CEU COURSE DESCRIPTION

PUMPS 303 CEU TRAINING COURSE – 18 Hours

This distance learning CEU training course will examine commonly found conventional water/well/wastewater/collection lift station fluid pumping methods, and related motor and components. This course was designed to provide continuing education credit to water and/ or wastewater treatment/onsite operators and well drillers.

Course Purpose

The main purpose of this course is to provide continuing education in understanding various water lifting procedures, basic pump fundamentals, hydraulic principles, theory, maintenance, related electrical and motor principles.

Target Audience

Water Distribution, Well Drillers, Pump Installers, Water Treatment Operators, Wastewater Treatment Operators, Wastewater Collection Operators, Industrial Wastewater Operators and Onsite Installer and Maintance. The target audience for this course is the person interested in working in a water or wastewater treatment or distribution/collection facility and/or 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. There are no prerequisites, and no other materials are needed for this course.

Course Statement of Need

All water and wastewater operators who work with pumps/motors need to be able to describe proper basic pump principles and/ maintenance procedures and properly demonstrate proper and safe operation, maintenance and theory of various pumps / motors.

Prerequisite

Basic math and chemistry knowledge on at a high school level is recommended for successful completion of this course.

CEU Course Principle Learning Goals

1. Energy and the foundation of electricity.
2. Electromagnetism and electricity production.
3. Electrical theory and various principles.
4. Single and three phase power systems, sources, connections and transformers.
5. Electric motors and operating principles.
6. Water/wastewater pumps and methods of moving fluids.
7. Pressure, measurements of pressures, fluid flow, fluid velocity and atmospheric principles.
8. Positive dynamic and displacement pumps.
9. Pump components, classifications and related parts.
10. Cavitation and methods to prevent it and explain water hammer

General Course Learning Objectives

1. The student will be able to understand and describe energy and the foundation of electricity.
2. The student will be able to understand and describe magnets, electromagnetism and electricity production.
3. The student will be able to understand and describe the electrical theory and various principles.
4. The student will be able to understand and describe the single and three phase power systems, sources, connections and transformers.
5. The student will be able to understand and describe various commonly found electric motors and operating principles.
6. The student will be able to understand and describe various water/wastewater pumps and methods of moving fluids.
7. The student will be able to understand and describe various pressure, measurements of pressures, fluid flow, fluid velocity and atmospheric principles.
8. The student will be able to understand and describe various principles of positive dynamic and displacement pumps.
9. The student will be able to understand and describe various types of pump components, classifications and related parts.
10. Describe cavitation and methods to prevent it and explain water hammer

CEU Course Learning Objectives and Timed Outcomes

Knowledge obtained by this CEU Course and the approximately average times the student will spend on each subject. This includes assignment reading, glossary review, practice questions and final examination.

Electrical Section

1. The student will be able to understand and describe energy and the foundation of electricity. 190 Minutes

    A. Water & Electrical Principles
    B. The Wonder of Electricity
    C. Static and Current Electricity
    D. Joules
    E. How Electricity is Generated
    F. Electrical Transmission
    G. Electrical Principles
    H. Electrical Generator Operation
    I. Electrical Equations
    J. Basic Electrical Terms

2. The student will be able to understand and describe magnets, electromagnetism and electricity production. 180 Minutes

    A. Battery Power Principles
    B. Calculate secondary voltage in a transformer.
    C. Describe a sine wave and explain how it is generated.
    D. Describe how a transformer makes AC power transmission and distribution possible.
    E. Electric Charge
    F. Electromagnetism

3. The student will be able to understand and describe the electrical theory and various principles. 180 Minutes

A. AC Power Generation
B. Calculate power in watts, using the Power Law.
C. Calculate voltage, current and resistance in a DC circuit, using Ohm's Law.
D. Convert watts to horsepower.
E. Explain static and current electricity as the movement of electrons.
F. Faraday's Law
G. Kirchoff's Contribution
H. Maxwell-Faraday Equation
I. Ohm's Experiment
J. Power, Resistance, Current
K. Size conductors properly.
L. Understanding AC verses DC
M. Understanding Resistance
N. Understanding Voltage

4. The student will be able to understand and describe the single and three phase power systems, sources, connections and transformers. 120 Minutes

A. Describe an Edison three-wire system and explain why it is used.
B. Explain the difference between neutral conductors and grounding wire.
C. Sine Wave
D. Single Phase from 3 Phase
E. Three Phase Transformers
F. Transformers
G. Understanding Single Phase
H. Understanding Three Phase

Motor Section

5. The student will be able to understand and describe various commonly found electric motors and operating principles. 250 Minutes

A. AC Motors
B. Compare centrifugal and turbine pumps and their applications.
C. Compare the characteristics of A-C and D-C motors.
D. Define "negative suction head."
E. Describe the common elements of vertical turbine pumps.
F. Describe the purpose of reduced voltage starters.
G. Discuss two types of totally enclosed motors and their uses.
H. Distinguish differences between turbine and submersible pumps.
I. Explain Bernoulli's equation as it relates to pumps.
J. Explain the purpose of motor enclosures.
K. Identify different types of pumps and describe the components.
L. Linear Motor
M. List the important points about suction piping.
N. List ways automatic control of pump motors can be regulated.
O. Motor Lubrication
P. Motor Operating Principles Review
Q. Rotary Motor
R. Stepper Motor
S. Synchronous Motor

T. Torque Motor

Pump Section

6. The student will be able to understand and describe various water/wastewater pumps and methods of moving fluids. 180 Minutes

A. Types of Pumps
B. Pump Categories
C. Positive Displacement
D. Complicated Pumps
E. General Pumping Fundamentals
F. Progressive Cavity
G. Reciprocating Pump
H. Centrifugal Pump
I. Understanding the Centrifugal Pump
J. Rope Pump
K. Impulse Pump
L. Sling Pump
M. Submersible Pump
N. Vertical Turbine Pump
O. Pump Requirement/Operation
P. What is a pump?
Q. Identify different types of pumps and related parts.
R. Identify and describe the most commonly used pumps.
S. Identify the suction and discharge valving.
T. Distinguish between discharge head, total head, suction head, and suction lift.
U. Describe information to be obtained from pump performance graphs.

7. The student will be able to understand and describe various pressure, measurements of pressures, fluid flow, fluid velocity and atmospheric principles. 230 Minutes

A. Identify different types of pumps and related parts.
B. Identify the main purpose of a motor starter.
C. Describe the main use of AC and DC motors.
D. Describe the operations of level sensor controls.
E. Identify and describe the most commonly used pumps.
F. Identify the suction and discharge valving.
G. Distinguish between discharge head, total head, suction head, and suction lift.
H. Describe information to be obtained from pump performance graphs.
I. Identify types of couplings, bearings, seals and other pump components.
J. Describe the importance of alignment of coupling.
K. Indicate when packing seals need to be replaced.
L. Describe cavitation.
M. Describe water hammer.

8. The student will be able to understand and describe various principles of positive dynamic and displacement pumps. 245 Minutes

A. Summarize the principles of atmospheric pressure.
B. Compare water and air as fluids.
C. Describe pressure in relation to fluids.
D. Analyze the effects of atmospheric pressure.
E. Examine the properties of water pressure.

F. Compare fluid flow and fluid velocity.

9. The student will be able to understand and describe various types of pump components, classifications and related parts. 220 Minutes

A. Analyze specific gravity.
B. Compare the types of positive displacement pumps.
C. Compare/contrast devices to determine specific gravity.
D. Describe information obtained from pump performance graphs.
E. Distinguish between discharge head, total head, suction head, and suction lift.
F. List the different types of early pumps and describe their characteristics.
G. State the basic principles of positive dynamic and displacement pumps.
H. Analyze the advantages of mechanical seals.
I. Analyze troubleshooting procedures for centrifugal pumps.
J. Classify pumps by two major categories and describe the differences.
K. Compare rigid and flexible couplings.
L. Compare the four types of impellers.
M. Compare the types of seals.
N. Deduce the five basics of pump performance.
O. Describe basic pump design and how centrifugal pumps work.
P. Differentiate between four types of positive displacement pumps.
Q. Discuss advantages and disadvantages of mechanical seals.
R. Distinguish between three commonly used types of couplings.
S. Divide pump types into two major categories.
T. Examine components of submersible pumps and how they work.
U. Explain the procedure for greasing motor bearings.
V. Identify the two main purposes of couplings.
W. Identify the typical characteristics of a screw pump.
X. List and explain the most common corrective maintenance actions for centrifugal pumps.
Y. List steps in the procedure for changing oil.
Z. Outline the troubleshooting process for pumps.

10. Describe cavitation and methods to prevent it and explain water hammer. 10 Minutes

A. Define water hammer.
B. Describe cavitation and its causes.
C. Evaluate how to avoid cavitation.
D. Explain the use of cavitations number.

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 this continuing education course. 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.

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.

1 page of text = 2 minutes of student time.
1 Math practice problem = 1 minute of student time.
1 word quiz/exam question = 1 minute of student time.

**CEU was awarded based on guidelines established by the International Association of Continuing Education and Training (IACET).

300 pages times 2 equals 600 divided by 60 minutes = 10.00 hours
500 post examination questions divided by 60 = 8.33 hours

Total time 18.33 hours ***We are asking for 18 hours of credit.***

Final Examination for Credit
Opportunity to pass the final comprehensive examination is limited to three attempts per course enrollment.

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

Ongoing Course Evaluation
Administrative and instructional staff will collect all student concerns (verbal, written and surveys) and distribute these to Jeff Durbin and Bubba Jenkins for evaluation and course corrections.

Specific Course Goals and Timed Outcomes (Beta Testing) Short Summary
44 students were successfully tested and the average time necessary to complete each task was recorded stated in the above objectives and timed outcome section. In the above timed outcome section area, the tasks were measured using times spent on each specific objective goal and final assignment grading of 70% and higher. 65 students were originally given a task assignment survey in which to track their times on the above learning objectives (course content) and utilized a Scantron answer sheet to complete their final assignment. All students were given 30 days to complete this assignment and survey. Only 44 were successful and passed the final assignment with the highest passing score of 99 and the lowest score of 70 percent with 21 students failing by not completing the assignment or scoring less than 70 percent. Average high score was 92, with the average passing score of 84 percent. Average time for course assignment completion was 19.2 hours. The majority of students found this assignment easy to complete without assistance. Rusty Randall Proctor, April 1, 2010 Powell Unit

2014 Second Beta Testing Breakdown
Out of seventy successful students who participated in the Second Beta Testing sixty percent of successful students performed at or above the *Basic* level in 2014 with an average score of 74 percent. Thirty five percent of successful students performed at or above the *Proficient* level, demonstrating their competency over challenging pumping/motor principle concepts content with an average score of eight two percent. Two percent of successful students performed at the *Advanced* level in follow-up 2014 beta testing with a high score of 99 percent. Rusty Randall Proctor, August 24, 2014 London, Ohio MACI.

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 Depart 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 make 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. **Ongoing Course Evaluation:** 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.

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.

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 of contents. The titles or names of subjects may be changed for readability purposes.

Course Author
Melissa Durbin
This course was co-authored by Melissa Durbin; she has over 30 years of water/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 10,000 students about water/wastewater treatment, disinfection and related classes, including mathematic and calculation principles. 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 Mater 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.

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.

Primary Course Designers Melissa and Jeff Durbin
Melissa Durbin
This course was co-designed by Melissa Durbin; she has over 30 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 10,000 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.

Course Complier
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 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

Course Procedures for Registration and Support

All of Technical Learning College's distance learning courses have complete registration and support services offered. Delivery of services will include e-mail, web site, telephone, fax and mail support. TLC will attempt immediate and prompt service.

When a student registers for a 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 to grant the request. All students will be tracked by a unique computer generated number assigned to the 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 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 Pumps 303 training CEU course uses multiple choice 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) 468-0675.

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.

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.

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 New York, Colorado, Texas, Indiana, Pennsylvania and any other required state 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 instruction 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 exanimation. 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. If you should need any assistance, please visit our Assistance Page on the website. Please e-mail all concerns and the final test to info@tlch2o.com.

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.

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.

Important Information about this Manual
This manual has been prepared to educate operators in the general education of pumping, pumps, motors, and hydraulic principles including basic water training and different pump applications. For most students, the study of pumping and hydraulics is quite large, requiring a major effort to bring it under control.

This manual should not be used as a guidance document for employees who are involved with cross-connection control. It is not designed to meet the requirements of the United States Environmental Protection Agency (EPA), the Department of Labor-Occupational Safety and Health Administration (OSHA), or your state environmental or health agency. Technical Learning College or Technical Learning Consultants, Inc. makes no warranty, guarantee or representation as to the absolute correctness or appropriateness of the information in this manual and assumes no responsibility in connection with the implementation of this information.

It cannot be assumed that this manual contains all measures and concepts required for specific conditions or circumstances. This document should be used for educational purposes and is not considered a legal document. Individuals who are responsible for hydraulic equipment, cross-connection control, backflow prevention or water distribution should obtain and comply with the most recent federal, state, and local regulations relevant to these sites and are urged to consult with OSHA, the EPA and other appropriate federal, state and local agencies.

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When the Student finishes this course…
At the conclusion of this course:
The student will understand various water lifting procedures, basic pump fundamentals, hydraulic principles, related electrical, motor principles and be able to describe common pumping principles, electrical troubleshooting and solve pump/hydraulic problems and receive a certificate of completion for 18 hours of credit.

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 environmental education field,

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

To provide opportunities for TLC students to learn and practice environmental educational 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 environmental education,

To provide a forum for the collection and dissemination of current information related to environmental education, and to maintain an environment that nurtures academic and personal growth.

The 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

PUMPS 303 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.

_____

_____