

**Registration form**

**BACTERIOLOGICAL SAMPLING TRAINING COURSE \$100.00  
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**Start and finish dates:** \_\_\_\_\_  
*You will have 90 days from this date in order to complete this course*

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

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

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**Please circle/check which certification you are applying the course CEU's.**  
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# BACTERIOLOGICAL SAMPLING Answer Key

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**Multiple Choice. Pick only one answer per question. Select answer according to text, exactly as in text. Circle, Mark off, underline or Bold the answer.**

- |                 |                 |                 |
|-----------------|-----------------|-----------------|
| 1. A B C D E F  | 14. A B C D E F | 27. A B C D E F |
| 2. A B C D E F  | 15. A B C D E F | 28. A B C D E F |
| 3. A B C D E F  | 16. A B C D E F | 29. A B C D E F |
| 4. A B C D E F  | 17. A B C D E F | 30. A B C D E F |
| 5. A B C D E F  | 18. A B C D E F | 31. A B C D E F |
| 6. A B C D E F  | 19. A B C D E F | 32. A B C D E F |
| 7. A B C D E F  | 20. A B C D E F | 33. A B C D E F |
| 8. A B C D E F  | 21. A B C D E F | 34. A B C D E F |
| 9. A B C D E F  | 22. A B C D E F | 35. A B C D E F |
| 10. A B C D E F | 23. A B C D E F | 36. A B C D E F |
| 11. A B C D E F | 24. A B C D E F | 37. A B C D E F |
| 12. A B C D E F | 25. A B C D E F | 38. A B C D E F |
| 13. A B C D E F | 26. A B C D E F | 39. A B C D E F |

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|-----------------|-----------------|------------------|
| 40. A B C D E F | 61. A B C D E F | 82. A B C D E F  |
| 41. A B C D E F | 62. A B C D E F | 83. A B C D E F  |
| 42. A B C D E F | 63. A B C D E F | 84. A B C D E F  |
| 43. A B C D E F | 64. A B C D E F | 85. A B C D E F  |
| 44. A B C D E F | 65. A B C D E F | 86. A B C D E F  |
| 45. A B C D E F | 66. A B C D E F | 87. A B C D E F  |
| 46. A B C D E F | 67. A B C D E F | 88. A B C D E F  |
| 47. A B C D E F | 68. A B C D E F | 89. A B C D E F  |
| 48. A B C D E F | 69. A B C D E F | 90. A B C D E F  |
| 49. A B C D E F | 70. A B C D E F | 91. A B C D E F  |
| 50. A B C D E F | 71. A B C D E F | 92. A B C D E F  |
| 51. A B C D E F | 72. A B C D E F | 93. A B C D E F  |
| 52. A B C D E F | 73. A B C D E F | 94. A B C D E F  |
| 53. A B C D E F | 74. A B C D E F | 95. A B C D E F  |
| 54. A B C D E F | 75. A B C D E F | 96. A B C D E F  |
| 55. A B C D E F | 76. A B C D E F | 97. A B C D E F  |
| 56. A B C D E F | 77. A B C D E F | 98. A B C D E F  |
| 57. A B C D E F | 78. A B C D E F | 99. A B C D E F  |
| 58. A B C D E F | 79. A B C D E F | 100. A B C D E F |
| 59. A B C D E F | 80. A B C D E F |                  |
| 60. A B C D E F | 81. A B C D E F |                  |

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

Please fax or e-mail the answer key to TLC  
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**BACTERIOLOGICAL SAMPLING CEU COURSE  
CUSTOMER SERVICE RESPONSE CARD**

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Very Easy 0 1 2 3 4 5 Very Difficult

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3. Please rate the subject matter on the exam to your actual field or work.  
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## Bacteriological Sampling Training Course Assignment

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

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

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

### Safe Drinking Water Act (SDWA) Review

1. Public water systems must provide water treatment, ensure proper drinking water quality through monitoring, and provide public notification of contamination problems.

A. True      B. False

### Relating to prevention of waterborne disease, the SDWA required EPA to:

2. Set criteria under which systems are obligated to filter water from surface water sources; it must also develop procedures for states to determine which systems have to filter.

A. True      B. False

3. The regulations set guidelines for determining if treatment, including turbidity (suspended particulate matter) removal and disinfection recommendations, is adequate for filtered systems.

A. True      B. False

### Microbes

4. Coliform bacteria are common in the environment and are considered harmful.

A. True      B. False

5. The presence of these bacteria in drinking water indicates that the water may be contaminated with germs that can cause disease.

A. True      B. False

### ICR

6. The EPA has collected data required by the Information Collection Rule (ICR) to support future regulation of Microbial contaminants, disinfectants, and disinfection byproducts.

A. True      B. False

7. The rule is intended to provide EPA with information on chemical byproducts that form when disinfectants used for microbial control react with chemicals already present in source water (disinfection byproducts (DBPs)); Disease-causing microorganisms (pathogens), including Cryptosporidium; and engineering data to control these contaminants.

A. True      B. False

### Disinfection Byproduct Regulations

8. \_\_\_\_\_ are a group of chemicals that are formed along with other disinfection byproducts when chlorine or other disinfectants are used?

- A. Disinfectant residual
- B. Chlorite
- C. Haloacetic Acids (HAA5)
- D. Giardia and viruses
- E. Disinfection By-Products (DBPs)
- F. None of the Above

9. Which compound/element/substance is a chemical that is formed when ozone, used to disinfect drinking water, reacts with naturally occurring bromide found in source water?

- A. Bromate
- B. Counter pathogens
- C. Monobromoacetic acid
- D. From the results of coliform testing
- E. Bacteria, Virus and Intestinal parasites
- F. None of the Above

### Stage 2 DBP Rule Federal Register Notices

10. \_\_\_\_\_ is one part of the Microbial and Disinfection Byproducts Rules (MDBPs), which are a set of interrelated regulations that address risks from microbial pathogens and disinfectants/disinfection byproducts?

- A. Groundwater Rule (GWR)
- B. Compliance
- C. The Stage 2 DBP
- D. Long Term 2 Enhanced Surface Water Treatment
- E. Interim Enhanced Surface Water Treatment
- F. None of the Above

11. Which Rule focuses on public health protection by limiting exposure to DBPs, specifically total trihalomethanes (TTHM) and five haloacetic acids (HAA5), which can form in water through disinfectants used to control microbial pathogens?

- A. Stage 2 DBPR
- B. DBP exposure
- C. The Stage 2 DBP
- D. Long Term 2 Enhanced Surface Water Treatment
- E. Traditional disinfection practices
- F. None of the Above

12. This rule will apply to all community water systems and nontransient non-community water systems that add a primary or residual disinfectant other than \_\_\_\_\_ or deliver water that has been disinfected by a primary or residual disinfectant other than UV.

- A. Ultraviolet (UV) light
- B. The open-channel system
- C. UV rather than ozone
- D. UV source
- E. UV radiation
- F. None of the Above

13. In the past 30 years, the \_\_\_\_\_ has been highly effective in protecting public health and has also evolved to respond to new and emerging threats to safe drinking water.

- A. Stage 2 DBPR
- B. DBP exposure
- C. The Stage 2 DBP rule
- D. Long Term 2 Enhanced Surface Water Treatment Rule
- E. Safe Drinking Water Act (SDWA)
- F. None of the Above

14. There are specific microbial pathogens, such as \_\_\_\_\_, which can cause illness, and are highly resistant to traditional disinfection practices.

- A. Enteric virus(es)
- B. Oocyst(s)
- C. Cryptosporidium
- D. C. perfringens
- E. E. coli host culture
- F. None of the Above



15. Amendments to the SDWA in 1996 require EPA to develop rules to balance the risks between microbial pathogens and disinfection byproducts (DBPs). The Stage 1 Disinfectants and Disinfection Byproducts Rule and \_\_\_\_\_, promulgated in December 1998, were the first phase in a rulemaking strategy required by Congress as part of the 1996 Amendments to the Safe Drinking Water Act.

- A. Major public health advances
- B. The Stage 2 DBPR
- C. This final rule
- D. Amendments to the SDWA in 1996
- E. Interim Enhanced Surface Water Treatment Rule
- F. None of the Above

16. The Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR) builds upon the \_\_\_\_\_ to address higher risk public water systems for protection measures beyond those required for existing regulations.

- A. Stage 2 DBPR
- B. DBP exposure
- C. Stage 1 DBPR
- D. Long Term 2 Enhanced Surface Water Treatment Rule
- E. Traditional disinfection practices
- F. None of the Above

17. \_\_\_\_\_ and the Long Term 2 Enhanced Surface Water Treatment Rule are the second phase of rules required by Congress?

- A. Major public health advances
- B. The Stage 2 DBPR
- C. This final rule
- D. Amendments to the SDWA in 1996
- E. Primary or residual disinfectant
- F. None of the Above

18. Which Rule will reduce potential cancer and reproductive and developmental health risks from disinfection byproducts (DBPs) in drinking water, which form when disinfectants are used to control microbial pathogens?

- A. Stage 3 DBPR
- B. DBP exposure
- C. Stage 2 Disinfection Byproducts
- D. Long Term 2 Enhanced Surface Water
- E. Traditional disinfection practices
- F. None of the Above

19. \_\_\_\_\_ strengthens public health protection for customers by tightening compliance monitoring requirements for two groups of DBPs, trihalomethanes (TTHM) and haloacetic acids (HAA5)?

- A. Major public health advances
- B. The Stage 3 DBPR
- C. Stage 2 Disinfection Byproducts
- D. Amendments to the SDWA in 1996
- E. Primary or residual disinfectant
- F. None of the Above

20. Which Rule targets systems with the greatest risk and builds incrementally on existing rules. This regulation will reduce DBP exposure and related potential health risks and provide more equitable public health protection?

- A. Stage 2 DBPR
- B. Stage 3 DBPR
- C. The Stage 1 DBP rule
- D. Long Term 2 Enhanced Surface Water Treatment Rule
- E. LT 3
- F. None of the Above

21. \_\_\_\_\_ is being promulgated simultaneously with the Long Term 2 Enhanced Surface Water Treatment Rule to address concerns about risk tradeoffs between pathogens and DBPs?

- A. Major public health advances
- B. The Stage 2 DBPR
- C. This final rule
- D. Amendments to the SDWA in 1996
- E. Primary or residual disinfectant
- F. None of the Above

**What does the rule require?**

22. Under which Rule, systems will conduct an evaluation of their distribution systems, known as an Initial Distribution System Evaluation (IDSE), to identify the locations with high disinfection byproduct concentrations?

- A. Stage 2 DBPR
- B. DBP exposure
- C. The Stage 1 DBP rule
- D. Long Term 2 Enhanced Surface Water Treatment Rule
- E. Traditional disinfection practices
- F. None of the Above

23. Compliance with the maximum contaminant levels for two groups of disinfection byproducts (TTHM and HAA5), referred to as \_\_\_\_\_.

- A. TTHM and HAA5
- B. DBP MCLs
- C. Locational running annual average (LRAA)
- D. Disinfection byproducts (DBPs)
- E. Trihalomethanes and haloacetic acids
- F. None of the Above

24. Which Rule also requires each system to determine if they have exceeded an operational evaluation level, which is identified using their compliance monitoring results?

- A. Stage 2 DBPR
- B. DBP exposure
- C. The Stage 1 DBP rule
- D. Long Term 2 Enhanced Surface Water Treatment Rule
- E. Traditional disinfection practices
- F. None of the Above

25. A system that exceeds an operational evaluation level is required to review their operational practices and submit a report to their state that identifies actions that may be taken to mitigate future high \_\_\_\_\_, particularly those that may jeopardize their compliance with the DBP MCLs.

- A. TTHM5 and HTAA5
- B. Halos
- C. DBP levels
- D. UV
- E. Amounts of rainfall
- F. None of the Above

**Who must comply with the rule?**

26. Entities potentially regulated by the \_\_\_\_\_ are community and nontransient noncommunity water systems that produce and/or deliver water that is treated with a primary or residual disinfectant other than ultraviolet light.

- A. DBPs from chlorination
- B. Chlorine and chloramine
- C. Stage 2 DBPR
- D. Classes of DBPs
- E. TTHM and HAA5
- F. None of the Above

27. Which system is a public water system that serves year-round residents of a community, subdivision, or mobile home park that has at least 15 service connections or an average of at least 25 residents?

- A. A nontransient non-community water system (NTNCWS)
- B. A non-community water system
- C. A community water system (CWS)
- D. Trailer park
- E. A nontransient water system
- F. None of the Above

28. \_\_\_\_\_ is a water system that serves at least 25 of the same people more than six months of the year, but not as primary residence, such as schools, businesses, and day care facilities?

- A. Trailer park
- B. A non-community water system
- C. A community water system (CWS)
- D. A nontransient non-community water system (NTNCWS)
- E. A nontransient water system
- F. None of the Above

### What are Disinfection Byproducts (DBPs)?

29. Which term forms when disinfectants used to treat drinking water react with naturally occurring materials in the water (e.g., decomposing plant material)?

- A. Disinfectants
- B. DBLs
- C. Humic
- D. Disinfection byproducts (DBPs)
- E. Sodium Thiosulfate
- F. None of the Above

30. Total trihalomethanes (TTHM - chloroform, bromoform, bromodichloromethane, and dibromochloromethane) and haloacetic acids (HAA5 - monochloro-, dichloro-, trichloro-, monobromo-, dibromo-) are widely occurring \_\_\_\_\_ formed during disinfection with chlorine and chloramine.

- A. Sodium Thiosulfate
- B. Chlorine and chloramine
- C. Stage 2 DBPR
- D. Classes of DBPs
- E. Trihalomethanes and haloacetic acids
- F. None of the Above

### Are THMs and HAAs the only disinfection byproducts?

31. The presence of this term is representative of the occurrence of many other chlorination DBPs; thus, a reduction generally indicates a reduction of DBPs from chlorination.

- A. DBPs from chlorination
- B. Chlorine and chloramine
- C. Stage 2 DBPR
- D. Classes of DBPs
- E. TTHM and HAA5
- F. None of the Above

### Stage 2 DBP Rule Federal Register Notices

32. Chlorine and its \_\_\_\_\_ are neutrally charged and therefore easily penetrate the negatively charged surface of pathogens.

- A. Halogen
- B. Water chlorination
- C. Chlorine as a disinfectant
- D. Hydrolysis product hypochlorous acid
- E. Hypochlorous acid
- F. None of the Above

### Microbial Regulations

33. One of the key regulations developed and implemented by the United States Environmental Protection Agency (USEPA) to counter pathogens in drinking water is the Surface Water Treatment Rule requires that a public water system, using surface water (or ground water under the direct influence of surface water) as its source, have sufficient treatment to reduce the source water concentration of Giardia and viruses by at least 99.9% and 99.99%, respectively.

- A. True
- B. False

34. Which rule specifies treatment criteria to assure that these performance requirements are met; they include turbidity limits, disinfectant residual, and disinfectant contact time conditions?

- A. Long Term 1 Rule
- B. Maximum Contaminant Level Goal (MCLG)
- C. Stage 1 Byproducts Rule
- D. Surface Water Treatment Rule
- E. Interim Enhanced Surface Water
- F. None of the Above

35. \_\_\_\_\_ improves physical removal of Cryptosporidium, and to maintain control of pathogens?

- A. Long Term 1 Enhanced Surface Water Treatment Rule
- B. Maximum Contaminant Level Goal (MCLG)
- C. Stage 1 Disinfectants/Disinfection Byproducts Rule
- D. Surface Water Treatment Rule
- E. Interim Enhanced Surface Water Treatment Rule
- F. None of the Above

36. When infected humans or animals pass the bacteria, viruses, and \_\_\_\_\_ in their stool, pathogens may get into water and spread disease.

- A. Fecal Coliform and E coli
- B. Protozoa
- C. Macroorganisms
- D. Cryptosporidiosis
- E. Bioslime
- F. None of the Above

37. For another person to become infected, he or she must take that pathogen in through the mouth.

- A. True
- B. False

38. This term means when in nature it is different from other types of pathogens such as the viruses that cause influenza (the flu) or the bacteria that cause tuberculosis.

- A. Fecal Coliform and E coli
- B. Giardia lamblia
- C. Microorganism(s)
- D. Waterborne Pathogen(s)
- E. Coliform bacteria
- F. None of the Above

39. According to the text, \_\_\_\_\_ are spread by secretions that are coughed or sneezed into the air by an infected person.

- A. Fecal Coliform and E coli
- B. Giardia lamblia
- C. Microorganisms
- D. Influenza virus and tuberculosis bacteria
- E. Coliform bacteria
- F. None of the Above

### **Viral-Caused Diseases**

40. Which of the following terms is an example of a common viral disease that may be transmitted through water? The onset is usually abrupt with fever, malaise, loss of appetite, nausea and abdominal discomfort, followed within a few days by jaundice.

- A. Pathogen
- B. Yersiniosis
- C. Hepatitis A
- D. Campylobacteriosis
- E. Incubation period
- F. None of the Above

41. Most \_\_\_\_\_ in drinking water can be inactivated by chlorine or other disinfectants.

- A. Illnesses
- B. Giardiasis
- C. Viruses
- D. Pathogen(s)
- E. Infections
- F. None of the Above

### Protozoan Caused Diseases

42. \_\_\_\_\_ is larger than bacteria and viruses but still microscopic, they invade and inhabit the gastrointestinal tract?

- A. HIV infections
- B. Symptoms
- C. Giardiasis
- D. Hepatitis A
- E. Protozoan pathogens
- F. None of the Above

43. Which of the following bugs/disease terms occurs worldwide primarily because customers are receiving their drinking water from streams or rivers without adequate disinfection or a filtration system?

- A. HIV infections
- B. Symptoms
- C. Giardiasis
- D. Hepatitis A symptoms
- E. Cryptosporidiosis symptoms
- F. None of the Above

44. \_\_\_\_\_ has been responsible for more community-wide outbreaks of disease in the U.S. than any other, drug treatment is not 100% effective?

- A. HIV infection
- B. Giardia lamblia
- C. Giardiasis
- D. Hepatitis A
- E. Cryptosporidiosis
- F. None of the Above

45. All of these diseases, with the exception of \_\_\_\_\_, have one symptom in common: diarrhea. They also have the same mode of transmission, fecal-oral, whether through person-to-person or animal-to-person contact.

- A. HIV infection
- B. Giardia lamblia
- C. Giardiasis
- D. Hepatitis A
- E. Cryptosporidiosis
- F. None of the Above

46. Which of the following is an example of a protozoan disease that is common worldwide, but was only recently recognized as causing human disease?

- A. HIV infection
- B. Giardia lamblia symptom
- C. Giardiasis
- D. Hepatitis A
- E. Cryptosporidiosis
- F. None of the Above

47. Which of the following usually come and go, and end in fewer than 30 days in most cases, the incubation period is 1-12 days, with an average of about seven days?

- A. HIV infections
- B. Symptoms
- C. Giardiasis
- D. Hepatitis A
- E. Cryptosporidiosis
- F. None of the Above

48. For those who operate water systems with adequate source protection or treatment facilities, the potential risk of a waterborne disease outbreak is real.

- A. True
- B. False

### Bacteriological Monitoring Section

49. According to the text, the routine microbiological analysis of your water is for \_\_\_\_\_.

- A. Indicator bacteria
- B. Bacteria tests
- C. Contamination
- D. Coliform bacteria
- E. Presence of an indicator
- F. None of the Above

50. Which of the following terms is used as an indicator organism to determine the biological quality of your water?

- A. Microbiological analysis
- B. Bac-T
- C. Coliform bacteria
- D. Escherichia coli (E. coli)
- E. Presence of an indicator
- F. None of the Above

51. The presence of an indicator or \_\_\_\_\_ in your drinking water is an important health concern.

- A. Indicator bacteria
- B. Pathogenic bacteria
- C. Contaminate
- D. Microbiological analysis
- E. Presence of an indicator
- F. None of the Above

52. Which of the following terms is used to signal possible fecal contamination, and therefore, the potential presence of pathogens?

- A. Indicator bacteria
- B. Pathogenic bacteria
- C. Contaminate
- D. Microbiological analysis
- E. Presence of an indicator
- F. None of the Above

### **Bacteria Sampling**

53. Water samples for \_\_\_\_\_ must always be collected in a sterile container.

- A. Indicator
- B. Bacteria tests
- C. Contamination
- D. pH analysis
- E. Presence of an indicator
- F. None of the Above

### **Laboratory Procedures**

54. The laboratory may perform this in one of four methods approved by the U.S. EPA and your local environmental or health division.

- A. Colilert
- B. Coliform
- C. Sample time
- D. Total coliform analysis
- E. Pathogen test
- F. None of the Above

### **Methods**

55. The MMO-MUG test, a product marketed as this and is the most common. The sample results will be reported by the laboratories as simply coliforms present or absent.

- A. Colilert
- B. Coliform
- C. Sample stuff
- D. Total coliform analysis
- E. Pathogen media
- F. None of the Above

56. If coliforms are present, the laboratory will analyze the sample further to determine if these are \_\_\_\_\_ and \_\_\_\_\_ and report their presence or absence.

- A. Colilert, E. coli
- B. Coliforms, E. coli
- C. Fecal coliforms, E. coli
- D. Total coliform analysis, Pathogens
- E. Pathogens, Total coliform analysis
- F. None of the Above

### **Types of Water Samples**

57. It is important to properly identify the type of \_\_\_\_\_ you are collecting.

- A. Colilert
- B. Coliforms
- C. Sample
- D. Total coliform analysis
- E. Pathogens
- F. None of the Above

**The three (3) types of samples are:**

58. Samples collected following a 'coliform present' routine sample. The number of repeat samples to be collected is based on the number of \_\_\_\_\_ samples you normally collect.

- A. Repeat
- B. Special
- C. QA QC
- D. Total coliform analysis
- E. Routine
- F. None of the Above

59. What type of samples can be collected for other reasons? Examples would be a sample collected after repairs to the system.

- A. Repeat
- B. Special
- C. Sample
- D. Total coliform analysis
- E. Routine
- F. None of the Above

60. What type of samples can be collected on a routine basis to monitor for contamination? Collection should be in accordance with an approved sampling plan.

- A. Repeat
- B. Special
- C. Sample
- D. Total coliform analysis
- E. Routine
- F. None of the Above

**Repeat Sampling**

61. If a \_\_\_\_\_ is total coliform or fecal coliform present, a set of repeat samples must be collected within 24 hours after being notified by the laboratory.

- A. MCL compliance
- B. Distribution system
- C. Routine sample
- D. Original sampling location
- E. Repeat sample(s)
- F. None of the Above

**The follow-up for repeat sampling is:**

62. If only one \_\_\_\_\_ per month or quarter is required, four (4) repeat samples must be collected.

- A. Special Sample
- B. Routine sample
- C. Repeat sample(s)
- D. Coliform present
- E. Original sampling location
- F. None of the Above

63. For systems collecting two (2) or more routine samples per month, three (3) \_\_\_\_\_ must be collected.

- A. Compliance sample
- B. Distribution sample
- C. Routine sample
- D. QA/QC Split
- E. Repeat sample(s)
- F. None of the Above

**Sampling Procedures**

64. \_\_\_\_\_ must be followed and all operating staff must be clear on how to follow the sampling plan.

- A. Seal individual samples
- B. Chain of custody
- C. Distribution system
- D. Sample siting plan
- E. Positive for total coliform
- F. None of the Above

65. Staff must be aware of how often sampling must be done, the \_\_\_\_\_ to be used for collecting the samples, and the proper procedures for identification, storage and transport of the samples to an approved laboratory.

- A. Multiple sources
- B. Sample siting plan
- C. Total coliform
- D. Proper procedures and sampling containers
- E. Sampling containers
- F. None of the Above

66. In addition, proper procedures must be followed for repeat sampling whenever a routine sample result is \_\_\_\_\_.

- A. Seal individual samples
- B. Chain of custody
- C. Distribution system
- D. Sample siting plan
- E. Positive for total coliform
- F. None of the Above

### **Chain of Custody Procedures**

67. If you have physical possession of a sample, have it in view, or have physically secured it to prevent tampering then it is defined as being in "custody." A \_\_\_\_\_, therefore, begins when the sample containers are obtained from the laboratory. From this point on, a chain of custody record will accompany the sample containers.

- A. Multiple sources
- B. Sample siting plan
- C. Total coliform
- D. Chain of custody record
- E. Sampling containers
- F. None of the Above

### **Maximum Contaminant Levels (MCLs)**

#### **Spread Plate Method**

68. During this method, colonies are on the \_\_\_\_\_ where they can be distinguished readily from particles and bubbles.

- A. Agar surface
- B. Surface growth area
- C. Top
- D. Bottom
- E. Material
- F. None of the Above

69. During the Spread Plate Method, colonies can be transferred quickly, and this is easily can be discerned and compared to published descriptions.

- A. Colonies grow
- B. Surface growth
- C. Low counts
- D. Heterotrophic organisms will grow
- E. Colony morphology
- F. None of the Above

#### **Membrane Filter Method**

70. This method permits testing large volumes of this and is the method of choice for low-count waters.

- A. Colonies
- B. Surface water
- C. Low-turbidity water
- D. Heterotrophic organisms
- E. MCL
- F. None of the Above

#### **Heterotrophic Plate Count (Spread Plate Method)**

71. Which term uses inorganic carbon sources as their carbon source (food or substrate)?

- A. Colonies
- B. Surface growth
- C. AGAR
- D. Heterotrophic organisms
- E. Autotrophic organisms
- F. None of the Above



72. Which term provides a technique to quantify the bacteriological activity of a sample?
- A. Colonies
  - B. Heat
  - C. Agar
  - D. Heterotrophic Plate Count
  - E. MCL
  - F. None of the Above

73. The R2A agar provides a medium that will support a large variety of?
- A. Colonies
  - B. Bugs
  - C. Germs
  - D. Heterotrophic bacteria
  - E. MCL
  - F. None of the Above

### **Total Coliforms**

74. This MCL is based on the presence of total coliforms, and compliance is on a daily or weekly basis, depending on your water system type and state rule.
- A. True
  - B. False

75. For systems that collect fewer than \_\_\_\_\_ samples per month, no more than one sample per month may be positive. In other words, the second positive result (repeat or routine) in a month or quarter results in a MCL violation.
- A. 5
  - B. 10
  - C. 100
  - D. 200
  - E. 40
  - F. None of the Above

76. For systems that collect \_\_\_\_\_ or more samples per month, no more than five (5) percent may be Positive, check with your state drinking water section or health department for further instructions.
- A. 5
  - B. 10
  - C. 100
  - D. 200
  - E. 40
  - F. None of the Above

### **Acute Risk to Health (Fecal coliforms and E. coli)**

77. A(n) \_\_\_\_\_ to human health violation occurs if either one of the following happens:
- A. Routine analysis
  - B. Drinking violation
  - C. Acute risk
  - D. Human health violation
  - E. Fecal coliform or E. coli is present
  - F. None of the Above

78. A routine analysis shows total coliform present and is followed by a repeat analysis which indicates \_\_\_\_\_.
- A. Routine analysis
  - B. Drinking violation
  - C. Water penalty
  - D. Human health violation
  - E. Fecal coliform or E. coli present
  - F. None of the Above

79. A routine analysis shows \_\_\_\_\_ is followed by a repeat analysis which indicates total coliform present.
- A. Routine analysis
  - B. Drinking water violation
  - C. MCL violation
  - D. Presence
  - E. Total and Fecal coliform or E. coli present
  - F. None of the Above

80. A(n) \_\_\_\_\_ requires the water system to provide public notice via radio and television stations in the area.

- A. Routine analysis violation
- B. Drinking water rule violation
- C. MCL violation
- D. Human health violation
- E. Acute health risk violation
- F. None of the Above

81. According to the text, the type of contamination can pose an immediate threat to human health and notice must be given as soon as possible, but no later than 24 hours after notification from your laboratory of the test results.

- A. True
- B. False

### Public Notice

82. This term best describes what also is required whenever a water system fails to comply with its monitoring and/or reporting requirements or testing procedure.

- A. Routine analysis
- B. Drinking water rule
- C. MCL violation
- D. Public notice
- E. Fecal coliform or E. coli present count
- F. None of the Above

83. There shall be certain information, be issued properly and in a timely manner, and contain certain \_\_\_\_\_ on the public notice.

- A. Legal analysis
- B. Drinking water rule information
- C. NOVs
- D. Mandatory language
- E. Fecal language
- F. None of the Above

84. If there is a(n) \_\_\_\_\_ present to users, the timing and place of posting of the public notice may have different priorities.

- A. Routine analysis
- B. Drinking water rule
- C. Acute risk
- D. Human health violation
- E. Fecal coliform or E. coli present
- F. None of the Above

### The following are acute violations:

85. Which is violation of nitrate?

- A. Presence
- B. MCL
- C. MCLG
- D. Count
- E. Acute violations
- F. None of the Above

86. Concerning total coliforms - when fecal coliforms or E. coli are present in the distribution system and is a violation of the \_\_\_\_\_.

- A. Presence
- B. MCL
- C. MCLG
- D. Count
- E. Acute violations
- F. None of the Above

87. Any outbreak of \_\_\_\_\_, as defined by the rules.

- A. Total coliforms
- B. MCL
- C. Waterborne disease
- D. Radioactive bacteria
- E. Acute violations
- F. None of the Above

### Protozoan Diseases

88. Which of the following can survive in the environment for long periods and be extremely resistant to conventional disinfectants such as chlorine?

- A. Paramecium
- B. Host
- C. Cyst
- D. Protozoan pathogen
- E. Cytoplasm
- F. None of the Above

### Giardiasis

89. \_\_\_\_\_ has been responsible for more community-wide outbreaks of disease in the U.S. than any other pathogen.

- A. Legionella
- B. Giardia lamblia
- C. Cryptosporidium organisms
- D. E-coli
- E. Hepatitis A
- F. None of the Above

90. Which bug/creature/organism is a commonly reported protozoan-caused disease?

- A. Backpacker's disease
- B. Cytoplasm disease
- C. Paramecium disease
- D. Giardiasis
- E. Protozoan-caused disease
- F. None of the Above

91. Symptoms include chronic diarrhea, abdominal cramps, bloating, frequent loose and pale greasy stools, fatigue and weight loss.

- A. Giardia lamblia
- B. Cytoplasm disease
- C. Paramecium disease
- D. Giardiasis
- E. Protozoan-caused disease
- F. None of the Above

92. \_\_\_\_\_ has symptoms usually come and go, and end in fewer than 30 days in most cases. The incubation period is 1-12 days, with an average of about seven days.

- A. Giardia lamblia
- B. Incubation period
- C. Animal-to-person contact
- D. Cryptosporidiosis
- E. Giardiasis
- F. None of the Above

93. The mode of transmission is fecal-oral, either by person-to-person or animal-to-person. There is no specific treatment for \_\_\_\_\_.

- A. Giardia lamblia treatment
- B. Incubation period
- C. Animal-to-person contact
- D. Major symptom
- E. Cryptosporidium infections
- F. None of the Above

94. Which bug/creature/organism/disease can occur through ingestion of dormant cysts in contaminated water, or by the fecal-oral route (through poor hygiene practices)?

- A. Giardiasis
- B. Giardia trophozoites
- C. Cytoplasms
- D. Giardia infection
- E. Trophozoites and cysts
- F. None of the Above

95. Which bug/creature/organism/disease is (synonymous with *Lamblia intestinalis* and *Giardia duodenalis*) is a flagellated protozoan parasite that colonizes and reproduces in the small intestine?

- A. Giardia trophozoites
- B. Incubations
- C. Animal-to-person contact
- D. Giardia lamblia
- E. Cryptosporidium infections
- F. None of the Above

96. \_\_\_\_\_ attaches to the epithelium by a ventral adhesive disc, and reproduces via binary fission.
- A. Water-borne source
  - B. Giardia trophozoites
  - C. Giardia cyst
  - D. Giardia infection(s)
  - E. Giardia parasite
  - F. None of the Above
97. Which bug/creature/organism/disease does not spread via the bloodstream, nor does it spread to other parts of the gastro-intestinal tract, but remains confined to the lumen of the small intestine?
- A. Giardiasis
  - B. Infected
  - C. Cytoplasm
  - D. Giardia infection
  - E. Trophozoites and cysts
  - F. None of the Above
98. \_\_\_\_\_ can survive for weeks to months in cold water and therefore can be present in contaminated wells and water systems.
- A. Water-borne sources
  - B. Giardia trophozoites
  - C. Giardia cyst
  - D. Giardia infections
  - E. Giardia parasite
  - F. None of the Above
99. Which bug/creature/organism/disease is also possible, and therefore Giardia infection is a concern for people camping in the wilderness or swimming in contaminated streams?
- A. Giardiasis
  - B. Infected
  - C. Cytoplasm
  - D. Giardia infection
  - E. Zoonotic transmission
  - F. None of the Above
100. \_\_\_\_\_ can also occur, for example in day care centers, where children may have poorer hygiene practices.
- A. Water-borne sources
  - B. Giardia trophozoites
  - C. Giardia cyst
  - D. Giardia infections
  - E. Fecal-oral transmission
  - F. None of the Above