

Registration form

**BACTERIOLOGICAL MONITORING 109 \$50.00
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Water Treatment ___ Water Distribution ___ Other _____

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AFFIDAVIT OF EXAM COMPLETION

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

Grading Information

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

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Bacteriological Monitoring 109 Answer Key

Name _____

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Did you check with your State agency to ensure this course is accepted for credit?

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You can electronically complete this assignment in Adobe Acrobat DC or use a felt-tipped pen.

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

- | | | | |
|-------------|-------------|-------------|-------------|
| 1. A B C D | 20. A B | 39. A B C D | 58. A B C D |
| 2. A B C D | 21. A B C D | 40. A B C D | 59. A B C D |
| 3. A B C D | 22. A B C D | 41. A B C D | 60. A B C D |
| 4. A B C D | 23. A B C D | 42. A B C D | 61. A B |
| 5. A B C D | 24. A B C D | 43. A B C D | 62. A B |
| 6. A B C D | 25. A B C D | 44. A B C D | 63. A B C D |
| 7. A B C D | 26. A B C D | 45. A B | 64. A B |
| 8. A B C D | 27. A B C D | 46. A B | 65. A B |
| 9. A B C D | 28. A B C D | 47. A B | 66. A B C D |
| 10. A B C D | 29. A B C D | 48. A B | 67. A B C D |
| 11. A B C D | 30. A B C D | 49. A B C D | 68. A B C D |
| 12. A B C D | 31. A B C D | 50. A B | 69. A B C D |
| 13. A B C D | 32. A B C D | 51. A B C D | 70. A B C D |
| 14. A B | 33. A B C D | 52. A B | 71. A B C D |
| 15. A B | 34. A B C D | 53. A B | 72. A B C D |
| 16. A B | 35. A B | 54. A B | 73. A B |
| 17. A B | 36. A B | 55. A B C D | 74. A B C D |
| 18. A B | 37. A B | 56. A B C D | 75. A B |
| 19. A B | 38. A B C D | 57. A B C D | |

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

**Please fax the answer key to TLC Western Campus
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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 course contains general EPA's SDWA federal rule requirements. Please be aware that each state implements water / sampling procedures / safety / environmental / SDWA 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 with your regulatory agencies and do not follow this course for any compliance concerns.

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

**BACTERIOLOGICAL MONITORING 109 CEU COURSE
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PLEASE COMPLETE THIS FORM BY CIRCLING THE NUMBER OF THE APPROPRIATE ANSWER IN THE AREA BELOW.

Please rate the difficulty of your course.

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

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How did you hear about this Course? _____

What would you do to improve the Course?

Any other concerns or comments.

Bacteriological Monitoring 109 CEU Training Course Assignment

The Bacteriological Monitoring 109 CEU course assignment is available in Word on the Internet for your convenience, please visit www.abctlc.com and download the assignment and e-mail it back to TLC.

You will have 90 days from receipt of this manual to complete it in order to receive your Professional Development Hours (PDHs) or Continuing Education Unit (CEU). A score of 70 % or better is necessary to pass this course. If you should need any assistance, please email or fax all concerns and the completed ANSWER KEY to info@tlch2o.com.

Select one answer per question. Please utilize the answer key. (s) on the answer will indicate either plural and singular tenses.

Hyperlink to the Glossary and Appendix

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

Organisms Descriptors and Meanings

1. Photo means...

- A. Feed or nourish
- B. Other (Organic carbon)
- C. Light
- D. None of the above

2. Troph means...

- A. Feed or nourish
- B. Other (Organic carbon)
- C. Light
- D. None of the above

3. Litho means...

- A. Rock
- B. Organic
- C. Light
- D. None of the above

4. Organo means...

- A. Rock
- B. Organic
- C. Light
- D. None of the above

5. Auto means...

- A. Without air
- B. With air
- C. Self (Inorganic carbon)
- D. None of the above

6. Facultative means...

- A. Without air
- B. With air or without air
- C. Self (Inorganic carbon)
- D. None of the above

7. Aerobic means...

- A. Without air
- B. With air
- C. Self (Inorganic carbon)
- D. None of the above

8. Chemo means...

- A. Rock
- B. Organic
- C. Chemical
- D. None of the above

9. Hetero means...
- A. Feed or nourish
 - B. Other (Organic carbon)
 - C. Light
 - D. None of the above

10. Anaerobic means...
- A. Without air
 - B. With air
 - C. Self (Inorganic carbon)
 - D. None of the above

Contaminants that may be present in sources of drinking water include:

11. Which of the following like salts and metals, which can be naturally occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming?

- A. Radioactive contaminants
- B. Pesticides and herbicides
- C. Inorganic contaminants
- D. Microbial contaminants

12. Which of the following can be synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can come from gas stations, urban stormwater run-off, and septic systems?

- A. Organic chemical contaminants
- B. Pesticides and herbicides
- C. Inorganic contaminants
- D. Microbial contaminants

13. Which of the following can be naturally occurring or be the result of oil and gas production and mining activities?

- A. Radioactive contaminants
- B. Pesticides and herbicides
- C. Inorganic contaminants
- D. Microbial contaminants

Background

14. Coliform bacteria and chlorine residual are the only routine sampling and monitoring requirements for small ground water systems with chlorination. The coliform bacteriological sampling is governed by the Coliform Reduction amendment of the SDWA.

- A. True
- B. False

TCR

15. The TCR recommends most of the Public Water Systems (PWS) to monitor their distribution system for bacteria according to the written sample sitting plan for that system.

- A. True
- B. False

16. The sample sitting plan identifies sampling frequency and locations throughout the distribution system that are selected to be representative of conditions in the entire system.

- A. True
- B. False

17. Coliform contamination may occur anywhere in the system, possibly due to problems such as; high-pressure conditions, line fluctuations, or wells, and therefore routine monitoring is required.

- A. True
- B. False

Routine Sampling Requirements

18. Total coliform samples must be collected by PWSs at sites which are representative of water quality throughout the distribution system according to a written sample siting plan subject to state review and revision.

- A. True
- B. False

19. If any routine sample is TC+, repeat samples are required. – PWSs on quarterly or annual monitoring must take a minimum of one additional routine samples (known as additional routine monitoring) the quarter following a TC+ routine or repeat sample.
A. True B. False

20. Reduced monitoring is general available for PWSs using only surface water and serving 1,000 or fewer persons that meet certain additional PWS criteria.
A. True B. False

Dangerous Waterborne Microbes

21. Which of the following is a species of the rod-shaped bacterial genus Shigella?
A. Fecal coliform bacteria C. Shigella dysenteriae
B. Cryptosporidium D. None of the above

22. Which of the following can cause bacillary dysentery?
A. Fecal coliform bacteria C. Shigella
B. Cryptosporidium D. None of the above

23. Which of the following are Gram-negative, non-spore-forming, facultatively anaerobic, non-motile bacteria.
A. Fecal coliform bacteria C. Shigellae
B. Cryptosporidium D. None of the above

24. Which of the following is a parasite that enters lakes and rivers through sewage and animal waste. It causes cryptosporidiosis, a mild gastrointestinal disease. The disease can be severe or fatal for people with severely weakened immune systems.
A. Coliform Bacteria C. Giardia lamblia
B. Cryptosporidium D. None of the above

25. Which of the following are not necessarily agents of disease may indicate the presence of disease-carrying organisms?
A. Fecal coliform bacteria C. Shigella dysenteriae
B. Cryptosporidium D. None of the above

26. Which of the following is a parasite that enters lakes and rivers through sewage and animal waste. It causes gastrointestinal illness (e.g. diarrhea, vomiting, and cramps)?
A. Coliform Bacteria C. Protozoa
B. Cryptosporidium D. None of the above

27. Which of the following are microscopic organisms that live in the intestines of warm-blooded animals? They also live in the waste material, or feces, excreted from the intestinal tract. When fecal coliform bacteria are present in high numbers in a water sample, it means that the water has received fecal matter from one source or another.
A. Fecal coliform bacteria C. Shigella dysenteriae
B. Cryptosporidium D. None of the above

28. Which of the following are common in the environment and are generally not harmful? However, the presence of these bacteria in drinking water are usually a result of a problem with the treatment system or the pipes which distribute water, and indicates that the water may be contaminated with germs that can cause disease.
A. Coliform Bacteria C. Giardia lamblia
B. Cryptosporidium D. None of the above

29. Which of the following are bacteria whose presence indicates that the water may be contaminated with human or animal wastes? Microbes in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms.
- A. Fecal Coliform and E. coli
 - B. Cryptosporidium
 - C. Shigella dysenteriae
 - D. None of the above

Bacteriological Monitoring Introduction

30. Which of the following are usually harmless, occur in high densities in their natural environment and are easily cultured in relatively simple bacteriological media?
- A. Indicator bacteria
 - B. Amoebas
 - C. Viruses
 - D. None of the above
31. Indicators in common use today for routine monitoring of drinking water include total coliforms, fecal coliforms, and?
- A. Cryptosporidium
 - B. Protozoa
 - C. Escherichia coli (E. coli)
 - D. None of the above
32. According to the text, the routine microbiological analysis of your water is for?
- A. Contamination
 - B. Colloids
 - C. Coliform bacteria
 - D. None of the above

Bacteria Sampling

33. Water samples for _____ must always be collected in a sterile container.
- A. Amoebas
 - B. Bacteria tests
 - C. Viruses
 - D. None of the above

Methods

34. The MMO-MUG test, a product marketed as _____, is the most common. The sample results will be reported by the laboratories as simply coliforms present or absent.
- A. Colilert
 - B. Coliform
 - C. Total coliform analysis
 - D. None of the above

Microbial Regulations

35. 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.
- A. True
 - B. False
36. Among Surface Water Treatment Rule provisions, the 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 protozoa and coliform bacteria by at least 99.9% and 99.99%, respectively.
- A. True
 - B. False

Basic Types of Water Samples

37. It is important to properly identify the type of sample you are collecting.
- A. True
 - B. False

The three (3) types of samples are:

38. A PWS has a second Level 1 Assessment within a rolling 12-month period.
- A. Trigger: Level 1 Assessment
 - B. Trigger: Level 2 Assessment
 - C. All of the above
 - D. None of the above

39. A PWS on state-approved annual monitoring has a Level 1 Assessment trigger in 2 consecutive years.
 A. Trigger: Level 1 Assessment C. All of the above
 B. Trigger: Level 2 Assessment D. None of the above
40. A PWS collecting fewer than 40 samples per month has 2 or more TC+ routine/ repeat samples in the same month.
 A. Trigger: Level 1 Assessment C. All of the above
 B. Trigger: Level 2 Assessment D. None of the above
41. 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 C. Routine
 B. Special D. None of the above
42. A PWS fails to take every required repeat sample after any single TC+ sample
 A. Trigger: Level 1 Assessment C. All of the above
 B. Trigger: Level 2 Assessment D. None of the above
43. A PWS incurs an E. coli MCL violation.
 A. Trigger: Level 1 Assessment C. All of the above
 B. Trigger: Level 2 Assessment D. None of the above
44. A PWS collecting at least 40 samples per month has greater than 5.0 percent of the routine/repeat samples in the same month that are TC+.
 A. Trigger: Level 1 Assessment C. All of the above
 B. Trigger: Level 2 Assessment D. None of the above

Maximum Contaminant Levels (MCLs)

45. State and federal laws establish standards for drinking water quality. Under normal circumstances when these standards are being met, the water is safe to drink with no threat to human health. These standards are known as maximum contaminant levels (MCL). When a particular contaminant exceeds its MCL a potential health threat may occur.
 A. True B. False
46. The MCLs are based on extensive research on toxicological properties of the contaminants, risk assessments and factors, short-term (acute) exposure, and long-term (chronic) exposure. You conduct the monitoring to make sure your water is in compliance with the MCL.
 A. True B. False
47. There are two types of MCL violations for coliform bacteria. The first is for total coliform; the second is an acute risk to health violation characterized by the confirmed presence of fecal coliform or E. coli.
 A. True B. False

Positive or Coliform Present Results

48. If you are notified of a positive coliform test result you need to contact either the Drinking Water Program or your local county health department within 72 hours, or by the next business day after the MCL compliance violation
 A. True B. False

(S) Means the answer can be plural or singular in nature

49. With a positive total coliform sample and after you have contacted an agency for assistance, you will be instructed as to the proper repeat sampling procedures and possible corrective measures for solving the problem. It is very important to initiate the _____ as the corrective measures will be based on those results.

- A. Perform routine procedures
- B. Repeat sampling immediately
- C. Corrective measures
- D. None of the above

Heterotrophic Plate Count HPC

50. Heterotrophic Plate Count (HPC) --- formerly known as the Bac-T plate, is a procedure for estimating the number of live heterotrophic bacteria and measuring changes during water treatment and distribution in water or in swimming pools.

- A. True
- B. False

Heterotrophic Plate Count (Spread Plate Method)

51. Which of the following provides a technique to quantify the bacteriological activity of a sample?

- A. Colonies
- B. Agar
- C. Heterotrophic Plate Count
- D. None of the above

Revised Total Coliform Rule (RTCR) Summary

52. EPA published the Revised Total Coliform Rule (RTCR) in the Federal Register (FR) on February 13, 2013 (78 FR 10269). It is the revision to the 1989 Total Coliform Rule (TCR).

- A. True
- B. False

53. The RTCR upholds the purpose of the 1989 TCR to protect public health by ensuring the duplicity of the drinking water distribution system and monitoring for the absence of microbial contamination.

- A. True
- B. False

54. The RTCR establishes criteria for systems to qualify for and stay on for special increased monitoring, which could reduce water system problems for better system operation.

- A. True
- B. False

55. The water provider shall develop and follow a sample-siting plan that designates the PWS's collection schedule. This includes location of _____.

- A. Routine and repeat water samples
- B. Reduced monitoring
- C. Microbial contamination
- D. Repeat water samples

56. The water provider shall collect _____ on a regular basis (monthly, quarterly, annually). Have samples tested for the presence of total coliforms by a state certified laboratory.

- A. Routine water samples
- B. Reduced monitoring
- C. Microbial contamination
- D. Repeat water samples

57. For PWSs on quarterly or annual routine sampling, collect additional routine samples (at least 3) in the month after a _____.

- A. CCR(s)
- B. PN
- C. Total coliform positive samples
- D. TC+ routine or repeat sample

58. PWSs incur violations if they do not comply with the requirements of the RTCR. The violation types are essentially the same as under the TCR with few changes. The biggest change is no acute or monthly MCL violation for _____ only.

- A. CCR(s)
- B. PN
- C. Total coliform positive samples
- D. TC+ routine or repeat sample

59. Community water systems (CWSs) must use specific language in their CCRs when they must conduct an assessment or if they incur_____.

- A. CCR(s)
- B. PN
- C. An E. coli MCL violation
- D. TC+ routine or repeat sample

60. PN is required for violations incurred. Within required timeframes, the PWS must use the required health effects language and notify the public if they did not comply with certain requirements of the RTCR. The type of _____ depends on the severity of the violation.

- A. CCR(s)
- B. PN
- C. MCL violation
- D. TC+ routine or repeat sample

61. The RTCR requires public water systems that are vulnerable to microbial contamination to identify and fix problems.

- A. True
- B. False

62. The water provider shall collect repeat samples (at least 3) for each TC+ positive routine sample.

- A. True
- B. False

63. The water provider shall analyze all _____ that are total coliform positive (TC+) for E. coli.

- A. Routine or repeat water samples
- B. Reduced monitoring
- C. Microbial contamination
- D. Repeat water samples

64. The RTCR requires public water systems (PWSs) to meet a legal limit for E. coli, as demonstrated by required monitoring.

- A. True
- B. False

65. The RTCR suggests the frequency and timing of required microbial testing based on, public water type and source water type.

- A. True
- B. False

Disinfection Key

66. The RTCR requires 99.99% or 4 log inactivation of _____ .

- A. Enteric viruses
- B. Crypto
- C. Giardia lamblia cysts
- D. None of the above

67. The RTCR requires 99% or 2 log inactivation of _____ .

- A. Enteric viruses
- B. Crypto
- C. Giardia lamblia cysts
- D. None of the above

68. The RTCR requires 99.9% or 3 log inactivation of _____.

- A. Enteric viruses
- B. Crypto
- C. Giardia lamblia cysts
- D. None of the above

69. The RTCR requires the chlorine residual leaving the plant must be = or > 0.2 mg/L and measurable throughout the system.

- A. > 0.2
- B. 2.0
- C. 0.2
- D. None of the above

Waterborne Pathogen Section - Introduction

Pathogen Section

70. Most pathogens are generally associated with diseases that _____ and affect people in a relatively short amount of time, generally a few days to two weeks.

- A. Cause intestinal illness
- B. Are mild in nature
- C. Will cause fatalities
- D. None of the above

71. Which of the following bugs has been responsible for more community-wide outbreaks of disease in the U.S. than any other and drug treatment are not 100% effective?

- A. Giardia lamblia
- B. Cryptosporidiosis
- C. Giardiasis
- D. None of the above

Primary Waterborne Diseases Section

72. Humans are the reservoir for the Salmonella typhi pathogen, which causes diarrheal illness, and also known as?

- A. Campylobacter
- B. Shigella dysenteriae
- C. Typhoid fever
- D. None of the above

73. Vibrio cholerae, the basics. It's a virus. It causes diarrheal illness, also known as cholera. It is typically associated with aquatic environments, shell stocks, and human. Vibrio cholerae has also been associated with ship ballast water.

- A. True
- B. False

74. Legionnaire's disease, which causes a severe pneumonia, and the second, _____, which is a non-pneumonia illness; it's typically an influenza-like illness, and it's less severe.

- A. Pontiac fever
- B. Yellow fever
- C. Typhoid fever
- D. None of the above

Viruses

Coronavirus

75. It looks like the COVID-19 coronavirus is not able to live in water.

- A. True
- B. False