

DETAILED CEU COURSE DESCRIPTION

WATERBORNE DISEASES CEU TRAINING COURSE

This course is a review of commonly found water and wastewater diseases, symptoms, and identification techniques. It is essential for water/wastewater operators to properly identify waterborne diseases to protect the integrity of the water supply. This course will cover the federal rules concerning water and wastewater sampling techniques, waterborne disease control, general water quality operations and definitions; disease symptoms; disease diagnosis; history; susceptibility; and disease sources of contamination. This course will apply to all categories of water treatment/distribution and wastewater treatment/collection. It is our responsibility to identify, stop and control all waterborne diseases.

This course was designed for the enhancement of laboratory technical abilities. This course was designed for Water Laboratory Analysts, but can be utilized by Wastewater Treatment, Collections, Water Distribution, Well Drillers, Pump Installers, and Water Treatment Operators. The target audience for this course is any person that has at least 2 years of college lecture and laboratory course work in microbiology or a closely related field. This person should have at least 6 months of continuous bench experience with environmental protozoa detection techniques and must have successfully analyzed at least 50 water and/or wastewater samples for *Cryptosporidium* and *Giardia*. Six months of additional experience in the above areas may be substituted for two years of college. This course is also an excellent introduction for a person interested in working in the water quality field, water/wastewater treatment or distribution or a collections facility and wishing to maintain CEUs for certification license or to learn how to do the job safely and effectively, and/or to meet education needs for promotion. Every operator or customer service person that has contact with the public should have this booklet accessible to help answer water quality and waterborne disease related questions.

Background

Less than 100 years ago, typhoid fever and amebiasis were the main causes of water-borne illnesses and deaths in the U.S. Thanks to contemporary water treatment measures, we have defeated old foes like typhoid fever, cholera, and dysentery.

But new threats have emerged in our waters. Microbial contamination of water is rare, but it can and does occur, resulting in illness and even death.

Probably the best known and most deadly case of contamination in the U.S. in recent years happened in Milwaukee in 1993, when the municipal water supply was contaminated by *Cryptosporidium*, an intestinal protozoan. At least 50 people died, and some 400,000 people became ill, 4,000 badly enough to be hospitalized.

This course provides guidance for water providers and public health personnel about recognizing illnesses or patterns of illness that might be associated with intentional release of biologic agents.



Cryptosporidium
image courtesy of
Centers for Disease
Control and
Prevention (Parasite
Library).

General Learning Objectives

Bacteriological Monitoring Section – Chapter 1
Water Quality Section Introduction- Chapter 2
Water Microbiology - Chapter 3
Escherichia Coli - Chapter 4
Giardiasis *Giardia lamblia* - Chapter 5
Cryptosporidiosis *Cryptosporidium* - Chapter 6
Legionnaires' Disease - Legionella -Chapter 7
Related Diseases and Associated Illnesses Chapter 9
Chapter 10- Laboratory Analysis
Chlorination Section – Chapter 11

Specific Learning Objectives

Bacteriological Monitoring Section – Chapter 1

Section Focus: You will learn the basics of the EPA's Total Coliform Rule and bacteriological sampling. At the end of this section, you the student will be able to understand and describe the Total Coliform Rule. There is a post quiz at the end of this section to review your comprehension and a final examination in the Assignment for your contact hours.

Scope/Background: The Environmental Protection Agency (EPA) published the Revised Total Coliform Rule (RTCR) in the Federal Register (FR) on February 13, 2013 (78 FR 10269) and minor corrections on February 26, 2014 (79 FR 10665). The RTCR is the revision to the 1989 Total Coliform Rule (TCR) and is intended to improve public health protection.

Bacteriological Monitoring Section–Chapter 1

TCR Provisions – CRAO&WQ
Related Microbes CRAO& MO
Bacteriological Monitoring - CRAO& MO
Types of Samples – CRAO
Coliform Present – CRAO& MO
Heterotrophic Plate Count CRAO& MO
Total Coliforms– CRAO
Pathogens CRAO& MO
Viral Diseases – CRAO
Microbial Contaminants – CRAO
Chain of Custody– CRAO
Collection of Surface Samples– CRAO&WQ
Total Coliform Rule Summary– CRAO&WQ
Post Quiz

Water Quality Section Introduction- Chapter 2

Section Focus: You will learn the basics of the EPA's Safe Water Drinking Act and the reasons why we need to ensure the water means federal standards. At the end of this section, you the student will be able to understand and describe EPA's Primary and Secondary standards. There is a post quiz at the end of this section to review your comprehension and a final examination in the Assignment for your contact hours.

Scope/Background: EPA identifies contaminants to regulate in drinking water to protect public health. The Agency sets regulatory limits for the amounts of certain contaminants in water provided by public water systems. These contaminant standards are required by

the Safe Drinking Water Act (SDWA). Drinking water standards may apply differently based on type and size of public water systems.

Water Quality Section –Chapter 2

Safe Drinking Water Act – CRAO

Source Water Protection – CRAO

MCL Introduction – CRAO

Inorganic Contaminants – CRAO

IESWTR – CRAO

Arsenic – CRAO

Sampling Plan Introduction – CRAO

Disinfection Rules Stages 1 and 2– CRAO

QA/QC Measures – CRAO

Drinking Water Analysis Chart – CRAO

Post Quiz

Water Microbiology - Chapter 3

Section Focus: You will learn the basics of bacteria and the history for bacteriological discoveries. At the end of this section, you the student will be able to understand and describe simple microbiology. There is a post quiz at the end of this section to review your comprehension and a final examination in the Assignment for your contact hours.

Scope/Background: The bacteriological examination of water is performed routinely by water utilities and many governmental agencies to ensure a safe supply (potable) of water. The Laboratory examination is intended to identify water sources which have been contaminated with potential disease-causing microorganisms. Such contamination generally occurs either directly by human or animal feces, or indirectly through improperly treated sewage (re-use effluent) or improperly functioning sewage treatment systems. The organisms of prime concern are the intestinal pathogens, (bacteria, viruses, cysts, single-celled organisms) particularly those that cause E. coli, gastroenteritis, cryptosporidiosis or giardia (primary domestic concerns).

Water Microbiology - Chapter 3

History

Germ Theory–MO & TECH & LAB

Cell Metabolism–MO & TECH & LAB

Bacteria –MO & TECH

Prokaryotes–MO & TECH

Gram Stain–MO & TECH & LAB

Eukaryotes – MO & LAB

Paramecium– MO & LAB

Protozoa– MO & LAB

Amoebas– MO & LAB

Protozoan Diseases–MO & TECH & LAB

References

Bacteria Glossary–MO & TECH & LAB

Post Quiz

Escherichia Coli - Chapter 4

Section Focus: You will learn the basics of *Escherichia coli* (e. coli). At the end of this section, you the student will be able to understand and describe *E. coli*. There is a post quiz at the end of this section to review your comprehension and a final examination in the Assignment for your contact hours.

Scope/Background: The bacteriological examination of water is performed routinely by water utilities and many governmental agencies to ensure a safe supply (potable) of water. The Laboratory examination is intended to identify water sources which have been contaminated with potential disease-causing microorganisms. Such contamination generally occurs either directly by human or animal feces, or indirectly through improperly treated sewage (re-use effluent) or improperly functioning sewage treatment systems. The organisms of prime concern are the intestinal pathogens, (bacteria, viruses, cysts, single-celled organisms) particularly those that cause *E. coli*, gastroenteritis, cryptosporidiosis or giardia (primary domestic concerns).

Escherichia Coli –Chapter 4

Fecal Bacteria–MO & TECH & LAB

Two Types of *E. Coli* –MO & TECH & LAB

Membrane Filter Total Coliforms –MO & TECH & LAB

Two Types of *E. Coli* –MO & TECH & LAB

E. Coli 0157:57–MO & TECH & LAB

Positive Test–MO & TECH & LAB

Clonal Groups–MO & TECH & LAB

Post Quiz

Giardiasis *Giardia lamblia* - Chapter 5

Section Focus: You will learn the basics of *Giardia*. At the end of this section, you the student will be able to understand and describe *Giardia* (also known as *Giardia intestinalis*, *Giardia lamblia*, or *Giardia duodenalis*). There is a post quiz at the end of this section to review your comprehension and a final examination in the Assignment for your contact hours.

Scope/Background: The bacteriological examination of water is performed routinely by water utilities and many governmental agencies to ensure a safe supply (potable) of water. The Laboratory examination is intended to identify water sources which have been contaminated with potential disease-causing microorganisms. Such contamination generally occurs either directly by human or animal feces, or indirectly through improperly treated sewage (re-use effluent) or improperly functioning sewage treatment systems. The organisms of prime concern are the intestinal pathogens, (bacteria, viruses, cysts, single-celled organisms) particularly those that cause *E. coli*, gastroenteritis, cryptosporidiosis or giardia (primary domestic concerns).

Giardiasis –Chapter 5

Frequency of Disease –MO & TECH & LAB

Nature of Disease–MO & TECH & LAB

Giardia Images–MO & TECH & LAB

Post Quiz

Cryptosporidiosis *Cryptosporidium* - Chapter 6

Section Focus: You will learn the basics of cryptosporidiosis. At the end of this section, you the student will be able to understand and describe *Cryptosporidium* infection (cryptosporidiosis) is an illness caused by tiny cryptosporidium parasites. There is a post quiz at the end of this section to review your comprehension and a final examination in the Assignment for your contact hours.

Scope/Background: The bacteriological examination of water is performed routinely by water utilities and many governmental agencies to ensure a safe supply (potable) of water. The Laboratory examination is intended to identify water sources which have been contaminated with potential disease-causing microorganisms. Such contamination generally occurs either directly by human or animal feces, or indirectly through improperly treated sewage (re-use effluent) or improperly functioning sewage treatment systems. The organisms of prime concern are the intestinal pathogens, (bacteria, viruses, cysts, single-celled organisms) particularly those that cause *E. coli*, gastroenteritis, cryptosporidiosis or giardia (primary domestic concerns).

Cryptosporidiosis –Chapter 6

Cryptosporidiosis Introduction–MO & TECH & LAB

Cryptosporidiosis Oocysts–MO & TECH & LAB

Images–MO & TECH & LAB

Route of Transmission–MO & TECH & LAB

Symptoms–MO & TECH & LAB

Prevention–MO & TECH & LAB

Water Filters–MO & TECH & LAB

Post Quiz

Cholera -*Vibrio cholerae* - Chapter 7

Section Focus: You will learn the basics of cholera. At the end of this section, you the student will be able to understand and describe the infection of small intestine caused by bacteria *vibrio cholerae* - cholera. This is a bacterial infection which is caused due to intake of contaminated water. There are many types of bacteria which are held responsible for causing cholera and this infection is occurs in varied degrees of severity. There is a post quiz at the end of this section to review your comprehension and a final examination in the Assignment for your contact hours.

Scope/Background: The bacteriological examination of water is performed routinely by water utilities and many governmental agencies to ensure a safe supply (potable) of water. The Laboratory examination is intended to identify water sources which have been contaminated with potential disease-causing microorganisms. Such contamination generally occurs either directly by human or animal feces, or indirectly through improperly treated sewage (re-use effluent) or improperly functioning sewage treatment systems. The organisms of prime concern are the intestinal pathogens, (bacteria, viruses, cysts, single-celled organisms) particularly those that cause *E. coli*, gastroenteritis, cryptosporidiosis or giardia (primary domestic concerns).

Cholera –Chapter 7

Control and Prevention–MO & TECH & LAB

El Tor–MO & TECH & LAB

Cholera Toxins–MO & TECH & LAB

Post Quiz

Legionnaires' Disease - Legionella -Chapter 8

Section Focus: You will learn the basics of Legionella bacteria. At the end of this section, you the student will be able to understand and describe Legionella bacteria and its effects - Legionnaires' disease. This is a bacterial infection which is caused due to intake of contaminated water. There are many types of bacteria which are held responsible for causing cholera and this infection is occurs in varied degrees of severity. There is a post quiz at the end of this section to review your comprehension and a final examination in the Assignment for your contact hours.

Scope/Background: *Legionella* bacteria can be found throughout the world, mostly in aquatic and moist environments (e.g., lakes, rivers, ground water and soil). *Legionella* can adversely impact public health. CDC estimates that 8,000 to 18,000 people are hospitalized with Legionnaires' disease each year in the U.S. EPA has developed the Surface Water Treatment Rules (SWTRs) to improve drinking water quality. The regulations provide protection from disease-causing pathogens, such as **Giardia lamblia**, *Legionella*, and *Cryptosporidium*. The regulations also protect against contaminants that can form during drinking water treatment.

Legionnaire's Disease–Chapter 8

Legionella Introduction–MO & TECH & LAB

L. Pneumophila–MO & TECH & LAB

Chlorine Dioxide–MO & TECH & LAB & DISN

Post Quiz

Related Diseases and Associated Illnesses Chapter 9

Section Focus: You will learn the basics of secondary waterborne diseases. At the end of this section, you the student will be able to understand and describe various secondary waterborne diseases and related concerns. This is a bacterial infection which is caused due to intake of contaminated water. There are many types of bacteria which are held responsible for causing cholera and this infection is occurs in varied degrees of severity. There is a post quiz at the end of this section to review your comprehension and a final examination in the Assignment for your contact hours.

Scope/Background: The bacteriological examination of water is performed routinely by water utilities and many governmental agencies to ensure a safe supply (potable) of water. The Laboratory examination is intended to identify water sources which have been contaminated with potential disease-causing microorganisms. Such contamination generally occurs either directly by human or animal feces, or indirectly through improperly treated sewage (re-use effluent) or improperly functioning sewage treatment systems.

Related Diseases –Chapter 9

Amebiasis–MO & TECH & LAB

Life Cycle–MO & TECH & LAB

Amebic Meningoencephalitis–MO & TECH & LAB

Naegleria Deaths–MO & TECH & LAB

Caliciviruses–MO & TECH & LAB

Schistosomiasis–MO & TECH & LAB

Gastroenteritis–MO & TECH & LAB

Rotavirus–MO & TECH & LAB

Virus Section –MO & TECH & LAB

Noroviruses–MO & TECH & LAB

Hepatitis Section–MO & TECH & LAB

Hepatitis A–MO & TECH & LAB

Leptospirosis–MO & TECH & LAB

Pseudomonas Aeruginosa–MO & TECH & LAB

Pyoverdin–MO & TECH & LAB
Pathogenesis–MO & TECH & LAB
Shigellosis–MO & TECH & LAB
Transmission–MO & TECH & LAB
Reported Cases–TECH
Typhoid Fever–MO & TECH & LAB
Tularemia–MO & TECH & LAB
MIB Geosmin–MO & TECH & LAB
Arsenic–TECH & LAB
Methemoglobinemia–MO & TECH & LAB
Illness Patterns–MO & TECH & LAB
References
Drinking Water Rules and Disease Relationship –CRAO
Water Quality Data–CRAO
Post Quiz

Chapter 10- Laboratory Analysis

Section Focus: You will learn the basics of water laboratory analysis with an emphasis on Chlorine and microorganisms. At the end of this section, you the student will be able to understand and describe disinfection related testing and microbial examination techniques. There is a post quiz at the end of this section to review your comprehension and a final examination in the Assignment for your contact hours.

Scope/Background: Laboratory analysis of water quality refers primarily to the chemical, physical, biological, and radiological characteristics of water. It is a measure of the condition of water relative to compliance or process control requirements. Laboratory analysis is frequently used by reference to a set of standards against which compliance, generally achieved through treatment of the water, can be assessed

Laboratory Analyst Section – Chapter 10

Residual Chlorine- CRAO
Chlorine Residual Reagents- CRAO
Biological Procedure Introduction
Protozoan Pathogens- CRAO & M/O
Method 1623- CRAO & M/O
Method 1604- CRAO & M/O
Post Quiz

Chlorination Section – Chapter 11

Section Focus: You will learn the basics of water disinfection with an emphasis on Chlorine. At the end of this section, you the student will be able to understand and describe chlorination. There is a post quiz at the end of this section to review your comprehension and a final examination in the Assignment for your contact hours.

Scope/Background: Traditionally, the use of chlorine gas was the most common method of water disinfection. Chlorine gas itself is relatively inexpensive but is a highly toxic chemical that must be transported and handled with extreme caution. It is stored under pressure in large tanks and is released into the water as a gas. Sodium hypochlorite is a diluted liquid form of chlorine that is also commonly used, primarily in the wellfield.

Chlorine Section–Chapter 11

Gas Introduction - O&M –DISN
Chemistry of Chlorination- O&M -DISN
Using DPD - O&M -DISN
DDBPs- O&M –DISN-CRAO

Risks and Benefits of Chlorine - O&M –DISN-CRAO- SAFETY
Chlorination Equipment - O&M –DISN- SAFETY
Chlorine Leak Detection - O&M –DISN- SAFETY
Chlorinator Parts- O&M –DISN- SAFETY
Amperometric Titration –WQ-DISN
Chlorine Dioxide - O&M –DISN- SAFETY
Chlorine Review- O&M –DISN- SAFETY
Ozone- O&M –DISN- SAFETY
Ultraviolet Radiation- O&M –DISN- SAFETY
Summary- O&M
Post Quiz

Topic Legend

This CEU course covers several educational topics/functions/purposes/objectives of conventional bacteriological monitoring, waterborne pathogen identification and regulatory compliance. The topics listed below are to assist in determining which educational objective or goal is covered for a specific topic area:

CRAO: The regulatory and compliance component. May be a requirement of the SDWA act or State Regulations, i.e. Compliance, non-compliance, process control related sampling or other drinking water related requirement. This EPA information is to satisfy the regulatory portion of your operator training. Part of O&M or laboratory training requirement for many operators.

DISINFECTION (DISN): This area covers plant disinfection procedures. Part of O&M training for many operators. May include alternative disinfection procedures, i.e. Ozone and Ultraviolet

LAB: A detailed Laboratory process or analysis. A process that is more advanced than simple grab sample analysis. Laboratory training for many operators.

M/O: The biological component. The microorganisms that are specifically found in drinking water. This section may be part of required sampling, i.e. Total Coliform Rule or other biological related sampling. O&M or laboratory training requirement for many operators.

O&M: This area is for normal operation and/or maintenance of the plant. Part of O&M training requirement for many operators.

SAFETY: This area is describing process safety procedures. O&M training requirement for many operators.

TECHNICAL (TECH): The mechanical or physical treatment process/component. The conventional or microfiltration process including processes, applications, engineering and theories. Part of O&M training for many operators.

WQ: Having to do with water quality or pollutants, i.e., hard water to primary water standards. May be a requirement of the SDWA and/or water chemistry concerns. This along with the EPA information is to satisfy the regulatory portion of your operator training.

Accreditation Formula for Figuring CEU Credit

The results of beta-testing were used in conjunction with a formula to determine average student time for accreditation purposes for intended audiences. This formula may not work for unintended audiences.

Course Page Count Total

780 pages times 2 equals 1560 divided by 60 minutes = 26.00 hours

500 post exam questions times 1 minutes = 8.30 hours

We are asking for 30 hours

Beta Testing Group Statistics

Seventeen students were selected for this assignment. All the students held water treatment and/or wastewater treatment operator certification positions. None of the test group received credit for their assignment. Four students failed the final examination. Three students did not complete the reading assignment. The average times were based upon the outcome of eleven students.

Timed Averages

Students have reported the following time burden for successful completion of this distance learning course to be estimated to average of 31 hours per response per completed assignment or final examination. The timed burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing of the final assignment and passing the assignment with a score of 70% or better.

Final Conclusion

The average time for the Waterborne Disease course is 31.5 hours with an average score of 85 percent.

Beta Course Training/Assessment Survey Results

1. 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

Task Analysis and Training Needs Assessment Process Information Gathering

Task Analysis and Training Needs Assessments have been conducted to determine or set Needs-To-Know for the basis of TLC's continuing education courses. The following is a listing of some of those who have conducted extensive valid studies from which TLC has based the continuing education program upon: the Environmental Protection Agency (EPA), the Arizona Department of Environmental Quality (ADEQ), the Texas Commission of Environmental Quality (TCEQ), Pennsylvania Department of Environmental Protection (PDEP) and the Association of Boards of Certification (ABC).

TLC has primary used Training Provider Manual for the Pennsylvania Water and Wastewater System Operator Training Program for course goal setting and learning objectives for all three training formats; conventional classroom, distance paper based and web based training.

The titles or names of subjects (Learning Objectives) may be changed for readability purposes. Some of the terms used in this document may be part of a copyrighted adult learning assessment process and in these cases, we utilize generic terminology. The needs assessment/survey maintains our training and education materials criteria. Assessments and changes are performed based on changes in technology, evaluations of the students, regulatory changes and editorial corrections. Most of this information is considered intellectual property and may not be owned by TLC but by third –parties. All of TLC's information is proprietary.

Assessment Implications

Core tasks have been statistically analyzed then reviewed and edited by the Advisory Committee, SME Experts. These tasks now form a distinct definition of the course and assessment content. The emphasis for most of the levels of operation would be found in the duty/functions discussion below. To recap, bodies of knowledge and concepts that support the understanding and valid performance of the following duty/functions should be taught first. Based on the job-task survey data and beta-testing, the most useful parts of the course are beneficial for the following:

ADDIE

TLC utilizes a five-phase instructional design model consisting of Analysis, Design, Development, Implementation, and Evaluation for our continuing education courses. Each course design step has an outcome that feeds into the next step in the sequence. The five phases of ADDIE are as follows:

ANALYSIS

During the Training Needs Assessment Process Information Gathering Analysis phase, the course designer(s)(see Subject Matter Experts and Contributing Editors) identifies the learning need, the goals and objectives, the student's needs, existing knowledge, Course Statement of Need, and any other relevant characteristics (State or Federal Need-to-Know) and to ensure that students are learning what is relevant for their job.

DESIGN

This is the systematic process of specifying learning objectives from the Training Needs with a focus on Bloom's Taxonomy. A detailed storyboard following the Needs Assessment/Survey and/or Course Statement of Need will determine the course content.

DEVELOPMENT

The actual creation (production) of the training content will begin based upon the Design phase using Bloom's Taxonomy. At this time, a decision is made to proceed or table the course.

IMPLEMENTATION

During implementation, the Alpha testing plan is put into action and a procedure for course and/or assessment revision is implemented. These course materials and assessments are delivered or distributed to the student group. After delivery, the effectiveness of the training materials is evaluated in Beta testing phase. All of our courses have extensive

Alpha and Beta testing to ensure job relevancy, correct information and course learning objectives are met.

EVALUATION

This phase consists of (1) formative and (2) summative evaluation from Alpha and Beta testing. Formative evaluation is present in each stage of the ADDIE process. Summative evaluation consists of tests designed for criterion-related referenced items and providing opportunities for feedback from the students and proctor. Administrative and instructional staff will collect all student concerns (verbal, written and surveys) and distribute these to TLC Administrative personnel for evaluation and course corrections. Course and/or Assessment revisions are made as necessary.

Precept-Based (Micro-Learning) Training Course

TLC's training courses are based upon a form of induction training, made of topical and technical precepts that are discovered in the Needs Assessment/Survey and/or Training Needs Assessment Process Information Gathering. The training topics or learning objectives are made up of "micro-content" or "precepts"— or small chunks of information that can be easily digested. These bite-size pieces of technical information are considered to be one of the most effective ways of teaching students new or important information (regulatory or technical) because it helps the mind retain knowledge easier.

Micro-learning or precept-based training doesn't rely on the student to process a large amount of information before breaking it down. Our method includes short modules with clearly defined learning goals for each section. This method allows a student to hone in on a particular skill, then given the opportunity to exhibit their knowledge in the final assessment (assignment).

Course Training/Assessment Needs Methodology

Technical Learning College identified training/assessment needs by placing identifying them in two categories; internal and external.

Internal Methods include:

- ✓ Observation
- ✓ Interviews
- ✓ Instruments: Perception instruments and Knowledge based assessments
- ✓ Student records and reports
- ✓ Group problem analysis (Classroom or Seminars)
- ✓ Performance or Survey appraisals

External Methods include:

- ✓ Outside consultants (Completion)
- ✓ Government Certification Reviews (Training Needs)
- ✓ Records and reports from other agencies

The needs assessment/survey maintains our training and education materials criteria. Assessments and course material changes are performed based on changes in technology, evaluations of the participants and regulatory changes. Materials are assessed yearly or as needed to insure course integrity.

**Course Author
Melissa Durbin**

This course was co-authored by Melissa Durbin; she has over 25 years of wastewater treatment teaching experience as a college instructor. Melissa has written the several nationally accepted wastewater treatment manuals since 2001. This course has been accepted in most States for continuing education credit. Melissa has taught approximately 20,000 students about water/wastewater treatment, disinfection and related classes. She will be available to answer questions relating this course.

Extensive Academic Research

Technical Learning College's (TLC's) continuing education course material development was based upon several factors; field experience working in the water quality field, extensive academic research (teaching in the community college system), advice from subject matter experts (State officials and industry leaders), data analysis, task analysis and training needs assessment process information gathered from other states.

Both Melissa and Jeff Durbin are the two primary Instructors, Subject Matter Experts and Technical Writers have trained and/or certified more than ten thousand students. These two Instructors teach on a daily basis in a classroom setting throughout Arizona and on-line to students nationwide. See below for more information.

**Primary Course Designers Melissa and Jeff Durbin
Melissa Durbin**

This course was co-designed by Melissa Durbin; she has over 25 years of teaching water and wastewater treatment experience as a college instructor. Melissa has written the several nationally accepted water and wastewater treatment manuals. Melissa has taught approximately 20,000 students about water and wastewater treatment and related classes. She will be available to answer questions relating this course.

Jeff Durbin

This course was co-designed by Jeff Durbin, over 10 years of water and wastewater treatment experience as a backflow inspector for the City of Phoenix and 20 years of water and wastewater treatment experience. Jeff has taught approximately 10,000 students about water and wastewater treatment primarily in water distribution, and pollution control (water quality) related classes. Jeff will also be able to answer any question pertaining to this course.

Advice from Subject Matter Experts

Both Melissa and Jeff Durbin are professional trainers and have been educated in current trends in professional education and continuing education needs.

Course Compiler

Peter Easterberg, Detail-oriented technical writer/technical editor/desktop publisher/copy editor. 20 years' experience editing and writing feasibility and trade-off studies, test procedures, specifications, user manuals, company policies, HR forms, and ISO-9000 documents. Exceptional grammatical/written communication skills. "Go-to" person for Microsoft Word, Outlook, and general computer questions. Internet Webmaster Certificate (including HTML)

Contributing Editors

James L. Six Received a Bachelor of Science Degree in Civil Engineering from the University of Akron in June of 1976, Registered Professional Engineer in the State of Ohio, Number 45031 (Retired), Class IV Water Supply Operator issued by Ohio EPA, Number WS4-1012914-08, Class II Wastewater Collection System Operator issued by Ohio EPA, Number WC2-1012914-94

Joseph Camerata has a BS in Management with honors (magna cum laude). He retired as a Chemist in 2006 having worked in the field of chemical, environmental, and industrial hygiene sampling and analysis for 40 years. He has been a professional presenter at an EPA analytical conference at the Biosphere in Arizona and a presenter at an AWWA conference in Mesa, Arizona. He also taught safety classes at the Honeywell and City of Phoenix, and is a motivational/inspirational speaker nationally and internationally.

James Bevan, Water Quality Inspector S.M.E. Twenty years of experience in the environmental field dealing with all aspects of water regulations on the federal, state, and local levels. Experience in the water/wastewater industry includes operation of a wastewater facility, industrial pretreatment program compliance sampling, cross-connection control program management, storm water management, industrial and commercial facility inspections, writing inspection reports for industry, and technical reports per EPA permit requirements. Teacher and Proctor in Charge for Backflow Certification Testing at the ASETT Center in Tucson for the past 15 years and I possess an Arizona Community College, Special Teaching Certificate in Environmental Studies. Extensive knowledge and experience in college course and assignment/assessment writing.

Dr. Pete Greer S.M.E., Retired biology instructor, chemistry and biological review.

Jack White, Environmental, Health, Safety expert, City of Phoenix. Art Credits

Ongoing Course Evaluation

Administrative and instructional staff will collect all student concerns (verbal, written and surveys) and distribute these to the Course Editor or Copyeditors for evaluation and course corrections. Administrative and instructional staff will collect all student concerns (verbal, written and surveys) and distribute these to TLC Administrative personnel for evaluation and course corrections. Course and/or Assessment revisions are made as necessary.

Editor's Discretion

The Course Editor may change the course assessment (assignment), course text, objective, artwork and topical order as necessary for security, corrective, printing, readability or typesetting purposes. The assessment may be rotated for security purposes and the course material may be updated to reflect any regulatory updates and/or corrections. The overall course objective or topic guide may be in a different order than the course manual for the reason of typesetting or copy editing purposes. Course materials, charts and artwork amendments, adjustments, modifications may be performed to reflect regulatory/safety text/artwork updates, error adjustments and comprehension. These changes generally do not reflect major course material changes, but are minor in nature.

Course Registration and Support

TLC offers complete registration and support services for all correspondence courses via e-mail, Web site, telephone, fax, and mail. TLC will attempt to provide immediate, prompt service.

When a student registers for a distance or correspondence course, he/she is assigned a “start date” and an “end date.” It is the student’s responsibility to note dates for assignments and keep up with the course work. If a student falls behind, he/she must contact TLC and request an end date extension in order to complete the course. It is the prerogative of TLC to decide whether or not to grant the request.

Students have 90 days from receipt of this manual to complete the assignments in order to receive their continuing education units (CEUs) or professional development hours (PDHs). A score of 70% or better is necessary to pass this course. If students need any assistance, they should e-mail or call TLC with their concerns. In the interest of privacy, students’ social security numbers are not used for tracking. Instead, a unique, alternate number is assigned to each student.

Disclaimer and Security Notice

The student shall understand that it their responsibility to ensure that this CEU course is either approved or accepted in my State for CEU credit. The student shall understand and follow State laws and rules concerning distance learning courses and understand these rules change on a frequent basis and will not hold Technical Learning College responsible for any changes. The student shall understand that this type of study program deals with dangerous conditions and 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. The student shall contact TLC if they need help or assistance and double-check to ensure my registration page and assignment has been received and graded.

Student’s Identity, Attendance, and Participation Verification

A proctoring report and/or computer-tracking program validates proper identity, attendance and participation. The student shall submit a driver’s license for signature verification and track their time worked on the assignment. The student shall also sign an affidavit verifying they have not cheated and worked alone on the assignment. We follow up with telephone confirmation and/or quiz review assessment. All student attendance is tracked on TLC’s student attendance database.

TLC’s Teaching Techniques and Assessment Tools

Our training courses are based upon a form of induction training, made of topical and technical precepts. The training topics are made up of “micro-content” or “precepts”– or small chunks of information that can be easily digested. These bite-size pieces of technical information are considered to be one of the most effective ways of teaching people new information because it helps the mind retain knowledge easier. Micro-learning or precept-based training doesn’t rely on the student to process a large amount of information before breaking it down. Our method includes short modules with clearly defined learning goals for each section with a post quiz and a final assessment (quiz). This method of pre-quiz allows a student to hone in on a particular skill, then given the opportunity to exhibit their knowledge in the final assessment.

TLC's Educational Learning Objective Topics

The general course descriptions or topic titles may be different from the detailed description of the course's outline or learning objectives. These terms may be an alternative expression or a substitute but essentially having the same meaning. This is done for reading or for editing purposes. The detailed alpha and beta-testing data is not available in this document and is proprietary information belonging to a third party. The CEU course covers several educational topics/functions/purposes/objectives of compliance. The general course description of topics may be different from the detailed description. These differences are cosmetic only. The topics listed are to assist in determining which educational objective or goal that is covered for a specific educational topic area. The general information is available in the detailed beta-testing information and may be found in the course's table of contents. The detailed testing information is not available in this document and is proprietary information. See page 8 of this document.

TLC Contact Information

All instructors and administrative staff are obligated to respond within 1 day by email, snail mail or telephone providing proper guidance to successfully complete the assignment. Email and telephone inquiries are handled quickly, generally within 2 hours of the call. We encourage students to complete their work with less frustration and fewer delays by calling or e-mailing us for any concern. We attempt to provide direct interaction similar to conventional classroom training.

Security and Integrity

All students are required to do their own work. All lesson sheets and final exams are not returned to the student to discourage sharing of answers. Any fraud or deceit and the student will forfeit all fees and the appropriate agency will be notified. A random test generator will be implemented to protect the integrity of the assignment.

Student Information Personal Data Security Procedures

All information regarding the student is strict and privileged only. This information is held in secure databases and is not sold or provided to any one unless the student requests a copy or a State agency does an audit. Even during audits, we restrict confidential information unless the Agency can provide a legitimate excuse. Some of this security information and data is priority and details are not provided. Students are not provided with any passwords at this time.

Certificate of Completion

TLC will offer the student either pass/fail or a standard letter grading assignment. If TLC is not notified, the student will only receive a pass/fail notice. In order to pass your final assignment, you are required to obtain a minimum score of 70% on your assignment. The certificate of completion will have all text in capital letters and there is a water mark of the Technical Learning College in three colors along with anti-counterfeiting security measures on the edge of the certificate. An electronic copy is assigned to the student's electronic record with issue date.

Student Assistance

The student shall contact TLC if they need help or assistance and double-check to ensure my registration page and assignment has been received and graded.

Instructions for Written Assignments

The Waterborne Diseases CEU correspondence course uses multiple choice and true/false questions. Answers may be written in this manual or typed out on a separate answer sheet. TLC prefers that students type out and e-mail their answer sheets to info@tlch2o.com, but they may be faxed to (928) 272-0747.

Final Examination for Credit

Opportunity to pass the final comprehensive examination is limited to three attempts per course enrollment.

Required Texts

This course comes complete and does not require any other materials.

Security and Integrity

All students are required to do their own work. All lesson sheets and final exams are not returned to the student to discourage sharing of answers. Any fraud or deceit and the student will result in forfeiture of all fees and the appropriate agency will be notified.

Environmental Terms, Abbreviations, and Acronyms

TLC provides a glossary in the rear of this manual that defines, in non-technical language, commonly used environmental terms appearing in publications and materials, as well as abbreviations and acronyms used throughout the EPA and other governmental agencies.

ADA Compliance

TLC will make reasonable accommodations for persons with documented disabilities. Students should notify TLC and their instructors of any special needs. Course content may vary from this outline to meet the needs of these particular students.

Instructions for Written Assignments

The Waterborne Diseases distance learning course uses a multiple-choice style answer key. You can find the answer key in the front of the assignment. You may have the option of completion of the laboratory assignment, either the heterotrophic plate count, Method 1623 - *Cryptosporidium* and *Giardia* or most EPA's data gathering and monitoring programs under the Unregulated Contaminant Monitoring Rule. To receive alternate credit for the course, please contact TLC to receive permission from your Instructor.

Required Texts

The Waterborne Disease course comes complete with a short summary of the EPA's Rules and Regulations and related drinking water standards. If you need more information or a complete set of Rules, you can download them off the EPA's web page, www.epa.gov or contact your local state environmental agency. You may need to contact a laboratory or state agency for certain sampling information.

Educational Learning Objective Topics

The CEU course covers several educational topics/functions/purposes/objectives. The topics listed are to assist in determining which educational objective or goal is covered for a specific topic area. This information is available in the detailed beta-testing information and may be found in the course's table

Feedback Mechanism (Examination Procedures)

Each student will receive a feedback or survey form as part of his or her study packet. The student will be able to find this form in the front of the assignment or lesson(assessment). The student can e-mail, snail mail or telephone TLC for any concern at any time.

Student Concerns

Most of student/training course related concerns are generally answered within 2 hours but not more than 24 hours. TLC has three support staff administrators with computers and telephones and have excellent communication and computer skills and able to respond and track all students and obtain or submit required forms and assignments. TLC has a dedicated computer student tracking system database that is backed-up on a daily bases and this information is secured and stored at a secure offsite location in case of fire or security problems. All student website information is tracked and documented for security measures.

Recordkeeping and Reporting Practices

TLC keeps all student records for a minimum of five years. It is the student's responsibility to give the completion certificate and/or paperwork to the appropriate government agencies. If necessary, we will electronically submit the required information to any required state agencies for your certification renewals.

TLC Record Storage

TLC's training records include the following elements:

1. Individual course training (assessment) and registration page (Customer Order Record) is recorded in Excel format and the hard copies are scanned and stored in a computer database for 5 years and include the following:
 - a. the instructor(s) who taught each session on that date the of the training session or grading was offered (in comments section registration page) as well as which instructor was considered to be the lead instructor(s) and by the Director.
 - b. the name of the instructor(s) and facilitator(s) who proctored and/or graded the examination for each training session if applicable (in comments section registration page);
 - c. the attendance sign-in sheet(s) (registration page) for each training course or session;
 - d. all graded and dated validated examination answer (Assessment) sheets for each examination attempt including an explanation (written in comments and/or Excel list) for any retests as well as a narrative explaining any assistance provided to the attendee before the re-test; and
 - e. session evaluation(survey)forms (in comments section registration page and or Excel list).

Grading Criteria

TLC offers students the option of either pass/fail or assignment of a standard letter grade. If a standard letter grade is not requested, a pass/fail notice will be issued. Final course grades are based on the total number of possible points. The grading scale is administered

equally to all students in the course. Do not expect to receive a grade higher than that merited by your total points. No point adjustments will be made for class participation or other subjective factors. 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.

Final Assignment

The final examination assignment is determined by the examination administrator or the instructor and there are generally three versions that are readily available. There are also three levels of the examination from average, (5 Answers) Difficult (5 +All of the above) and very difficult (Six answers and All of the above). The student is provided the average rated examination unless there is a condition or concern that requires a more difficult examination. Example, two or more students at the same address or any suspicion of cheating or potential fraud. We try to ensure the security and learning experience. Assignments/answer keys are only accessible to instructors and administrative staff that have a need to know clearance.

Failure

If the student fails the examination, they are provided with two more chances to successfully pass the exam with a score of 70% or better. The student may receive a different and randomly generated exam. Upon failure of an exam, the student can submit their concerns in writing or submit a survey form and has the option to receive instructor assistance that would be equivalent to conventional classroom assistance in discovering the areas that are deficient. The instructor has the option in describing the assistance method or procedure depending upon the student's deficiencies.

Grading Criteria

TLC will offer the student either pass/fail or a standard letter grading assignment.

- A 900 – 1000 points
- B 800 – 899 points
- C 700 – 799 points
- D 600 – 699 points
- F <600 points

In order to successfully pass this course, you will need to have 70% on the final exam. The entire assignment is available on TLC's Website in a Word document format for your convenience.

Forfeiture of Certificate (Cheating)

If a student is found to have cheated on an examination, the penalty may include--but is not limited to--expulsion; foreclosure from future classes for a specified period; forfeiture of certificate for course/courses enrolled in at TLC; or all of the above in accordance with TLC's Student Manual. A letter notifying the student's sponsoring organization (State Agency) of the individual's misconduct will be sent by the appropriate official at TLC. No refund will be given for paid courses. An investigation of all other students that have taken the same assignment within 60-day period of the discovery will be re-examined for fraud or cheating. TLC reserves the right to revoke any published certificates and/or grades if cheating has been discovered for any reason and at any time. Students shall sign affidavit agreeing with all security measures. The student shall submit a driver's license for signature verification and track their time worked on the assignment. The student shall sign an affidavit verifying they have not cheated and worked alone on the assignment.

Note to students: Keep a copy of everything that you submit.

If your work is lost, you can submit your copy for grading. If you do not receive your certificate of completion or quiz results within two or three weeks after submitting it, please contact us immediately. We expect every student to produce his/her original and independent work.

Any student whose work indicates a violation of the Academic Misconduct Policy (cheating, plagiarism) can expect penalties as specified in the Student Handbook, which is available through Student Services; contact them at (928) 468-0665. A student who registers for a distance learning course is assigned a "start date" and an "end date." It is the student's responsibility to note due dates for assignments and to keep up with the course work. If a student falls behind, she/he must contact the instructor and request an extension of her/his *end date* in order to complete the course. It is the prerogative of the instructor to decide whether or not to grant the request.

Your assignments are due on time. Any assignment or mailed-in examination that is one to five days late will be marked down one letter grade. Any assignment or mailed-in examination that is turned in *later* than five days will not be accepted and will be recorded in my grade book as "non-participating" and you can be withdrawn from class. (See final grade options.)

Proctoring Instructions

Students enrolled in Technical Learning College's CEU courses that require proctored testing and **who do not live in the physical service area** of the Technical Learning College Test Center must nominate and gain prior approval of a proctor who will monitor course tests. A new proctor nomination form is required for each term and for each class.

PROCTORS, If Necessary...

A proctor is an individual who agrees to receive and administer a student's test(s) from Technical Learning College at the proctor's business email address. The test(s) will be ethically and professionally administered in a suitable testing environment (e.g., college/library or professional office). The proctor will return the test(s) to the Technical Learning College Test Center via fax immediately after administration, and the proctor will mail the exam within one (1) work day of administration to the Technical Learning College Test Center.

Proctors certify in writing to the Technical Learning College Test Center that the student completed the test according to all of the specific directions provided in the proctor guidelines letter. As the Proctor Nomination Form indicates, the student will identify the specific test(s) the proctor will monitor.

Any proctor the student nominates must be acting in the official capacity in one of the following positions:

- **College or University Personnel:** Dean, Department Chair, Student Records, Professional Staff Member of an adult/continuing education office or counseling center, Librarian, Professor, or any official testing center personnel if the tests are administered in the center.
- **Armed Forces Education Office Personnel**
- **Public or Private School Personnel:** Superintendent, Principal, Guidance Counselor, or Librarian.

- **Other:** Civil Service Examiner, Librarian for City/County, HR Professional, or Education/Training Coordinator.

The following persons do not qualify as proctors:

- Co-workers, someone who reports to you or your immediate supervisor
- Friends
- Neighbors
- Relatives

Nominating a Proctor

Students are responsible for identifying, nominating, and making all of the arrangements for the proctoring of their course tests, including the payment of any fees for services and the return of test materials to Technical Learning College Test Center (cost of FAX or postage). The proctor must be able to receive the student's test(s) via email as attachments. The Technical Learning College Test Center does not accept Yahoo, AOL, G-mail, Hotmail, or etc. email addresses.

If the student is unable to find a suitable proctor, they must contact the Technical Learning College Test Center for assistance immediately via email.

Proctor Nomination Form

Students will use the Proctor Nomination Form for nomination and approval of a proctor. The student will complete the top part of the form for each course s/he is taking, even if the same proctor is used for all tests. The student must click on the submit button for the data to be electronically transmitted to the Technical Learning College Test Center.

Disclaimer Notice

It is ultimately the student's responsibility to ensure that this CEU course is either approved or accepted in my State for CEU credit. The student shall understand State laws and rules change on a frequent basis and believe this course is currently accepted in their State for CEU or contact hour credit, if it is not, the student shall will not hold Technical Learning College responsible. The student shall also understand that this type of study program deals with dangerous conditions and that the student shall 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. The student shall will call or contact TLC if help or assistance is needed and double-check to ensure the registration page and assignment has been received and graded.

Affidavit of Exam Completion

The student shall affirm that they alone completed the entire text of the course. The student shall affirm that they completed the exam without assistance from any outside source. The student shall understand that it is their sole responsibility to file or maintain their certificate of completion as required by the state.

Refund Policy

We will beat any other training competitor's price for the same CEU material or classroom training. Student satisfaction is guaranteed. We will refund course fees if the course is not accepted for credit by the State. Otherwise, any other problem will be given an exchange credit towards an acceptable or approved course for the State. Once we are notified of the refund or exchange, we will generally issue a refund in 30 days of the problem and

exchange within the same day.

Continuing Education Units

You will have 90 days from receipt of this manual to complete it in order to receive your Continuing Education Units (**CEUs**) or Professional Development Hours (**PDHs**). A score of 70% or better is necessary to pass this course.

Mission Statement

Our only product is educational service. Our goal is to provide you with the best possible education service possible. TLC will attempt to make your learning experience an enjoyable opportunity.

At the finish of this course...

At the conclusion of this training course, the student will receive 30 hours of continuing education on various and commonly found waterborne diseases, sampling techniques and modern disinfection techniques related to the proper treatment of water or wastewater.

Note to Students

Keep a copy of everything that you submit! If your work is lost, you can submit your copy for grading. If you do not receive your certificate of completion or other results within two to three weeks after submitting it, please contact your instructor.

Student is required to submit the following information for assignment grading...

1. 70 PERCENT ON FINAL ASSESSMENT
2. DRIVER'S LICENSE
3. SCHEDULE OF TIME WORKED ON ASSIGNMENT
4. AFFIDAVIT OF EXAM COMPLETION
5. PROCTOR CERTIFICATION
6. TELEPHONE CONFIRMATION

Educational Mission

The educational mission of TLC is:

To provide TLC students with comprehensive and ongoing training in the theory and skills needed for the operator certification and professional development field,

To provide TLC students with opportunities to understand and apply the theory and skills needed for operator certification and professional development,

To provide opportunities for TLC students to learn and practice pesticide application skills with members of the community for the purpose of sharing diverse perspectives and experience,

To provide a forum in which students can exchange experiences and ideas related to operator certification and professional development education,

To provide a forum for the collection and dissemination of current information related to operator certification and professional development education, and

To maintain an environment that nurtures academic and personal growth.



Melissa Durbin, Author and Dean of Instruction.

30 years' experience in waterborne disease training along with 18 years of college instruction. Call me or any of the other Instructors for course assistance. I welcome your input and comments and hope you enjoy this 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.
