

Registration form

WATER/WASTEWATER SAMPLING TRAINING COURSE \$75.00
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** _____

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

Distribution ___ Water Treatment ___ WWT ___ Other _____

Your certificate will be mailed to you in about two weeks unless you pay for the rush service.

Technical Learning College PO Box 420, Payson AZ 85547-0420
Fax (928) 272-0747 E-Mail info@tlch2o.com
Telephone (928) 468-0665 Toll Free (866) 557-1746

Discover card _____ **CCV code** _____
American Express
Visa or MasterCard # _____ **Exp. Date** _____

If you've paid on the Internet, Please write your customer# _____

Purchase Order #, Please invoice me _____

We will stop mailing the certificate of completion 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.

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

WATER /WASTEWATER SAMPLING Answer Key

Name _____

Phone # _____

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 | 41. A B C D E F | 81. A B C D E F |
| 2. A B C D E F | 42. A B C D E F | 82. A B C D E F |
| 3. A B C D E F | 43. A B C D E F | 83. A B C D E F |
| 4. A B C D E F | 44. A B C D E F | 84. A B C D E F |
| 5. A B C D E F | 45. A B C D E F | 85. A B C D E F |
| 6. A B C D E F | 46. A B C D E F | 86. A B C D E F |
| 7. A B C D E F | 47. A B C D E F | 87. A B C D E F |
| 8. A B C D E F | 48. A B C D E F | 88. A B C D E F |
| 9. A B C D E F | 49. A B C D E F | 89. A B C D E F |
| 10. A B C D E F | 50. A B C D E F | 90. A B C D E F |
| 11. A B C D E F | 51. A B C D E F | 91. A B C D E F |
| 12. A B C D E F | 52. A B C D E F | 92. A B C D E F |
| 13. A B C D E F | 53. A B C D E F | 93. A B C D E F |
| 14. A B C D E F | 54. A B C D E F | 94. A B C D E F |
| 15. A B C D E F | 55. A B C D E F | 95. A B C D E F |
| 16. A B C D E F | 56. A B C D E F | 96. A B C D E F |
| 17. A B C D E F | 57. A B C D E F | 97. A B C D E F |
| 18. A B C D E F | 58. A B C D E F | 98. A B C D E F |
| 19. A B C D E F | 59. A B C D E F | 99. A B C D E F |
| 20. A B C D E F | 60. A B C D E F | 100. A B C D E F |
| 21. A B C D E F | 61. A B C D E F | 101. A B C D E F |
| 22. A B C D E F | 62. A B C D E F | 102. A B C D E F |
| 23. A B C D E F | 63. A B C D E F | 103. A B C D E F |
| 24. A B C D E F | 64. A B C D E F | 104. A B C D E F |
| 25. A B C D E F | 65. A B C D E F | 105. A B C D E F |
| 26. A B C D E F | 66. A B C D E F | 106. A B C D E F |
| 27. A B C D E F | 67. A B C D E F | 107. A B C D E F |
| 28. A B C D E F | 68. A B C D E F | 108. A B C D E F |
| 29. A B C D E F | 69. A B C D E F | 109. A B C D E F |
| 30. A B C D E F | 70. A B C D E F | 110. A B C D E F |
| 31. A B C D E F | 71. A B C D E F | 111. A B C D E F |
| 32. A B C D E F | 72. A B C D E F | 112. A B C D E F |
| 33. A B C D E F | 73. A B C D E F | 113. A B C D E F |
| 34. A B C D E F | 74. A B C D E F | 114. A B C D E F |
| 35. A B C D E F | 75. A B C D E F | 115. A B C D E F |
| 36. A B C D E F | 76. A B C D E F | 116. A B C D E F |
| 37. A B C D E F | 77. A B C D E F | 117. A B C D E F |
| 38. A B C D E F | 78. A B C D E F | 118. A B C D E F |
| 39. A B C D E F | 79. A B C D E F | 119. A B C D E F |
| 40. A B C D E F | 80. A B C D E F | 120. A B C D E F |

Please fax or e-mail the answer key to TLC
Western Campus Fax (928) 272-0747.

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.

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

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

**WATER / WASTEWATER SAMPLING CEU 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?

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.

Water / Wastewater Sampling Course Assignment

Your assignment is to correctly answer the following questions about the characteristic of the water quality system, sampling procedures, TCR, pathogens and sampling violations.

You will have 90 days in order to successfully complete this assignment with a score of 70% or better. If you need any assistance, please contact TLC's Student Services. Once you are finished, please, e-mail or fax or e-mail your answer sheet along with your registration form.

Please use the Answer Key and Registration form. Select the exact answer from text. Legend (s) means the answer is either singular or plural. Be careful and examine the "Or" answers too.

1. The Stage 1 Disinfectant/Disinfection Byproduct Rule standards became effective for trihalomethanes and other _____ listed above back in December 2001 for large surface water public water systems.

- A. Disinfection byproducts
- B. Trihalomethanes (THM)
- C. Haloacetic Acids (HAA5)
- D. Bromate
- E. Total Trihalomethane Rule
- F. None of the Above

2. _____ are formed when disinfectants used in water treatment plants react with bromide and/or natural organic matter (i.e., decaying vegetation) present in the source water. Different disinfectants produce different types or amounts of disinfection byproducts.

- A. Disinfection byproducts
- B. Trihalomethanes (THM)
- C. Haloacetic Acids (HAA5)
- D. Bromate
- E. Total Trihalomethane Rule
- F. None of the Above

3. _____ are a group of four chemicals that are formed along with other disinfection byproducts when chlorine or other disinfectants used to control microbial contaminants in drinking water react with naturally occurring organic and inorganic matter in water.

- A. Disinfection byproducts
- B. Trihalomethanes (THM)
- C. Haloacetic Acids (HAA5)
- D. Bromate
- E. Total Trihalomethane Rule
- F. None of the Above

4. EPA has published the Stage 1 Disinfectants/Disinfection Byproducts Rule to regulate total _____ at a maximum allowable annual average level of 80 parts per billion. This new standard replaced the old standard of a maximum allowable annual average level of 100 parts per billion back in December 2001 for large surface water public water systems.

- A. Disinfection byproducts
- B. Trihalomethanes (TTHM)
- C. Haloacetic Acids (HAA5)
- D. Bromate
- E. Total Trihalomethane Rule
- F. None of the Above

5. The regulated haloacetic acids, known as _____, are: monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid. EPA has published the

- A. Disinfection byproducts
- B. Trihalomethanes (THM)
- C. Haloacetic Acids (HAA5)
- D. Bromate
- E. Total Trihalomethane Rule
- F. None of the Above

6. _____ is a chemical that is formed when ozone, used to disinfect drinking water, reacts with naturally occurring bromide found in source water. EPA has established the Stage 1 Disinfectants/Disinfection Byproducts Rule to regulate bromate at an annual average of 10 ppb in drinking water.

- A. Disinfection byproducts
- B. Trihalomethanes (THM)
- C. Haloacetic Acids (HAA5)
- D. Bromate
- E. Total Trihalomethane Rule
- F. None of the Above

Microbial Regulations

7. One of the key regulations developed and implemented by the United States Environmental Protection Agency (USEPA) to counter _____ in drinking water is the Surface Water Treatment Rule.

- A. Disinfectant residual
- B. Bacteria, Virus and Intestinal parasites
- C. Disinfection By-Products (DBPs)
- D. Pathogens
- E. E. Coli, Escherichia coli
- F. None of the Above

8. The Surface Water Treatment Rule specifies treatment criteria to assure that these performance requirements are met; they include turbidity limits, _____ and disinfectant contact time conditions.

- A. Disinfectant residual
- B. Bacteria, Virus and Intestinal parasites
- C. Disinfection By-Products (DBPs)
- D. Giardia and viruses
- E. E. Coli, Escherichia coli
- F. None of the Above

Disinfectant Review Statements:

9. The CT values for disinfection are used to determine the disinfection efficiency based upon time and what other parameter?

- A. Disinfectant residual
- B. Bacteria, Virus and Intestinal parasites
- C. Disinfection By-Products (DBPs)
- D. Giardia and viruses
- E. E. Coli, Escherichia coli
- F. None of the Above

10. What types of organisms may transmit waterborne diseases?

- A. Disinfectant residual
- B. Bacteria, Virus and Intestinal parasites
- C. Disinfection By-Products (DBPs)
- D. Giardia and viruses
- E. E. Coli, Escherichia coli
- F. None of the Above

11. How is the effectiveness of disinfection determined?

- A. Disinfectant residual
- B. Bacteria, Virus and Intestinal parasites
- C. Disinfection By-Products (DBPs)
- D. Giardia and viruses
- E. From the results of coliform testing.
- F. None of the Above

12. What types of source water are required by law to treat water using filtration and disinfection? _____ under the direct influence of surface water, and related surface water sources.

- A. Disinfectant residual
- B. Bacteria, Virus and Intestinal parasites
- C. Disinfection By-Products (DBPs)
- D. Groundwater
- E. E. Coli, Escherichia coli
- F. None of the Above

Common Water Quality Definitions

Acronyms

13. _____ - A required process intended to reduce the level of a contaminant in drinking water.

- A. Treatment Technique (TT)
- B. Maximum Contaminant Level (MCL)
- C. Action Level (AL)
- D. Maximum Contaminant Level Goal (MCLG)
- E. None of the Above

14. _____ - The concentration of a contaminant that, if exceeded, triggers treatment or other requirements which a water system must follow.

- A. Treatment Technique (TT)
- B. Maximum Contaminant Level (MCL)
- C. Action Level (AL)
- D. Maximum Contaminant Level Goal (MCLG)
- E. None of the Above

15. _____ - The level of a contaminant in drinking water below which there is no known or expected risk to health.

- A. Treatment Technique (TT)
- B. Maximum Contaminant Level (MCL)
- C. Action Level (AL)
- D. Maximum Contaminant Level Goal (MCLG)
- E. None of the Above

Timeline of Existing Federal Water and State Drinking Water Quality Regulations

16. Promulgated 1975-1981 Contained 7 contaminants Targeted: Trihalomethanes, Arsenic, and Radionuclides Established 22 drinking water standards.

- A. NIPDWR
- B. Phase 1 Standards
- C. Phase 2 Standards
- D. Phase 5 Standards
- E. Stage 1 Disinfectant/Disinfection By-product (D/DBP) Rule
- F. None of the Above

17. Promulgated 1987 Contained 8 contaminants Targeted: VOCs.

- A. NIPDWR
- B. Phase 1 Standards
- C. Phase 2 Standards
- D. Phase 5 Standards
- E. Stage 1 Disinfectant/Disinfection By-product (D/DBP) Rule
- F. None of the Above

18. Promulgated 1992 Contained 23 contaminants Targeted: VOCs, SOCs, and IOCs.

- A. NIPDWR
- B. Phase 1 Standards
- C. Phase 2 Standards
- D. Phase 5 Standards
- E. Stage 1 Disinfectant/Disinfection By-product (D/DBP) Rule
- F. None of the Above

19. Promulgated 1998 Contained 14 contaminants Targeted: DBPs and precursors.

- A. NIPDWR
- B. Phase 1 Standards
- C. Phase 2 Standards
- D. Phase 5 Standards
- E. Stage 1 Disinfectant/Disinfection By-product (D/DBP) Rule
- F. None of the Above

20. Promulgated 2000 Contained 4 contaminants Targeted: Radionuclides.

- A. Arsenic Rule
- B. Filter Backwash Recycling Rule
- C. Radionuclide Rule
- D. IESWTR
- E. SWTR
- F. None of the Above

21. Promulgated 2001 Contained - Targeted: Microbiological and Turbidity.

- A. Arsenic Rule
- B. Filter Backwash Recycling Rule
- C. Radionuclide Rule
- D. IESWTR
- E. SWTR
- F. None of the Above

Water Quality Key Words

22. _____: A chemical element with the symbol Sb (Latin: stibium, meaning "mark") and atomic number 51.

- A. CHLORITE
- B. CHROMIUM
- C. ASBESTOS
- D. BERYLLIUM
- E. ANTIMONY
- F. None of the Above

23. _____ is used in flame-proofing, paints, ceramics, enamels, a wide variety of alloys, electronics, and rubber.
- A. CHLORITE D. BERYLLIUM
 B. CHROMIUM E. BROMATE
 C. ANTIMONY F. None of the Above
24. _____: A chemical element. It has the symbol Ba, and atomic number 56.
- A. CHLORITE D. BERYLLIUM
 B. CHROMIUM E. BROMATE
 C. BARIUM F. None of the Above
25. A bivalent element, _____ is a steel grey, strong, light-weight yet brittle alkaline earth metal. It is primarily used as a hardening agent in alloys, most notably beryllium copper.
- A. CHLORITE D. BERYLLIUM
 B. CHROMIUM E. BROMATE
 C. ASBESTOS F. None of the Above
26. _____: An inorganic anion, bromate is tasteless and colorless, with a low volatility. As a moderately strong oxidant, bromate is reactive. BrO_3^- is a bromine-based oxoanion.
- A. CHLORITE D. BERYLLIUM
 B. CHROMIUM E. BROMATE
 C. ASBESTOS F. None of the Above
27. _____: A chemical element with the symbol Cd and atomic number 48. A relatively abundant, soft, bluish-white, transition metal, cadmium is known to cause cancer and occurs with zinc ores.
- A. CHLORITE D. BERYLLIUM
 B. CHROMIUM E. CADMIUM
 C. ASBESTOS F. None of the Above
28. _____: A chlorite (compound) is a compound that contains this group, with chlorine in oxidation state +3. Chlorites are also known as salts of chlorous acid.
- A. CHLORITE D. BERYLLIUM
 B. CHROMIUM E. BROMATE
 C. ASBESTOS F. None of the Above
29. This element is a steel-gray, lustrous, hard metal that takes a high polish and has a high melting point. It is also odorless, tasteless, and malleable. Identify the related term...
- A. CHLORITE D. BERYLLIUM
 B. CHROMIUM E. BROMATE
 C. ASBESTOS F. None of the Above
30. _____ are chemical, organic and inorganic substances that can form during a reaction of a disinfectant with naturally present organic matter in the water.
- A. HIGH-TEST HYPOCHLORITE D. HYDROCHLORIC ACID
 B. HALOACETIC ACIDS E. FORMAZIN TURBIDITY UNIT (FTU)
 C. DISINFECTION BYPRODUCTS F. None of the Above
31. Chlorine in water is determined according to ISO 7393-2 by colorimetric HACH method on the basis of DPD (N, N-diethyl - p - phenylendiamine). The photometric detection uses the wave lengths of 490 – 555 nm. Hach elected, for most of his _____ colorimetric systems, the wave length of 530 nm.
- A. HIGH-TEST HYPOCHLORITE D. HYDROCHLORIC ACID
 B. HALOACETIC ACIDS E. DPD
 C. DISINFECTION BYPRODUCTS F. None of the Above

32. The technique is the same as that for the NTU, but the calibration uses microspheres of the polymer formazin.

- A. HIGH-TEST HYPOCHLORITE
- B. HALOACETIC ACIDS
- C. DISINFECTION BYPRODUCTS
- D. HYDROCHLORIC ACID
- E. FORMAZIN TURBIDITY UNIT (FTU)
- F. None of the Above

33. _____: A composition composed mainly of calcium hypochlorite is commonly called high test hypochlorite.

- A. HIGH-TEST HYPOCHLORITE
- B. HALOACETIC ACIDS
- C. DISINFECTION BYPRODUCTS
- D. HYDROCHLORIC ACID
- E. FORMAZIN TURBIDITY UNIT (FTU)
- F. None of the Above

34. _____: It is the aqueous solution of hydrogen chloride gas (HCl). It is a strong acid, and the major component of gastric acid, and of wide industrial use.

- A. HIGH-TEST HYPOCHLORITE
- B. HALOACETIC ACIDS
- C. DISINFECTION BYPRODUCTS
- D. HYDROCHLORIC ACID
- E. FORMAZIN TURBIDITY UNIT (FTU)
- F. None of the Above

35. _____: EPA collected data required by the Information Collection Rule (May 14, 1996) to support future regulation of microbial contaminants, disinfectants, and disinfection byproducts.

- A. ICR
- B. IRON BACTERIA
- C. HYDROCHLORIC ACID
- D. MANGANESE (IV) OXIDE
- E. LETHAL CONCENTRATION 50
- F. None of the Above

36. _____: In the management of water-supply wells, iron bacteria are bacteria that derive the energy they need to live and multiply by oxidizing dissolved ferrous iron (or the less frequently available manganese and aluminum).

- A. ICR
- B. IRON BACTERIA
- C. HYDROCHLORIC ACID
- D. MANGANESE (IV) OXIDE
- E. LETHAL CONCENTRATION 50
- F. None of the Above

37. They are known to grow and proliferate in waters containing as low as 0.1 mg/l of iron. However, at least 0.3 ppm of dissolved oxygen is needed to carry out oxidation. The proliferation of iron bacteria, in some way, increases the chance of sulfur bacteria infestation. Identify the related term...

- A. ICR
- B. IRON BACTERIA
- C. HYDROCHLORIC ACID
- D. MANGANESE (IV) OXIDE
- E. LETHAL CONCENTRATION 50
- F. None of the Above

38. _____: The chemical compound MnO₂, commonly called manganese dioxide.

- A. MCLG
- B. MCL
- C. NTU
- D. MANGANESE (IV) OXIDE
- E. PEL or OSHA PEL
- F. None of the Above

39. The principal use for MnO₂ is for dry-cell batteries, such as the alkaline battery and the zinc-carbon battery. In 1976 this application accounted for 500,000 tons of pyrolusite. MnO₂ is also used for production of MnO₄⁻. It is used extensively as an oxidizing agent in organic synthesis, for example, for the oxidation of allylic alcohols.

- A. MCLG
- B. MCL
- C. NTU
- D. MANGANESE (IV) OXIDE
- E. PEL or OSHA PEL
- F. None of the Above

40. _____: The maximum level at which a contaminant can exist in drinking water without having an adverse effect on human health.
- A. MCLG D. MANGANESE (IV) OXIDE
 B. MCL E. PEL or OSHA PEL
 C. NTU F. None of the Above
41. The greater the scattering, the higher the turbidity. Therefore, low _____ values indicate high water clarity, while high NTU values indicate low water clarity.
- A. MCLG D. MANGANESE (IV) OXIDE
 B. MCL E. PEL or OSHA PEL
 C. NTU F. None of the Above
42. For substances it is usually expressed in parts per million (ppm), or sometimes in milligrams per cubic meter (mg/m³). Identify the related term...
- A. MCLG D. MANGANESE (IV) OXIDE
 B. MCL E. PEL or OSHA PEL
 C. NTU F. None of the Above
43. _____: A wastewater technology in which powdered activated carbon is added to an anaerobic or aerobic treatment system.
- A. SCADA D. PACT
 B. REL E. TNCWS
 C. PPM F. None of the Above
44. _____: Abbreviation for parts per million.
- A. SCADA D. PACT
 B. REL E. TNCWS
 C. PPM F. None of the Above
45. Chemical formula is CaO. Identify the related term...
- A. SCADA D. PACT
 B. REL E. QUICKLIME
 C. PPM F. None of the Above
46. The _____ is a level that NIOSH believes would be protective of worker safety and health over a working lifetime if used in combination with engineering and work practice controls, exposure and medical monitoring, posting and labeling of hazards, worker training and personal protective equipment.
- A. SCADA D. PACT
 B. REL E. TNCWS
 C. PPM F. None of the Above
47. _____ A remote method of monitoring pumps and equipment.
- A. SCADA D. PACT
 B. REL E. TNCWS
 C. PPM F. None of the Above
48. These systems do not have to test or treat their water for contaminants which pose long-term health risks because fewer than 25 people drink the water over a long period. They still must test their water for microbes and several chemicals.
- A. SCADA D. PACT
 B. REL E. TNCWS
 C. PPM F. None of the Above

49. _____: Solvents used as degreasers or cleaning agents. Improper disposal of VOCs can lead to contamination of natural waters.
A. SCADA D. PACT
B. REL E. VOCs
C. PPM F. None of the Above

50. _____ are organic chemical compounds that have high enough vapor pressures under normal conditions to significantly vaporize and enter the atmosphere.
A. SCADA D. PACT
B. REL E. VOCs
C. PPM F. None of the Above

Water Sampling Terms, and Definitions

Microbes

51. _____ are common in the environment and are generally not harmful.
A. Giardia lamblia D. Human or animal wastes
B. Cryptosporidiosis E. Coliform bacteria
C. Microbial growth F. None of the Above

52. The presence of these bacteria in drinking water is 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 _____.
A. Giardia lamblia D. Germs that can cause disease
B. Cryptosporidiosis E. Bacteria
C. Microbial growth F. None of the Above

53. _____ in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms.
A. Giardia lamblia D. Human or animal wastes
B. Cryptosporidiosis E. Microbes
C. Microbial growth F. None of the Above

54. Turbidity may indicate the presence of disease causing organisms. These organisms include _____ that can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.
A. Giardia lamblia D. Human or animal wastes
B. Cryptosporidiosis E. Bacteria, viruses, and parasites
C. Microbial growth F. None of the Above

55. The disease can be severe or fatal for people with severely weakened immune systems. The EPA and the CDC have prepared advice for those with severely compromised immune systems who are concerned about _____.
A. Giardia lamblia D. Human or animal wastes
B. Cryptosporidiosis E. Cryptosporidium
C. Microbial growth F. None of the Above

Radionuclides

56. _____ Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the EPA standard over many years may have an increased risk of getting cancer.
A. Beta/photon emitters D. Radon
B. Combined Radium 226/228 E. EPA standard
C. Alpha emitters F. None of the Above

57. _____ Some people who drink water containing radium 226 or 228 in excess of EPA standard over many years may have an increased risk of getting cancer.

- A. Beta/photon emitters
- B. Combined Radium 226/228
- C. Alpha emitters
- D. Radon
- E. EPA standard
- F. None of the Above

58. _____ in air is more dangerous than radon in water.

- A. Beta/photon emitters
- B. Combined Radium 226/228
- C. Alpha emitters
- D. Radon
- E. EPA standard
- F. None of the Above

59. _____ Many communities add fluoride to their drinking water to promote dental health. Each community makes its own decision about whether or not to add fluoride.

- A. Fluoride
- B. Arsenic
- C. Lead
- D. EPA standard
- E. Drinking water
- F. None of the Above

60. The EPA has also set a secondary _____ standard of 2 mg/L to protect against dental fluorosis.

- A. Fluoride
- B. Arsenic
- C. Lead
- D. EPA standard
- E. Drinking water
- F. None of the Above

61. Children under nine should not drink water that has more than 2 mg/L of _____.

- A. Fluoride
- B. Arsenic
- C. Lead
- D. EPA standard
- E. Drinking water
- F. None of the Above

Waterborne Pathogens and Disease Section

62. _____ that cause disease are known as pathogens. Most pathogens are generally associated with diseases that cause intestinal illness and affect people in a relatively short amount of time, generally a few days to two weeks.

- A. Intestinal illness
- B. Pathogens
- C. Microscopic particles
- D. Bacteria, viruses, and protozoan
- E. Feces-to-mouth route
- F. None of the Above

63. _____ may get into water and spread when infected humans or animals pass the bacteria, viruses, and protozoa in their stool. For another person to become infected, he or she must take that pathogen in through the mouth.

- A. Intestinal illness
- B. Pathogens
- C. Microscopic particles
- D. Stomach flu
- E. Feces-to-mouth route
- F. None of the Above

64. Human or animal wastes in watersheds, failing septic systems, failing sewage treatment plants or cross-connections of water lines with sewage lines provide the potential for contaminating water with _____.

- A. Intestinal illness
- B. Pathogens
- C. Microscopic particles
- D. Stomach flu
- E. Feces-to-mouth route
- F. None of the Above

65. These particles, containing _____, may remain in the water and be passed to humans or animals unless adequately treated.

- A. Intestinal illness
- B. Pathogens
- C. Microscopic particles
- D. Stomach flu
- E. Feces-to-mouth route
- F. None of the Above

66. In addition to water, other methods exist for spreading pathogens by the _____. The foodborne route is one of the more common methods.

- A. Intestinal illness
- B. Pathogens
- C. Microscopic particles
- D. Stomach flu
- E. Fecal-oral route
- F. None of the Above

67. The individual who eats _____ may become infected and ill. It is interesting to note the majority of foodborne diseases occur in the home, not restaurants.

- A. Intestinal illness
- B. Pathogens
- C. Microscopic particles
- D. Feces-contaminated food
- E. Feces-to-mouth route
- F. None of the Above

68. Infected children in diapers may get _____ on their fingers, then put their fingers in a friend's mouth or handle toys that other children put into their mouths.

- A. Intestinal illness
- B. Pathogens
- C. Microscopic particles
- D. Stomach flu
- E. Feces
- F. None of the Above

69. Technically, influenza is an upper respiratory illness and rarely has diarrhea associated with it; therefore, _____ is a misleading description for foodborne or waterborne illnesses, yet is accepted by the general public.

- A. Intestinal illness
- B. Pathogens
- C. Microscopic particles
- D. Stomach flu
- E. Feces-to-mouth route
- F. None of the Above

Chain of Transmission

70. Water is contaminated with feces. This contamination may be of human or animal origin. The feces must contain _____ (disease-causing bacteria, viruses or protozoa).

- A. Cryptosporidium
- B. Pathogens
- C. Susceptible person
- D. Campylobacteriosis
- E. Cholera, Legionellosis, salmonellosis, shigellosis, and yersiniosis
- F. None of the Above

71. If the human or animal source is not infected with a _____, no disease will result. The pathogens must survive in the water.

- A. Cryptosporidium
- B. Pathogen
- C. Susceptible person
- D. Campylobacteriosis
- E. Cholera, Legionellosis, salmonellosis, shigellosis, and yersiniosis
- F. None of the Above

72. This depends on the temperature of the water and the length of time the _____ are in the water.

- A. Cryptosporidium
- B. Pathogens
- C. Susceptible person
- D. Campylobacteriosis
- E. Cholera, Legionellosis, salmonellosis, shigellosis, and yersiniosis
- F. None of the Above

73. Some pathogens will survive for only a short time in water, others, such as Giardia or _____, may survive for months.

- A. Cryptosporidium
- B. Pathogens
- C. Susceptible person
- D. Campylobacteriosis
- E. Cholera, Legionellosis, salmonellosis, shigellosis, and yersiniosis
- F. None of the Above

74. The pathogens in the water must enter the water system's intake and in numbers sufficient to infect people. The water is either not treated or inadequately treated for the _____ present.

- A. Cryptosporidium
- B. Pathogens
- C. Susceptible person
- D. Campylobacteriosis
- E. Cholera, Legionellosis, salmonellosis, shigellosis, and yersiniosis
- F. None of the Above

75. A susceptible person must drink the water that contains the _____. Illness (disease) will occur.

- A. Cryptosporidium
- B. Pathogen
- C. Susceptible person
- D. Campylobacteriosis
- E. Cholera, Legionellosis, salmonellosis, shigellosis, and yersiniosis
- F. None of the Above

76. This chain lists the events that must occur for the _____ via drinking water. By breaking the chain at any point, the transmission of disease will be prevented.

- A. Cryptosporidium
- B. Pathogens
- C. Susceptible person
- D. Transmission of disease
- E. Cholera, Legionellosis, salmonellosis, shigellosis, and yersiniosis
- F. None of the Above

Bacterial Diseases

77. _____ is the most common diarrhea illness caused by bacteria. Symptoms include abdominal pain, malaise, fever, nausea and vomiting, and they usually begin three to five days after exposure.

- A. Cryptosporidium
- B. Pathogens
- C. Susceptible person
- D. Campylobacteriosis
- E. Cholera, Legionellosis, salmonellosis, shigellosis, and yersiniosis
- F. None of the Above

78. The illness is frequently over within two to five days and usually lasts no more than 10 days. _____ outbreaks have most often been associated with food, especially chicken and unpasteurized milk, as well as un-chlorinated water.

- A. Cryptosporidium
- B. Pathogens
- C. Susceptible person
- D. Campylobacteriosis
- E. Cholera, Legionellosis, salmonellosis, shigellosis, and yersiniosis
- F. None of the Above

Types of Bacteria

79. These organisms are also an important cause of _____. Medical treatment generally is not prescribed for campylobacteriosis because recovery is usually rapid.

- A. Cryptosporidium
- B. Travelers' diarrhea
- C. Susceptible person
- D. Campylobacteriosis
- E. Cholera, Legionellosis, salmonellosis, shigellosis, and yersiniosis
- F. None of the Above

80. _____ are other bacterial diseases that can be transmitted through water. All bacteria in water are readily killed or inactivated with chlorine or other disinfectants.

- A. Cryptosporidium
- B. Pathogens
- C. Susceptible person
- D. Campylobacteriosis
- E. Cholera, Legionellosis, salmonellosis, shigellosis, and yersiniosis
- F. None of the Above

Viral-Caused Diseases

81. Hepatitis A 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 _____.

- A. Common viral disease
- B. Incubation period
- C. Viruses
- D. Giardiasis
- E. Jaundice
- F. None of the Above

82. The disease varies in severity from a _____ lasting one to two weeks, to a severely disabling disease lasting several months (rare).

- A. Common viral disease
- B. Incubation period
- C. Viruses
- D. Giardiasis
- E. Mild illness
- F. None of the Above

83. The _____ is 15-50 days and averages 28-30 days.
- A. Common viral disease
 - B. Incubation period
 - C. Viruses
 - D. Giardiasis
 - E. Cyst
 - F. None of the Above

84. Hepatitis A outbreaks have been related to fecally contaminated water; food contaminated by infected food handlers, including sandwiches and salads that are not cooked or are handled after cooking and raw or undercooked mollusks harvested from _____.
- A. Common viral disease
 - B. Incubation period
 - C. Contaminated waters
 - D. Giardiasis
 - E. Cyst
 - F. None of the Above

85. Aseptic meningitis, polio and viral gastroenteritis (Norwalk agent) are other _____ that can be transmitted through water.
- A. Viral diseases
 - B. Incubation period
 - C. Viruses
 - D. Giardiasis
 - E. Cyst
 - F. None of the Above

86. Most viruses in drinking water can be _____ or other disinfectants.
- A. Common viral disease
 - B. Incubation period
 - C. Inactivated by chlorine
 - D. Giardiasis
 - E. Cyst
 - F. None of the Above

Protozoan Caused Diseases

87. Protozoan pathogens are larger than bacteria and viruses but still microscopic. They invade and inhabit the _____.
- A. Common viral disease
 - B. Gastrointestinal tract
 - C. Viruses
 - D. Giardiasis
 - E. Cyst
 - F. None of the Above

88. Some parasites enter the environment in a dormant form, with a protective cell wall, called a _____.
- A. Common viral disease
 - B. Incubation period
 - C. Viruses
 - D. Giardiasis
 - E. Cyst
 - F. None of the Above

89. The _____ can survive in the environment for long periods of time and is extremely resistant to conventional disinfectants such as chlorine.
- A. Common viral disease
 - B. Incubation period
 - C. Viruses
 - D. Giardiasis
 - E. Cyst
 - F. None of the Above

90. Effective filtration treatment is therefore critical to removing these _____ from water sources.
- A. Common viral disease
 - B. Organisms
 - C. Viruses
 - D. Giardiasis
 - E. Cyst
 - F. None of the Above

91. _____ is a commonly reported protozoan-caused disease. It has also been referred to as backpacker's disease and beaver fever because of the many cases reported among hikers and others who consume untreated surface water.
- A. Common viral disease
 - B. Incubation period
 - C. Viruses
 - D. Giardiasis
 - E. Cyst
 - F. None of the Above

92. Symptoms include chronic diarrhea, abdominal cramps, bloating, frequent loose and _____, fatigue and weight loss.

- A. Common viral disease
- B. Incubation period
- C. Viruses
- D. Giardiasis
- E. Cyst
- F. None of the Above

93. The _____ is 5-25 days or longer, with an average of 7-10 days. Many infections are asymptomatic (no symptoms).

- A. Common viral disease
- B. Incubation period
- C. Viruses
- D. Giardiasis
- E. Cyst
- F. None of the Above

94. _____ occurs worldwide. Waterborne outbreaks in the United States occur most often in communities receiving their drinking water from streams or rivers without adequate disinfection or a filtration system.

- A. Common viral disease
- B. Incubation period
- C. Viruses
- D. Giardiasis
- E. Cyst
- F. None of the Above

Giardia lamblia

95. Giardia lamblia has been responsible for more community-wide _____ in the U.S. than any other pathogen. Drugs are available for treatment, but these are not 100% effective.

- A. Cryptosporidium
- B. Cryptosporidiosis
- C. General malaise
- D. Pathogen
- E. Outbreaks of disease
- F. None of the Above

Cryptosporidiosis

96. Cryptosporidiosis is an example of a _____ that is common worldwide, but was only recently recognized as causing human disease.

- A. Cryptosporidium
- B. Cryptosporidiosis
- C. Protozoan disease
- D. Pathogen
- E. Waterborne disease outbreak
- F. None of the Above

97. The major symptom in humans is diarrhea, which may be profuse and watery. The diarrhea is associated with cramping abdominal pain. _____, fever, anorexia, nausea and vomiting occur less often.

- A. Cryptosporidium
- B. Cryptosporidiosis
- C. General malaise
- D. Pathogen
- E. Waterborne disease outbreak
- F. None of the Above

98. _____ 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. Cryptosporidium
- B. Cryptosporidiosis
- C. General malaise
- D. Symptoms
- E. Waterborne disease outbreak
- F. None of the Above

99. _____ organisms have been identified in human fecal specimens from more than 50 countries on six continents.

- A. Cryptosporidium
- B. Cryptosporidiosis
- C. General malaise
- D. Pathogen
- E. Waterborne disease outbreak
- F. None of the Above

100. The mode of transmission is fecal-oral, either by person-to-person or animal-to-person. There is no specific treatment for _____ infections.

- A. Cryptosporidium
- B. Cryptosporidiosis
- C. General malaise
- D. Pathogen
- E. Waterborne disease outbreak
- F. None of the Above

101. All of these diseases, with the exception of hepatitis A, 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, and the same routes of transmission, being either foodborne or _____.

- A. Cryptosporidium
- B. Cryptosporidiosis
- C. General malaise
- D. Pathogen
- E. Waterborne
- F. None of the Above

102. Although most _____ cause mild, self-limiting disease, on occasion, they can cause serious, even life threatening illness.

- A. Cryptosporidium
- B. Cryptosporidiosis
- C. General malaise
- D. Pathogens
- E. Waterborne disease outbreak
- F. None of the Above

103. Particularly vulnerable are persons with _____ such as those with HIV infections or cancer.

- A. Cryptosporidium
- B. Cryptosporidiosis
- C. General malaise
- D. Pathogen
- E. Weak immune systems
- F. None of the Above

104. By understanding the nature of _____, the importance of properly constructed, operated and maintained public water systems becomes obvious.

- A. Cryptosporidium
- B. Cryptosporidiosis
- C. General malaise
- D. Pathogen
- E. Waterborne diseases
- F. None of the Above

105. While water treatment cannot achieve sterile water (no microorganisms), the goal of treatment must clearly be to produce drinking water that is as pathogen-free as possible at all times. For those who operate water systems with inadequate source protection or treatment facilities, the potential risk of a _____ is real.

- A. Cryptosporidium
- B. Cryptosporidiosis
- C. General malaise
- D. Pathogen
- E. Waterborne disease outbreak
- F. None of the Above

Bacteriological Monitoring Section

106. Most waterborne diseases and illnesses have been related to the _____ of drinking water.

- A. Disease-causing microorganisms
- B. Microbiological analysis
- C. Bacteria tests
- D. Sample container
- E. Microbiological quality
- F. None of the Above

107. The routine _____ of your water is for coliform bacteria. The coliform bacteria group is used as an indicator organism to determine the biological quality of your water.

- A. Disease-causing microorganisms
- B. Microbiological analysis
- C. Bacteria tests
- D. Sample container
- E. Microbiological quality
- F. None of the Above

108. The _____ of an indicator or pathogenic bacteria in your drinking water is an important health concern. Indicator bacteria signal possible fecal contamination, and therefore, the potential presence of pathogens.

- A. Disease-causing microorganisms
- B. Microbiological analysis
- C. Bacteria tests
- D. Presence
- E. Microbiological quality
- F. None of the Above

109. They are used to monitor for pathogens because of the difficulties in determining the presence of specific _____.

- A. Disease-causing microorganisms
- B. Microbiological analysis
- C. Bacteria tests
- D. Sample container
- E. Microbiological quality
- F. None of the Above

110. _____ are usually harmless, occur in high densities in their natural environment and are easily cultured in relatively simple bacteriological media. Indicators in common use today for routine monitoring of drinking water include total coliforms, fecal coliforms, and Escherichia coli (E. coli).

- A. Disease-causing microorganisms
- B. Microbiological analysis
- C. Indicator bacteria
- D. Sample container
- E. Microbiological quality
- F. None of the Above

Bacteria Sampling

111. Water samples for _____ must always be collected in a sterile container. Take the sample from an inside faucet with the aerator removed.

- A. Disease-causing microorganisms
- B. Microbiological analysis
- C. Bacteria tests
- D. Sample container
- E. Microbiological quality
- F. None of the Above

112. _____ by spraying a 5% household bleach or alcohol solution or flaming the end of the tap with disposable butane lighter.

- A. Sterilize
- B. Microbiological analysis
- C. Bacteria tests
- D. Sample container
- E. Microbiological quality
- F. None of the Above

113. Carefully open the sample container and _____. Fill the container and replace the top.

- A. Disease-causing microorganisms
- B. Microbiological analysis
- C. Hold the outside of the cap
- D. Sample container
- E. Microbiological quality
- F. None of the Above

114. _____ is not recommended because laboratory analysis results are not as reliable.

- A. Needed for identification
- B. Mailing bacteria samples
- C. Refrigerate the sample
- D. Indicates that the water
- E. Total coliform analysis
- F. None of the Above

115. Coliform bacteria are common in the environment and are generally not harmful. However, the _____ in drinking water is 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. Needed for identification
- B. Mailing bacteria samples
- C. Refrigerate the sample
- D. Presence of these bacteria
- E. Total coliform analysis
- F. None of the Above

Laboratory Procedures

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

- A. Needed for identification
- B. Mailing bacteria samples
- C. Refrigerate the sample
- D. Indicates that the water
- E. Total coliform analysis
- F. None of the Above

Methods

117. 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. Routine
- B. Repeat
- C. Special
- D. Colilert
- E. Fecal coliforms or E. coli
- F. None of the Above

Types of Water Samples

118. It is important to properly identify the type of sample you are collecting. Please indicate in the space provided on the laboratory form the _____.

- A. Routine
- B. Repeat
- C. Special
- D. Type of sample
- E. Fecal coliforms or E. coli
- F. None of the Above

119. _____: Samples collected on a routine basis to monitor for contamination. Collection should be in accordance with an approved sampling plan.

- A. Routine
- B. Repeat
- C. Special
- D. Colilert
- E. Fecal coliforms or E. coli
- F. None of the Above

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

- A. Routine
- B. Repeat
- C. Special
- D. Colilert
- E. Fecal coliforms or E. coli
- F. None of the Above

Please fax or e-mail the answer key to TLC
Western Campus Fax (928) 272-0747.

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.

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

Thank you...