known as "sewage," but this term is now falling out of favor because it refers specifically to domestic sanitary wastewater, like toilet flushing, which represents only a portion of the entire fluid waste content.

- A. Collection
- B. Sewage
- C. Wastewater
- D. Sewer
- E. None of the Above

174. "\_\_\_\_\_" is a more accurate 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. Collection
- B. Sewage
- C. Wastewater
- D. Sewer
- E. None of the Above

### Types of Sewer Systems

175. \_\_\_\_\_are generally broken out into three different categories: sanitary sewers, storm sewers, and combined sewers.

- A. Overflows
- B. Combined sewers
- C. Sanitary sewers
- D. Storm sewers
- E. None of the Above

176. \_\_\_\_\_carry wastewater or sewage from homes and businesses to treatment plants.

- A. Overflows
- B. Combined sewers
- C. Sanitary sewers
- D. Storm sewers
- E. None of the Above

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

- A. Overflows
- B. Combined sewers
- C. Sanitary sewers
- D. Storm sewers
- E. None of the Above

178. \_\_\_\_\_are designed to quickly get rainwater off the streets during rain events.

- A. Overflows
- B. Combined sewers
- C. Sanitary sewers
- D. Storm sewers
- E. None of the Above

179. Chemicals, trash and debris from lawns, parking lots and streets are washed by the rain into the \_\_\_\_\_drains.

- A. Overflows
- B. Combined sewers
- C. Sanitary sewers
- D. Storm sewers
- E. None of the Above

180. Most \_\_\_\_\_do not connect with a treatment plant, but instead drain directly into nearby rivers, lakes, or oceans.

- A. Overflows
- B. Combined sewers
- C. Sanitary sewers
- D. Storm sewers
- E. None of the Above

181. \_\_\_\_\_carry 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. Overflows
- B. Combined sewers
- C. Sanitary sewers
- D. Storm sewers
- E. None of the Above

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

- A. Overflows
- B. Combined sewers
- C. Sanitary sewers
- D. Storm sewers
- E. None of the Above

183. The great majority of sewer systems have \_\_\_\_\_, not combined, sanitary and storm water pipes.

- A. Overflows
- B. Combined sewers
- C. Sanitary sewers
- D. Storm sewers
- E. None of the Above

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

- A. Maintenance
- B. Undersized
- C. Cracks
- D. SSOs
- E. I&I

185. Leaking, \_\_\_\_\_ and insufficient wastewater collection systems can release untreated wastewater into receiving waters.

- A. Maintenance
- B. Undersized
- C. Overflowing
- D. SSOs
- E. I&I

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

- A. Maintenance
- B. Undersized
- C. Leaking
- D. SSOs
- E. I&I

187. The \_\_\_\_\_ of the sewer system is therefore a continuous, never-ending cycle.

- A. Maintenance
- B. Undersized
- C. Leaking
- D. SSOs
- E. I&I

188. \_\_\_\_\_ are discharges of raw sewage from municipal sanitary sewer systems.

- A. Maintenance
- B. Undersized
- C. Leaking
- D. SSOs
- E. I&I

189. \_\_\_\_\_ 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. Maintenance
- B. Undersized
- C. Leaking
- D. SSOs
- E. I&I

190. \_\_\_\_\_ are often caused by blockages and breaks in the sewer lines.

- A. Maintenance
- B. Undersized Systems
- C. Blockages
- D. SSOs
- E. I&I

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

- A. Maintenance
- B. Undersized Systems
- C. Blockages
- D. SSOs

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

- A. Maintenance
- B. Undersized Systems
- C. Blockages
- D. SSOs
- E. I&I

193. \_\_\_\_\_ Too much rainfall or snowmelt infiltrating through the ground into leaky sanitary sewers not designed to hold rainfall or to drain property, and excess water inflowing through roof drains connected to sewers, broken pipes, and badly connected sewer service lines.

- A. Maintenance
- B. Undersized Systems
- C. Blockages
- D. SSOs
- E. I&I

194. \_\_\_\_\_ Sewers and pumps are too small to carry sewage from newly-developed subdivisions or commercial areas.

- A. Maintenance
- B. Undersized Systems
- C. Blockages
- D. SSOs

195. \_\_\_\_\_ Blocked, broken or cracked pipes; tree roots grown into the sewer; sections of pipe settle or shift so that pipe joints no longer match; and sediment and other materials build up, causing pipes to break or collapse.

- A. Pipe Failures
- B. Undersized Systems
- C. Blockages
- D. SSOs
- E. I&I

196. \_\_\_\_\_ 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. Sewer Service Connections
- B. Undersized Systems
- C. Blockages
- D. SSOs
- E. I&I

197. \_\_\_\_\_ Improper installation, improper maintenance; widespread problems that can be expensive to fix develop over time, some municipalities have found severe problems necessitating billion-dollar correction programs; often communities have to curtail new development until problems are corrected or system capacity is increased.

- A. Deteriorating Sewer System
- B. Undersized Systems
- C. Blockages
- D. SSOs
- E. I&I

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

- A. CMOM or MOM
- B. Combined sewer systems
- C. Combined sewer overflows
- D. Collection system management
- E. None of the Above

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

- A. CMOM or MOM
- B. Combined sewer systems
- C. Combined sewer overflows
- D. Wastewater discharges
- E. None of the Above

200. \_\_\_\_\_ are sewers that are designed to collect rainwater runoff, domestic sewage, and industrial wastewater in the same pipe.

- A. CMOM or MOM
- B. Combined sewer systems
- C. Combined sewer overflows
- D. Wastewater discharges
- E. None of the Above

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

- A. CMOM or MOM
- B. Combined sewer systems
- C. Combined sewer overflows
- D. Wastewater discharges
- E. None of the Above

202. During periods of heavy rainfall or snowmelt, however, the wastewater volume in a \_\_\_\_\_ can exceed the capacity of the sewer system or treatment plant.

- A. CMOM or MOM
- B. Combined sewer system
- C. Combined sewer overflows
- D. Wastewater discharges
- E. None of the Above

203. \_\_\_\_\_ are designed to overflow occasionally and discharge excess wastewater directly to nearby streams, rivers, or other water bodies.

- A. CMOM or MOM
- B. Combined sewer systems
- C. Combined sewer overflows
- D. Wastewater discharges
- E. None of the Above

204. These overflows, called \_\_\_\_\_ contain not only storm water but also untreated human and industrial waste, toxic materials, and debris. They are a major water pollution concern for the approximately 772 cities in the U.S. that have combined sewer systems.

- A. CMOM or MOM
- B. Combined sewer systems
- C. Combined sewer overflows
- D. Wastewater discharges
- E. None of the Above

205. \_\_\_\_\_ may be thought of as a type of "**urban wet weather**" discharge. This means that, like sanitary sewer overflows (**SSOs**) and storm water discharges, they are discharges from a municipality's wastewater conveyance infrastructure that are caused by precipitation events such as rainfall or heavy snowmelt.

- A. CMOM or MOM
- B. Combined sewer systems
- C. Combined sewer overflows
- D. Wastewater discharges
- E. None of the Above

206. The EPA's \_\_\_\_\_ Control Policy, published April 19, 1994, is the national framework for control of CSOs. The Policy provides guidance on how communities with combined sewer systems can meet Clean Water Act goals in as flexible and cost-effective a manner as possible.

- A. CMOM or MOM
- B. Combined sewer systems
- C. Combined sewer overflows
- D. Wastewater discharges

207. EPA's Report to Congress on implementation of the \_\_\_\_\_ Control Policy assesses the progress made by EPA, states, and municipalities in implementing and enforcing the CSO Control Policy.

- A. CMOM or MOM
- B. Combined sewer systems
- C. Combined sewer overflows
- D. Wastewater discharges
- E. None of the Above

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

#### **Utility Specific**

208. The complexity and expense associated with a utility's \_\_\_\_\_ programs is specific to the size and complexity of the Publicly Owned Treatment Works (**POTW**) and related infrastructure. Factors such as population growth rate and soil/groundwater conditions also dictate the level of investment which should be made.

- A. CMOM or MOM
- B. Combined sewer systems
- C. Combined sewer overflows
- D. Wastewater discharges
- E. None of the Above

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

- A. MOM
- B. Combined sewer systems
- C. Combined sewer overflows
- D. Wastewater discharges
- E. None of the Above

210. Proper \_\_\_\_\_ programs have goals directed toward their individual purposes. Progress toward these goals is measurable, and the goals are attainable.

- A. MOM
- B. Combined sewer systems
- C. Combined sewer overflows
- D. Wastewater discharges
- E. None of the Above

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

- A. MOM
- B. Combined sewer systems
- C. Combined sewer overflows
- D. Wastewater discharges
- E. None of the Above

212. An \_\_\_\_\_ toward reaching the goals, or a reassessment of the goals, should be made periodically and based upon the quantified performance measures.

- A. Evaluation of the progress
- B. Program training is essential
- C. Effectiveness a MOM program
- D. Made readily available
- E. Involves its entire

213. The \_\_\_\_\_ quickly breaks down unless it is available in writing. Personnel turnover and lapses in communication between staff and management can change otherwise proper MOM programs to improper ones.

- A. Evaluation of the progress
- B. Program training is essential
- C. Effectiveness a MOM program
- D. Made readily available
- E. Involves its entire

214. Written MOM programs are useful only if they are \_\_\_\_\_ to all personnel and clearly documented.

- A. Evaluation of the progress
- B. Program training is essential
- C. Effectiveness a MOM program
- D. Made readily available
- E. Involves its entire

215. Appropriate safety, equipment, technical, and \_\_\_\_\_ for implementing MOM programs properly.

- A. Evaluation of the progress
- B. Program training is essential
- C. Effectiveness a MOM program
- D. Made readily available
- E. Involves its entire

216. MOM activity at a utility \_\_\_\_\_wastewater infrastructure.

- A. Evaluation of the progress
- B. Program training is essential
- C. Effectiveness a MOM program
- D. Made readily available
- E. Involves its entire

217. Common utility management\_\_\_\_\_ and maintenance activities associated with sewer systems and pretreatment are listed in the Self-Audit Review Document.

- A. Evaluation of the progress
- B. Program training is essential
- C. Effectiveness a MOM program
- D. Made readily available
- E. Activities and operations

218. If a utility owns treatment works or a pond system, then activities associated with the management, operation, and maintenance of these facilities should also be included in the audit. A helpful guide for this part is the \_\_\_\_\_ Compliance Inspection Manual. Instruction for obtaining this manual is provided in a list of references.

- A. Unpermitted discharges
- B. NPDES
- C. Capital improvements
- D. MOM
- E. None of the Above

219. Begin by performing a general assessment of the utility, and prioritizing the order of programs to be audited. The \_\_\_\_\_ Compliance Inspection Manual and Guidance may be useful references in making this assessment.

- A. Unpermitted discharges
- B. NPDES
- C. Capital improvements
- D. MOM
- E. None of the Above

220. Identify the \_\_\_\_\_programs present and/or needed at the utility, establish performance measures, and develop a schedule for auditing the programs.

- A. Unpermitted discharges
- B. NPDES
- C. Capital improvements
- D. MOM
- E. None of the Above

221. Evaluate each MOM program against the defined elements of a proper program. This can be accomplished by reviewing the program's \_\_\_\_\_, conducting a field evaluation, and comparing the program understanding of both personnel and management.

- A. Unpermitted discharges
- B. NPDES
- C. Capital improvements
- D. MOM
- E. None of the Above

222. Define any programs needed, or improvements to programs needed, and any \_\_\_\_\_ found. Identify any unpermitted discharges which have occurred in the past five years.

- A. Unpermitted discharges
- B. NPDES
- C. Capital improvements
- D. None of the Above

223. Define the utility's plan/schedule to remediate the necessary improvements. This plan should include any short-term or long-term program improvements, and any short-term or long-term \_\_\_\_\_ which need addressing.

- A. Unpermitted discharges
- B. NPDES
- C. Capital improvements
- D. MOM
- E. None of the above

224. Generate a report of the audit results, including any \_\_\_\_\_ and the corresponding improvement plan, which is useful for the utility.

- A. Unpermitted discharges
- B. NPDES
- C. Bodies of water
- D. SSOs
- E. None of the Above

225. This report should be capable of serving the \_\_\_\_\_ when conducting any needed remedial measures, and as a reference to compare current performance with future self-audit results.

- A. Unpermitted discharges
- B. NPDES
- C. Bodies of water
- D. SSOs
- E. None of the Above

226. \_\_\_\_\_ also damage property and the environment. When basements flood, the damaged area must be thoroughly cleaned and disinfected to reduce the risk of disease.

- A. Unpermitted discharges
- B. NPDES
- C. Bodies of water
- D. SSOs
- E. None of the Above

227. Cleanup can be expensive for homeowners and municipalities. Rugs, curtains, flooring, wallboard panels, and upholstered furniture usually must be replaced. A key concern with \_\_\_\_\_ that enter oceans, bays, estuaries, rivers, lakes, streams, or brackish waters is their effect on water quality.

- A. Unpermitted discharges
- B. NPDES
- C. Bodies of water
- D. SSOs
- E. None of the Above

### **Sewer Cleaning Section**

228. The purpose of sewer cleaning is to \_\_\_\_\_ from the sewer.

- A. Causes a further buildup
- B. Remove accumulated material
- C. Accumulation of material
- D. Helps to prevent blockages
- E. None of the Above

229. Cleaning \_\_\_\_\_ and is also used to prepare the sewer for inspections.

- A. Causes a further buildup
- B. Remove accumulated material
- C. Accumulation of material
- D. Helps to prevent blockages
- E. None of the Above

230. Stoppages in gravity sewers are usually caused by a structural defect, poor design, poor construction, an \_\_\_\_\_ in the pipe (especially grease), or root intrusion.

- A. Causes a further buildup
- B. Remove accumulated material
- C. Accumulation of material
- D. Helps to prevent blockages
- E. None of the Above

231. \_\_\_\_\_ may catch debris, which then causes a further buildup of solids that eventually block the sewer.

- A. Causes a further buildup
- B. Remove accumulated material
- C. Accumulation of material
- D. Helps to prevent blockages
- E. None of the Above

232. There are three major \_\_\_\_\_: hydraulic, mechanical, and chemical.

- A. Causes a further buildup
- B. Remove accumulated material
- C. Accumulation of material
- D. Helps to prevent blockages
- E. None of the Above

233. \_\_\_\_\_ (also referred to as flushing) refers to any application of water to clean the pipe.

- A. Chemical cleaning
- B. Hydraulic cleaning
- C. Mechanical cleaning
- D. Potential problem areas
- E. Identify problem collection

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

- A. Chemical cleaning
- B. Hydraulic cleaning
- C. Mechanical cleaning
- D. Potential problem areas
- E. Identify problem collection

235. \_\_\_\_\_ can facilitate the control of odors, grease buildup, root growth, corrosion, and insect and rodent infestation.

- A. Chemical cleaning
- B. Hydraulic cleaning
- C. Mechanical cleaning
- D. Potential problem areas
- E. Identify problem collection

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

- A. Chemical cleaning
- B. Hydraulic cleaning
- C. Mechanical cleaning
- D. Potential problem areas
- E. Identify problem collection

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

- A. Chemical cleaning
- B. Hydraulic cleaning
- C. Mechanical cleaning
- D. Potential problem areas
- E. Identify problem collection

238. The connection between \_\_\_\_\_ in the collection system and the preventive maintenance cleaning schedule should be clear.

- A. Owner or operator
- B. Problem areas
- C. Inventory
- D. Reviewer
- E. None of the Above

239. The \_\_\_\_\_ 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 grease producing activities, etc).

- A. Owner or operator
- B. Problem areas
- C. Inventory
- D. Reviewer
- E. None of the Above

240. An inventory of spare parts, equipment, and supplies should be maintained by the collection system \_\_\_\_\_.

- A. Owner or operator
- B. Problem areas
- C. Inventory
- D. Reviewer

241. The \_\_\_\_\_ should be based on the equipment manufacturer's recommendations, supplemented by historical experience with maintenance and equipment problems.

- A. Owner or operator
- B. Problem areas
- C. Inventory
- D. Reviewer
- E. None of the Above

242. Without such an \_\_\_\_\_, the collection system may experience long down times or periods of inefficient operation in the event of a breakdown or malfunction.

- A. Owner or operator
- B. Problem areas
- C. Inventory
- D. Reviewer
- E. None of the Above

243. Files should be maintained on all pieces of equipment and major tools. The owner or operator should have a system to assure that each \_\_\_\_\_ has adequate and correct tools for the job.

- A. Owner or operator
- B. Problem areas
- C. Inventory
- D. Reviewer
- E. None of the Above

244. The \_\_\_\_\_ should maintain a yard where equipment, supplies, and spare parts are maintained and personnel are dispatched.

- A. Owner or operator
- B. Problem areas
- C. Inventory
- D. Reviewer
- E. None of the Above

245. Very large systems may maintain more than one yard. In this case, the \_\_\_\_\_ should perform a visual survey at the main yard.

- A. Owner or operator
- B. Problem areas
- C. Inventory
- D. Reviewer
- E. None of the Above

246. In small to medium size systems, \_\_\_\_\_ may share the yard with the department of public works, water department, or other municipal agencies.

- A. Owner or operator
- B. Collection system operations
- C. Inventory
- D. Reviewer
- E. None of the Above

### **I&I (Infiltration and Inflow)**

247. \_\_\_\_\_ occurs when groundwater enters the sewer system through cracks, holes, faulty connections, or other openings.

- A. I/I
- B. Inflow
- C. Infiltration
- D. Flow monitoring
- E. Sewer System Evaluation Survey

248. \_\_\_\_\_ 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. I/I
- B. Inflow
- C. Infiltration
- D. Flow monitoring
- E. Sewer System Evaluation Survey

249. The sanitary sewer collection system and treatment plants have a maximum flow capacity of wastewater that can be handled. \_\_\_\_\_, which is essentially clean water, takes up this capacity and can result in sewer overflows into streets and waterways.

- A. I/I
- B. Inflow
- C. Infiltration
- D. Flow monitoring
- E. Sewer System Evaluation Survey

250. \_\_\_\_\_ is water (typically groundwater) entering the sewer underground through cracks or openings in joints.

- A. I/I
- B. Inflow
- C. Infiltration
- D. Flow monitoring
- E. Sewer System Evaluation Survey

251. \_\_\_\_\_ is water (typically stormwater or surface runoff) that enters the sewer from grates or unsealed manholes exposed to the surface.

- A. I/I
- B. Inflow
- C. Infiltration
- D. Flow monitoring
- E. Sewer System Evaluation Survey

252. Flow monitoring and flow modeling provide measurements and data used to determine estimates of \_\_\_\_\_.

- A. I/I
- B. Inflow
- C. Infiltration
- D. Flow monitoring
- E. Sewer System Evaluation Survey

253. Flow meters are placed at varying locations throughout the sewer collection system to take measurements and identify general \_\_\_\_\_ source areas.

- A. I/I
- B. Inflow
- C. Infiltration
- D. Flow monitoring
- E. Sewer System Evaluation Survey

254. Measurements taken before and after a precipitation event indicate the extent that \_\_\_\_\_ is increasing total flow.

- A. I/I
- B. Inflow
- C. Infiltration
- D. Flow monitoring
- E. Sewer System Evaluation Survey

255. Both \_\_\_\_\_ increase with precipitation.

- A. I/I
- B. Inflow
- C. Infiltration
- D. Flow monitoring
- E. Sewer System Evaluation Survey

256. \_\_\_\_\_ increases when groundwater rises from precipitation, and inflow is mainly stormwater and rainwater. Rainfall monitoring is also performed to correlate this data.

- A. I/I
- B. Inflow
- C. Infiltration
- D. Flow monitoring
- E. Sewer System Evaluation Survey

257. A \_\_\_\_\_ involves inspection of the sewer system using several methods to identify sources of I/I:

- A. I/I
- B. Inflow
- C. Infiltration
- D. Flow monitoring
- E. Sewer System Evaluation Survey

258. \_\_\_\_\_ Accessible pipes, gutter and plumbing connections, and manholes are visually inspected for faults.

- A. Smoke testing
- B. Visual inspection
- C. Dye testing
- D. Repair techniques
- E. TV inspection

259. \_\_\_\_\_ Smoke is pumped into sewer pipes. Its reappearance aboveground indicates points of I/I. These points can be on public property such as along street cracks or around manholes, or on private property such as along house foundations or in yards where sewer pipes lay underground.

- A. Smoke testing
- B. Visual inspection
- C. Dye testing
- D. Repair techniques
- E. TV inspection

260. \_\_\_\_\_ Camera equipment is used to do internal pipe inspections. The City will usually have one 2-3 person crew that can perform TV inspection on over 20 miles of sewer pipe per year.

- A. Smoke testing
- B. Visual inspection
- C. Dye testing
- D. Repair techniques
- E. TV inspection

261. \_\_\_\_\_ Dye is used at suspected I/I sources. The source is confirmed if the dye appears in the sewer system.

- A. Smoke testing
- B. Visual inspection
- C. Dye testing
- D. Repair techniques
- E. TV inspection

262. Sources of I/I are also sometimes identified when sewer backups or overflows bring attention to that part of the system.

- A. Flow monitoring plan
- B. Characterize peaking factors
- C. Sources of I/I
- D. Identify areas
- E. None of the Above

263. The purpose of the \_\_\_\_\_ is to reduce these incidences by finding sources before they cause a problem.

- A. I/I
- B. Inflow
- C. Infiltration
- D. Flow monitoring
- E. Sewer System Evaluation Survey

264. \_\_\_\_\_ Include manhole wall spraying, Insituform pipe relining, manhole frame and lid replacement, and disconnecting illegal plumbing, drains, and roof downspouts.

- A. Smoke testing
- B. Visual inspection
- C. Dye testing
- D. Repair techniques
- E. TV inspection

265. The owner or operator should have in place a program for the efficient identification of excessive \_\_\_\_\_.

- A. Flow monitoring plan
- B. Characterize peaking factors
- C. I/I
- D. Identify areas
- E. None of the Above

266. The program should look at the wastewater treatment plant, pump stations, permanent meter flows, and rainfall data to \_\_\_\_\_ for the whole system and major drainage basins.

- A. Flow monitoring plan
- B. Characterize peaking factors
- C. Sources of I/I
- D. Identify areas
- E. None of the Above

267. The reviewer should evaluate the program including procedures and records associated with the \_\_\_\_\_.

- A. Flow monitoring plan
- B. Characterize peaking factors
- C. Sources of I/I
- D. Identify areas
- E. None of the Above

268. Temporary meters should be used on a "roving" basis to \_\_\_\_\_ with high wet weather flows.

- A. Flow monitoring plan
- B. Characterize peaking factors
- C. Sources of I/I
- D. Identify areas
- E. None of the Above

269. Areas with high wet weather flows should then be \_\_\_\_\_ and rehabilitation activities.

- A. Flow monitoring plan
- B. Characterize peaking factors
- C. Sources of I/I
- D. Identify areas
- E. None of the Above

### **Sewer System Testing**

270. Sewer system testing techniques are often used to identify leaks which allow unwanted infiltration into the sewer system and determine the location of \_\_\_\_\_ and other sources of stormwater inflow.

- A. Tests
- B. Detecting
- C. Illicit connections
- D. Smoke testing
- E. None of the Above

271. Two commonly implemented techniques include \_\_\_\_\_ and dyed water testing.

- A. Tests
- B. Detecting
- C. Illicit connections
- D. Smoke testing
- E. None of the Above

272. Regardless of the program(s) implemented by the owner or operator, the reviewer should evaluate any \_\_\_\_\_ that have been established for these programs.

- A. Tests
- B. Detecting
- C. Illicit connections
- D. Smoke testing
- E. None of the Above

273. The reviewer should also evaluate any \_\_\_\_\_ and assess how the owner or operator communicates with the public during these tests (i.e., when there is a possibility of smoke entering a home or building).

- A. Tests
- B. Detecting
- C. Public relations program
- D. Smoke testing
- E. None of the Above

274. \_\_\_\_\_ is a relatively inexpensive and quick method of detecting sources of inflow in sewer systems, such as down spouts, or driveway and yard drains and works best suited for detecting cross connections and point source inflow leaks.

- A. Tests
- B. Detecting
- C. Illicit connections
- D. Smoke testing
- E. None of the Above

275. \_\_\_\_\_ is not typically used on a routine basis, but rather when evidence of excessive I/I already exists. With each end of the sewer of interest plugged, smoke is introduced into the test section.

- A. Tests
- B. Detecting
- C. Illicit connections
- D. Smoke testing
- E. None of the Above

276. Sources of inflow can then be identified when smoke \_\_\_\_\_ through them.

- A. Tests
- B. Detecting
- C. Illicit connections
- D. Smoke tests
- E. None of the Above

277. The results of positive \_\_\_\_\_ should be documented with carefully labeled photographs.

- A. Tests
- B. Detecting
- C. Illicit connections
- D. Smoke tests
- E. None of the Above

278. If properly connected to the sanitary sewer system, smoke should exit the vent stacks of the surrounding properties. If traces of the smoke or its odor enter the building, it is an \_\_\_\_\_ from the sewer system may also be entering.

- A. Tests
- B. Indication that gases
- C. Illicit connections
- D. Smoke testing
- E. None of the Above

279. \_\_\_\_\_ can be labor intensive and require advanced preparation and communication with the public.

- A. Tests
- B. Detecting
- C. Building inspections
- D. Smoke testing
- E. None of the Above

280. \_\_\_\_\_ may be used to establish the connection of a fixture or appurtenance to the sewer. It is often used to confirm smoke testing or to test fixtures that did not smoke.

- A. Observing
- B. Dyed water testing
- C. Smoke testing
- D. Visual inspection
- E. None of the Above

281. As is the case with \_\_\_\_\_, it is not used on a routine basis but rather in areas that have displayed high wet weather flows.

- A. Observing
- B. Dyed water testing
- C. Smoke testing
- D. Visual inspection
- E. None of the Above

282. \_\_\_\_\_ can be used to identify structurally damaged manholes that might create potential I/I problems.
- A. Observing
  - B. Dyed water testing
  - C. Smoke testing
  - D. Visual inspection
  - E. None of the Above
283. This is accomplished by \_\_\_\_\_ the area close to the suspected manholes with dyed water and checking for entry of dyed water at the frame-chimney area, cone/corbel, and walls of the manhole.
- A. Observing
  - B. Dyed water testing
  - C. Smoke testing
  - D. Visual inspection
  - E. None of the Above
284. \_\_\_\_\_ of manholes and pipelines are the first line of defense in the identification of existing or potential problem areas.
- A. Observing
  - B. Dyed water testing
  - C. Smoke testing
  - D. Visual inspection
  - E. None of the Above
285. \_\_\_\_\_ should take place on both a scheduled basis and as part of any preventive or corrective maintenance activity.
- A. Observing
  - B. Dyed water testing
  - C. Smoke testing
  - D. Visual inspection
  - E. None of the Above
286. \_\_\_\_\_ provide additional information concerning the accuracy of system mapping, the presence and degree of I/I problems, and the physical state-of-repair of the system.
- A. Observing
  - B. Dyed water testing
  - C. Smoke testing
  - D. Visual inspection
  - E. None of the Above
287. By \_\_\_\_\_ the manhole directly and the incoming and outgoing lines with a mirror, it is possible to determine structural condition, the presence of roots, condition of joints, depth of debris in the line, and depth of flow.
- A. Observing
  - B. Dyed water testing
  - C. Smoke testing
  - D. Visual inspection
  - E. None of the Above
288. Manholes should undergo \_\_\_\_\_ typically every one to five years.
- A. Sewer system cleaning
  - B. Lamping
  - C. Sewer inspection
  - D. Routine inspection
  - E. None of the Above

289. There should be a \_\_\_\_\_ for manhole inspections (e.g., once every two years) with problematic manholes being inspected more frequently.

- A. Sewer system cleaning
- B. Lamping
- C. Sewer inspection
- D. Routine inspection
- E. None of the Above

290. There are various pipeline inspection techniques, the most common include: \_\_\_\_\_, camera inspection, sonar, and CCTV.

- A. Sewer system cleaning
- B. Lamping
- C. Sewer inspection
- D. Routine inspection
- E. None of the Above

291. \_\_\_\_\_ is an important component of any maintenance program. There are a number of inspection techniques that may be employed to inspect a sewer system.

- A. Sewer system cleaning
- B. Lamping
- C. Sewer inspection
- D. Routine inspection
- E. None of the Above

292. The reviewer should determine if an inspection program includes frequency and schedule of \_\_\_\_\_ and procedures to record the results.

- A. Sewer system cleaning
- B. Lamping
- C. Sewer inspection
- D. Inspections
- E. None of the Above

293. \_\_\_\_\_ should always be considered before inspection is performed in order to provide adequate clearance and inspection results.

- A. Sewer system cleaning
- B. Lamping
- C. Sewer inspection
- D. Routine inspection
- E. None of the Above

294. \_\_\_\_\_ is more comprehensive than lamping in that more of the sewer can be viewed.

- A. Sonar technique
- B. Still camera
- C. Sewer scanner
- D. Camera inspection
- E. None of the Above

295. A \_\_\_\_\_ is mounted on a floatable raft and released into a pipe. The camera takes photographs with a strobe-like flash as it floats through the sewer pipe.

- A. Sonar technique
- B. Still camera
- C. Sewer scanner
- D. Camera inspection
- E. None of the Above

296. This technique is often employed in \_\_\_\_\_ where access points are far apart.

- A. Sonar technique
- B. Still camera
- C. Sewer scanner
- D. Camera inspection
- E. None of the Above

297. Similar to \_\_\_\_\_, portions of the pipe may still be missed using this technique. This technique also does not fully capture the invert of the pipe and its condition.

- A. Sonar technique
- B. Still camera
- C. Sewer scanner
- D. Camera inspection
- E. None of the Above

298. \_\_\_\_\_ is a newer technology deployed similarly to CCTV cameras.

- A. Sonar
- B. Still camera
- C. Sewer scanner
- D. Camera inspection
- E. None of the Above

299. The \_\_\_\_\_ emits a pulse which bounces off the walls of the sewer. The time it takes for this pulse to bounce back provides data and an image of the interior of the pipe, including its structural condition.

- A. Sonar
- B. Still camera
- C. Sewer scanner
- D. Camera inspection
- E. None of the Above

300. A benefit of \_\_\_\_\_ is that it can be used in flooded or inaccessible sections of the sewer. The drawback is that the technique requires heavy and expensive equipment.

- A. Sonar technique
- B. Still camera
- C. Sewer scanner
- D. Camera inspection
- E. None of the Above

**You are finished.**