2008 - 2009 Edition

Small Water Systems Class Catalog

OCT Academy
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McClellan, CA
95652-2407

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OCT Academy is an accredited avocational school authorized to provide CEU's under the standards set by IACET - International Assocation for Continuing Education and Training. OCT Academy is fully compliant with California Title 22 and Operator Certification Regulations, Chapter 13.

A Message from OCT Academy

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AUTHORIZED IACET PROVIDER

3305

INTRODUCTION

This Small Water Systems class catalog introduces OCT Academy's completely revised outline of courses for California water distribution, treatment, and small water system operators (T1 / D1 – T2 / D2 and SWS).

The curriculum within this catalog was reviewed by California DHS Operator Certification Unit personnel in May, 2005 and is in full compliance with the Department's academic requirements under Specialized Training. The Course titles which appear in this catalog are a match to those that appear under OCT's listing on the State's Operator Certification website.

In addition to compliance with California DHS, OCT now offers water and wastewater classes in both northern and southern Nevada several times each year. OCT water classes and courses are recognized for credit with the Nevada Water Certification Manager in Carson City.

OCT Academy currently offers 36 and 42 hour Courses. Additionally, OCT Academy has created an approved Introduction to Basic Small Water Distribution System Operations Course specifically designed for Small Water System operators. Course fees for some participants may be eligible for re-imbursement under the federal / state SWS – Expense Reimbursement Grant program (ERG).

As an IACET Authorized Provider, OCT Academy has offered approved courses since July 17, 2001 and reviewed on June 26, 2006. The school is in full compliance with California Title 22 and Nevada NAC445A Operator Certification regulations. Certificates of Completion are awarded to each operator who has completed all class sessions, and all of the required study material (homework) assigned.

In compliance with IACET standards, OCT maintains class participation records, and daily sign in sheets. Each operator is assigned an individual identification number utilizing his / her birthdate. Transcripts of work completed can be provided upon request. Records are kept for a period of seven (7) years.

For further information and scheduling, please contact the Customer Service for costs and scheduling.

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Small Water systems Classes

CPS Human Resource Services

Money Available

EDUCATION GRANTS FROM U.S. ENVIRONMENTAL PROTECTION AGENCY ARE AVAILABLE FOR SMAL WATER SYSTEM OPERATORS

Expense reimbursement for elligible California systems that serve a community or non-transient population of 3,300 or less.

Are you interested in continuing your education as a Small Water System Operator? Do you need to take your Operator exam or renew your Certification?

WE WANT TO PROVIDE YOU THE OPPORTUNITY
TO REACH YOUR GOALS.

The California Department of Health Services, In partnership with CPS Human Resource Services, is offering an Expense Reimbursement Grant Program, conducted under a grant from the U.S. Environmental Protection Agency. This program gives money to Small Water System Operators to attend training in order to qualify for and to take the operator certification exams and to complete continuing education requirements for renewing certifications.

In November 2006, the Expense Reimbursement Grant Program introduced the Scholarship Program for Small Water System (SWS) Operators. This program enables SWS Operators to attend training classes and obtain training materials with little or no out of pocket expenses from the system or the operator. This exciting new program provides system owners and managers an easy opportunity to send operators to valuable training programs, helps opertors fullfill their continuing education requirements and helps them achieve certification all paid for through the Small Water Systems Expense Reimbursement Grant (SWS-ERG) program.

Program benefits include:

- Increased training opportunities
- Operators can obtain reimbursement for certifications costs
- Operators can attend training courses with little or no out-of-pocket cost
- Systems save on training dollars
- Operators are more qualified

For more information about eligibility requirements for the Small Water System Expense Reimbursement Grant go to
http://www.cps.ca.gov/tlc/sws/index.asp

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Application for Small Water System Operators Expense Reimbursement Grant

Application Instructions

1. Personal Information

Last Name	First Name	Middle Initial	Date of Birth (eg: 4/8/1965)

Mailing Address	City	State	Zip Code

Work Phone Number	Home Phone Number (Optional)	E-mail Address

Are you currently certified by the State of California as a *water distribution operator*? ○ Yes ○ No	Operator Number (numeric)	Grade -	Expiration Date (Month/Year) -- ----
Are you currently certified by the State of California as a *potable water treatment operator*? ○ Yes ○ No	Operator Number (numeric)	Grade -	Expiration Date (Month/Year) -- ----

2. Position Related Employment

Do you currently work for a community or non-transient non-community water system that services 3,300 or less? ○ Yes ○ No

Water System Facility	System ID Number (if unknown, leave blank)		

Facility Address	City	State	Zip Code

Facility E-mail Address	Facility Phone Number

Do you currently work for more than one (1) water system? (If Yes, please list all additional systems below) ○ Yes ○ No

Water System Facility 2	System ID Number (if unknown, leave blank)		

Facility Address	City	State	Zip Code

Facility E-mail Address	Facility Phone Number

3. Additional Information

4. Signature of Applicant

OCT Course / Program Outline - Small Water Systems

Introduction To Basic Small Water Distribution System Operations

COURSE TITLE: Introduction to Basic Small Water Distribution System Operations
OPERATOR GRADES: Recommended for Grades 1, Grade 2, Entry Level
PRE REQUISITE: High School Diploma or GED

COURSE DESCRIPTION:
This Introduction to Basic Small Water Distribution System Operations is a comprehensive educational program designed for entry level and grade 1 Water Distribution Operators taking their first Water Distribution System Operations Course. It is intended to acquaint the operators of systems which serve a population of less than 3,300 people with a basic knowledge of D-1, small water distribution system operations. Some participants in the course MAY be eligible for reimbursement under the State of California Expense Reimbursement Grant Program. **Course topics will include:** Water sources, quality and sampling, Basic and Grade 1-2 Water Distribution Mathematics, disinfection within the distribution system, pumps and motors, basic hydraulics, an introduction to California Title 22 Water Quality Regulations, distribution system safety, distribution system and storage facilities design/ maintenance and repairs, backflow/ cross connection control, pipes, valves and fittings, instrumentation and control.

COURSE OBJECTIVES: *Upon completion of the course, the student will be able to:*
1. Describe the responsibilities of a Water Distribution operator.
2. Describe the two major sources of raw water.
3. Solve basic dosage, demand and residual, volumes, PSI and industry related mathematical problems. Demonstrate mathematical application of water formulas and conversions.
4. Demonstrate a basic understanding of hydraulics, friction loss, Hazen-Williams C factors, and the relationship between head and pressure.
5. Discuss the microbiological impact of bacteria, viruses and protozoa on drinking water.
6. Describe disinfection practices to provide safe drinking water.
7. Review pipes, valves, fittings and appurtenances in a water system.
8. Gain a basic knowledge of pumps, pumping and motors.
9. Identify storage tanks, reservoirs and hydropneumatic systems.
10. Understand the importance of map reading and record keeping
11. Review worksite safety practices.
12. Comprehend basic water sampling practices for coliforms, chlorine residuals, temperature, pH, VOC's, IOC's, SOC's and turbidity.
13. Appreciate basic instrumentation practice.
14 Understand the legal aspects, moral requirements and application of California Title 22 Water Quality Laws and the Safe Drinking Water Act.

METHOD OF INSTRUCTION: Lectures, workbook activities and audiovisual aides.
METHODS OF EVALUATION: A review examination is administered at the conclusion of each lecture. A final examination is given at the completion of the course.

COURSE CONTENT:
1. Basic Level and Grade 1 Water Distribution Math
   a. Review of basic arithmetic problem solving.
   b. Industry formula and math conversion applications.
2. Water Sources, Quality Parameters and the SDWA.
3. Water Sampling procedures, safety, pH, temperature, Lead-Copper Rule, Coliform testing and the Surface Water Testing Rule.
4. California State Regulations (Title 22).
6. Water Distribution Systems.
   a. Design/ maintenance and repair.
   b. Storage facilities, reservoirs and hydropneumatic tanks.
   c. Water meters, piping and valves.
   d. Hydraulics, instrumentation and control.
   e. Backflow/cross connection control
7. Pumps and motors.

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BASIC - SMALL WATER DISTRIBUTION SYSTEMS - GRADE 1

COURSE TITLE: Water Distribution System Operations, Basic Level
OPERATOR GRADES: Recommended for Grades 1, Entry Level
PRE REQUISITE: High School Diploma or GED

COURSE DESCRIPTION:
This is a Basic level Water Distribution Supply Principles course of instruction, designed for entry level, grade 1 and grade 2 operators taking their first Water Distribution System Operations Course. It is intended to acquaint the operators of systems which serve a population over 3,300 people with a basic knowledge of water distribution system operations. Course topics will include: Water sources, quality and sampling, Basic and Grade 1 Water Distribution Mathematics, disinfection within the distribution system, pumps and motors, basic hydraulics, an introduction to California Title 22 Water Quality Regulations, distribution system safety, distribution system and storage facilities design/ maintenance and repairs, backflow/ cross connection control, pipes, valves and fittings, instrumentation and control.

COURSE OBJECTIVES: *Upon completion of the course, the student will be able to:*
1. Describe the responsibilities of a Water Distribution operator.
2. Describe the two major sources of raw water.
3. Solve basic dosage, demand and residual, volumes, PSI and industry related mathematical problems. Demonstrate mathematical application of water formulas and conversions.
4. Demonstrate a basic understanding of hydraulics, friction loss, Hazen-Williams C factors, and the relationship between head and pressure.
5. Discuss the microbiological impact of bacteria, viruses and protozoa on drinking water.
6. Describe disinfection practices to provide safe drinking water.
7. Review pipes, valves, fittings and appurtenances in a water system.
8. Gain a basic knowledge of pumps, pumping and motors.
9. Identify storage tanks, reservoirs and hydropneumatic systems.
10. Understand the importance of map reading and record keeping.
11. Review worksite safety practices.
12. Comprehend basic water sampling practices for coliforms, chlorine residuals, temperature, pH, VOC's, IOC's, SOC's and turbidity.
13. Appreciate basic instrumentation practice.
14. Understand the legal aspects, moral requirements and application of California Title 22 Water Quality Laws and the Safe Drinking Water Act.

METHOD OF INSTRUCTION: Lectures, workbook activities and audiovisual aides.
METHODS OF EVALUATION: A review examination is administered at the conclusion of each lecture. A final examination is given at the completion of the course.

COURSE CONTENT:
1. Basic Level and Grade 1 Water Distribution Math.
   a. Review of basic arithmetic problem solving.
   b. Industry formula and math conversion applications.
2. Water Sources, Quality Parameters and the SDWA.
3. Water Sampling procedures, safety, pH, temperature, Lead-Copper Rule, Coliform testing and the Surface Water Testing Rule.
4. California State Regulations (Title 22).
5. Disinfection Practices.
6. Water Distribution Systems.
   a. Design/ maintenance and repair.
   b. Storage facilities, reservoirs and hydropneumatic tanks.
   c. Water meters, piping and valves.
   d. Hydraulics, instrumentation and control.
   e. Backflow/cross connection control
7. Pumps and motors.

INTERMEDIATE - SMALL WATER DISTRIBUTION SYSTEMS - GRADE 2

COURSE TITLE: Water Distribution System Operations, Intermediate
OPERATOR GRADES: Recommended for Grade 2
PRE REQUISITE: Successful completion of Basic Level Water Distribution System Operations Course

COURSE DESCRIPTION:
This is the second level of Water Distribution System Operations Courses. This Grade 2 Intermediate Water Distribution System Operations course of instruction is designed for grade 2 operators preparing for and taking the Grade 2 State of California Water Distribution Examination. Course topics will include: Grade 2 Water Distribution Mathematics, disinfection practices within of the distribution system, groundwater and wells, source water, hydraulics, Safe Drinking Water Act and California Title 22 Water Quality Regulations, water quality monitoring, sampling and laboratory analysis, water chemistry, Distribution System operations, design, repair and maintenance, Water Distribution System and storage facility technology including pipes, valves and fittings and appurtenances, Pumps and motors, basic hydraulics, Instrumentation and SCADA Control, Back flow/ cross connection control and Safety.

COURSE OBJECTIVES: *Upon completion of the course, the student will be able to:*
1. Describe the responsibilities of a Grade 2 or Grade 3 Water Distribution operator.
2. Acquire knowledge of ground and surface water sources as raw water.
3. Solve dosage, demand and residual, volumes, pounds and PSI formulas, hydraulics, and velocity applications in industry related mathematical problem
4. Demonstrate an understanding of hydraulics, friction loss, Hazen-Williams C factors, and the relationship between head and pressure.
5. Discuss the microbiological impact on drinking water quality, and disinfection practices including bacteria, viruses and protozoa in drinking water.
6. Understand disinfection practices to provide safe drinking water.
7. Review pipes, valves, fittings and appurtenances in a water system.
8. Gain a basic knowledge of pumps, pumping and motors.
9. Identify storage tanks, reservoirs and hydropneumatic systems.
10. Understand the importance of map reading and record keeping.
11. Review worksite safety practices.
12. Comprehend basic water sampling practices for coliforms, chlorine residuals, temperature, pH, VOC's, IOC's, SOC's and turbidity.
13. Appreciate basic instrumentation practice.
14. Understand the legal aspects, moral requirements and application of California Title 22 Water Quality Laws and the Safe Drinking Water Act.

METHOD OF INSTRUCTION: Lectures, workbook activities and audiovisual aides.
METHODS OF EVALUATION: A review examination is administered at the conclusion of each lecture. A final examination is given at the completion of the course.

COURSE CONTENT:
1. Grade 2-3 Water Distribution Mathematics.
   a. Review of basic math problem solving.
   b. Volumes, Dosage, Demand and Residual.
   c. Hydraulics and velocity formulas.
   d. Industry math conversions and problem solving.
2. Water Sources, Quality Parameters and the SDWA.
   a. Microbiology and chemistry.
3. Water Sampling procedures, safety, pH, temperature, Lead-Copper Rule, and Coliform testing.
4. California State Regulations (Title 22).
5. Disinfection Practices.
6. Water Distribution Systems.
   a. Design/ maintenance and repair.
   b. Storage, reservoirs and hydropneumatic tanks.
   c. Water meters, pipes, valves, and hydraulics.
   d. Instrumentation, backflow/cross connection control.
   f. Distribution mains, lines and grids.
7. Pumps and motors.

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Water - Wastewater Pump Course / 36 - 42 Hours

COURSE TITLE: Pump Course
OPERATOR GRADES: Recommended for Grades OIT, 1, 2 WW, SWWS, WT, WD
PREREQUISTE: High School Diploma, or GED.

COURSE DESCRIPTION:
This 36 hour program of instruction includes:
1) Pump theory, **2)** Pump Repair and Maintenance **3)** Hydraulic headloss in pumping systems, and **4)** Pump station electrical systems. Pumping volumes, time, GPM, brakehorse power, cost of operation, headloss, calculations are presented, selection of pipe material, and energy losses sustained when water is pumped through valves and fittings is explored. Series and parallel pumping headloss, suction head, suction lift and the effect of atmospheric pressure are taught.

COURSE OBJECTIVES: Upon completion of the course, the student will be able to:

Part 1. – Pump Theory
1. Understand the basic theory and operation of centrifugal pumps and sewage ejectors, identify basic pump configuration, transformation of velocity head to pressure head, and the classification of pumps.
2. Discuss pump terminology and glossary terms.
3. Explore the types of centrifugal pumps, pump configurations of suction head and lift, and the effects of atmospheric pressure and series and parallel pumping installations.
4. Demonstrate a basic understanding of hydraulics, friction loss, and relationship between the system head curve and friction head.
5. Identify pump components and related nomenclature.
6. Build pump curves and complete pump horsepower math problems.
7. Discuss troubleshooting, and solve pump operating problems.

Part 2. – Pump Repair and Maintenance
1. Working with a factory instructor, troubleshoot and repair pumps.
2. Disassemble / assemble a working pump; identifying mechanical seals, packing glands, wear ring sets, bearings, and impellers.
3. Troubleshoot couplings, misalignment, sand cuts, and other damage.
4. The student will be able to identify excessive noise and bearing problems.

Part 3. - Hydraulic headloss in pumping systems
1. Develop an understanding of hydraulics, and friction loss
2. Identify energy, hydraulic lines, and velocity head.
3. Describe the concept and importance of Net Positive Suction Head Available (NPSHA).

Part 4 - Pump station electrical systems.
1. Review the components of electrical control systems; motor control panels, contacts and motor starter controls, three phase power, float switches, fuses, overload protection and varied switches, flow switches, and electro-mechanical devices (solenoid switches).
2. Discuss basic electrical diagrams, power system, control systems, and operation descriptions.
3. Learn the fundamentals of small electrical motors, maintenance problems and electrical troubleshooting measures.

METHOD OF INSTRUCTION: Lecture, workbook activities, audiovisual aides, and hands-on work.
METHODS OF EVALUATION: Quizzes and reviews are administrated between chapter subjects. A Multiple Choice examination is administered at the end of each subject for measure, and a final examination is administered at the end of the course.

COURSE CONTENT:
1. Basic pump theory & operation.
2. Pump terminology and glossary terms.
3. Types of water – wastewater pumps.
4. Pump mathematics.
5. Pump components.
6. Pump repair & maintenance.
7. Hydraulic Head Loss in pumping systems.
8. Net Positive Suction Head.
9. Available Net Positive Suction Head.
10. Pump station electrical system.

BASIC - FUNDAMENTALS OF DRINKING WATER TREATMENT - GRADE 1

COURSE TITLE: Fundamentals of Drinking Water Treatment, Basic Level
OPERATOR GRADES: Recommended for Grades 1, Entry Level
PRE REQUISITE: High School Diploma or GED

COURSE DESCRIPTION:

This is a Basic level Fundamentals of Drinking Water Treatment course of instruction, designed for entry level, grade 1 treatment operators taking their first Fundamentals of Drinking Water Course. It is intended to acquaint the operator with a basic concept of drinking water treatment. Course topics will include: Basic and Grades 1 Water Treatment Mathematics, Water Sources and Sanitary Hazards, Pumps and Motors, Equipment Maintenance, an introduction to California Title 22 Water Quality Regulations, Record Keeping and Reporting, Basic Water Quality, Disinfection, Lab Analysis and Interpretation, Chemistry, Microbiology, Filtration, Coagulation/Flocculation/ Sedimentation, Instrumentation, Pretreatment and Watershed Management, Backflow/ Cross Connection Control and Safety.

COURSE OBJECTIVES: *Upon completion of the course, the student will be able to:*

1. Describe the responsibilities of a Water Treatment operator.
2. Describe the two major sources of raw water and the sanitary hazards involved in the pre-treatment and treatment process of raw water.
3. Solve basic dosage, demand and residual, volumes, chemical dosage calculations, solutions and solutions percentages and industry related mathematical problems and demonstrate the mathematical application of water formulas and conversions .
4. Demonstrate a basic understanding of coagulation/flocculation/sedimentation processes.
5. Discuss the microbiological impact of bacteria, viruses and protozoa on drinking water.
6. Describe disinfection practices to provide safe drinking water.
7. Review basic water chemistry including conventional pretreatment and chemical post-treatment processes and controls.
8. Gain a basic knowledge of pumps, pumping and motors.
9. Understand the importance of laboratory analysis and record keeping.
10. Review equipment maintenance and worksite safety practices.
11. Comprehend basic water sampling practices.
12. Appreciate basic instrumentation practice.
13. Apply basic back flow/ cross connection control fundamentals to the water treatment process.
14. Understand the legal aspects, moral requirements and application of California Title 22 Water Quality Laws and the Safe Drinking Water Act.

METHOD OF INSTRUCTION: Lectures, workbook activities and audiovisual aides.
METHODS OF EVALUATION: A review examination is administered at the conclusion of each lecture. A final examination is given at the completion of the course.

COURSE CONTENT:

1. Basic Level and Grade 1 Water Treatment Math.
   a. Review of basic arithmetic problem solving techniques.
   b. Volumes, Dosage, Demand and Residual formulas.
   c. Solutions, solution percentages, and chemical dosage.
   d. Filtration.
   e. Industry conversions and problem solving applications.
2. Water Sources, Quality Parameters and the SDWA.
3. Basic water chemistry, disinfection and microbiology.
4. Water Sampling procedures, lab analysis and interpretation.
5. California Regulations (Title 22), record keeping, and reporting.
6. Conventional surface water treatment, coagulantion, flocculation, sedimentation, and filtration.
7. Pumps and motors.
8. Back flow/ cross connection, instrumentation, pre-treatment and watershed management, equipment maintenance and safety.

CUSTOMER SERVICE:
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INTERMEDIATE - FUNDAMENTALS OF DRINKING WATER TREATMENT - GRADE 2

COURSE TITLE: Fundamentals of Drinking Water Treatment, Intermediate Level
OPERATOR GRADES: Recommended for Grade 2
PRE REQUISITE: Fundamentals of Drinking Water Treatment Basic Level

COURSE DESCRIPTION:
This is an intermediate level Fundamentals of Drinking Water Treatment course of instruction, designed for grade 2 treatment operators taking their second Fundamentals of Drinking Water Course. It is intended to acquaint the operator with a intermediate level concepts of drinking water treatment. Course topics will include: Grade 2 Water Treatment Mathematics, Water Sources and Sanitary Hazards, Pumps and Motors, an introduction to California Title 22 Water Quality Regulations, Record Keeping and Reporting, Disinfection, Lab Analysis and Interpretation, Basic Water Quality, Chemistry, Microbiology, Filtration, Coagulation/Flocculation/Sedimentation, Pretreatment and Watershed Management, Instrumentation, Backflow/ Cross Connection Control and Safety.

COURSE OBJECTIVES: *Upon completion of the course, the student will be able to:*
1. Describe the responsibilities of a Water Treatment operator.
2. Describe the two major sources of raw water and the sanitary hazards involved in the pre-treatment and treatment process of raw water.
3. Solve basic dosage, demand and residual, volumes, chemical dosage calculations, solutions and solutions percentages and industry related mathematical problems and demonstrate the mathematical application of water formulas and conversions.
4. Demonstrate a basic understanding of coagulation/flocculation/sedimentation processes.
5. Discuss the microbiological impact of bacteria, viruses and protozoa on drinking water.
6. Describe disinfection practices to provide safe drinking water.
7. Review basic water chemistry including conventional pretreatment and chemical post-treatment processes and controls.
8. Gain a basic knowledge of pumps, pumping and motors.
9. Understand the importance of laboratory analysis and record keeping.
10. Review equipment maintenance and worksite safety practices.
11. Comprehend basic water sampling practices.
12. Appreciate basic instrumentation practice.
13. Apply basic back flow/ cross connection control fundamentals to the water treatment process.
14. Understand the legal aspects, moral requirements and application of California Title 22 Water Quality Laws and the Safe Drinking Water Act.

METHOD OF INSTRUCTION: Lectures, workbook activities and audiovisual aides.
METHODS OF EVALUATION: A review examination is administered at the conclusion of each lecture. A final examination is given at the completion of the course.

COURSE CONTENT:
1. Basic Level and Grade 2 Water Treatment Math.
   a. Review of basic problem solving techniques.
   b. Volumes, Dosage, Demand and Residual formulas.
   c. Solutions and solution percentages.
   d. Filtration.
   e. Chemical Dosage.
   f. Industry math conversions and applications.
2. Water Sources, Quality Parameters and the SDWA
3. Basic water chemistry, disinfection and microbiology
4. Water Sampling procedures, lab analysis and interpretation.
5. California Regulations (Title 22), record keeping and reporting.
6. Conventional surface water treatment, flash mixing, coagulation, flocculation,sedimentation, filtration, and chemical post-treatment.
7. Pumps and motors.
8. Back flow/ cross connection, instrumentation, pre-treatment and watershed management, equipment maintenance and safety.

Water Distribution / Water Treatment Educational Programs

OCT Mission Statement: To provide professional water/wastewater industry education, to assist in grade advancement, and to improved management skills. Through education each operator can meet his/her respsonsiblity to "protect the health and well-being of the community they serve."

The following courses of study designed by OCT instructors have been reviewed by water operations supervisors, the California Department of Health Services, and the Nevada Water Certification Manager. These courses meet the requirements of job-specific tasks which operators and supervisors face on a day-to-day basis and meet the overall objectives of California Title 22 and Nevada NAC445A Operator Certification Regulations. These courses provide in-depth learning experiences so operators can successfully respond to questions and mathematics problems typically found on state certification examinations at individual grade levels.

- **Water Certification Courses**
- **Certification Review Classes**
- **Small Water Systems Courses and Classes**
- **Contact hour (CEU) classes**
- **Laboratory Science classes**
- **Water System Anti-Terrorism classes**
- **Water Utilities Management classes**

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Backflow/ Cross Connection
Procedures and practices for maintaining and managing a backflow/ cross connection program, which will reduce the risk to public potable water supplies. Learn about backflow and back siphonage, as well as, other related causes of cross connection dangers to drinking water systems. Review the types of prevention measures possible and to identify the devices and assemblies recommended to prevent backflow, recommended installation practices and recommended cross connection control programs. Learn the benefits of having solid safety practices, and the health and legal aspects of having an active backflow / cross connection program for your community.
GR. 1-2 WD, SWS

Bacteriological Sampling in the Water Distribution System
The Safe Drinking Water Act mandated procedures for properly collecting, processing and recording samples within the distribution system. Laboratory analysis are explored. Proper sampling containers, how to sample, preservatives, labeling, storage and transport time according to federal regulations as well as sample collections for coliform bacteria, lead-copper, surface water treat rule, IOC's, VOC's and SOC's are highlighted in this important one day class.
GR. 1-2 WD, SWS

Basic Mathematics for Water Operators
The basic level mathematics class is designed to acquaint Water Operators with the most commonly used mathematical processes encountered in the water industry. Distance, area, circumference, perimeter, gauge and meter calculations, flow rates, basic volume and PSI formulas practice is included to develop confidence and accuracy in beginning water math skills.
OIT, GR. 1 WD, WT, SWS

BASIC WATER MATHEMATICS
For Distribution & Water Operators
Newly written manual to add to your study library. This easy to read math workbook features easy step-by-step methods to solve math problems commonly found in the water industry. Use this workbook to study for any state certification exam, or for in-house training.
GR. 1-2 WD, WT, SWS

Basic Water Chemistry for Water Operators
The structure and classification of matter, valences, chemical formulas and equations, solutions, acids, bases and salts, the chemistry of treatment processes and practical dosage problems with math reinforcement problems and quizzes are in this class.
GR. 1-2 WT, SWS

Basic Water Laboratory Practice
This class will provide the students with a comprehensive review of environmental chemistry and microbiology particular to the industry. Lab personnel will learn the methods to perform the following test procedures: chlorine residuals, break-point chlorination, turbidity, temperature, acids vs. bases, chlorides, iron and manganese, dissolved oxygen, fluorides, nitrites & nitrates, coliform and heterotrophic bacteria, and basic laboratory safety measures.
GR. 1-2 WD, WT, SWS

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Basic Water Microbiology
The fundamentals of microbiology are the focus of this one day class which covers information basic to the understanding and processing of water from a raw to potable state. Topics that are discussed include: identification of common waterborne pathogenic organisms; bacteria, viruses and protozoa. Water sampling practices, laboratory testing methods, biofilm, and heterotrophic bacteria are studied. Basic disinfection mathematics problems may be introduced in this class.
GR. 1-2 WD, WT, SWS

C•t Calculations
A day long class of instruction in the calculation of Cl which includes identifying Table "E" Clt values, actual system Clt values, calculation of simple and complex contact times, and T-10 values are included in this class. Emphasis on determining 2 and 3 Log disinfection contact time for Giardia, Cryposporidium and chlorine, U.V. and ozone after deductions for plant credits. Referencing temperature and pH guidelines then calculate the additional contact time by adding more storage from point-of-injection to first service within the water system.
GR. 2-4 WT, SWS

Certified Sampling
This class is ideal for all distribution and small water system personnel charged with the responsibility of collecting water samples in their water system. Heavily impacted by the federal Coliform Rule, California Title 22 outlines in section 64415 that sample collection and field tests shall be performed by a certified operator trained by qualified personnel from a certified lab. Other states have similar training regulations.
GR. 1,2 WD, WT, SWS

Chemical Feed Pumps / Operations
This class introduces positive displacement and diaphragm operated, chemical feed pumps for use in dispensing chemicals, chlorines and polymers in a water system. The class will learn how to size and select chemical feeder pumps based on the chemicals solutions to be feed. The maintenance portion of the class will troubleshoot common operations problems.
GR. 1-2 WD, WT, SWS

Chemicals and Chemical Solutions / Water Distribution and Treatment
The class will review the use of a wide variety of chemicals use in water treatment and water distribution system. The chemicals include chlorine, ammonia, polymers, sodium hydroxide, polyphosphates, activated carbon, and others. The class will learn to complete mathematics for blended solutions and learn how to calculate percentage (%) of solutions and lbs/gal.
GR. 1-2 WD, WT, SWS

Chloramination Water Disinfection
Research and case histories indicate that chloramination is superior to free chlorine as a distribution system disinfectant because of its ability to control biofilms. The water produced by these systems is free of trihalomethanes and has no biofilm on pipe and tank surfaces. Consumers avoid being exposed to high THM levels. Chloramines are also a good way to reduce risk of coliforms.
GR. 1-2 WD, WT, SWS

Coagulation-Flocculation and Alkalinity Factors
The coagulation – flocculation class will address operations issues regarding the removal of solids in a range of NTUs and microbiological contaminates. Learn the chemistry of coagulation and the need for "wetting the chemical" during the flash mix step. Learn the use of coagulant salts, and the possible need for pH / alkalinity adjustment to gain optimum flock development. Review the use of coagulant salts, coagulant aids, polymers (cationic, anionic and nonionic), chemical feed pump operations with the use of graduated cylinders and ml/min mathematics.
GR. 1-2 WT, SWS

Corrosion Control in Potable Water
What is corrosion? How do you measure it? What are the pros and cons of the various water treatment issues associated with changes in water chemistry to reduce corrosiveness? This class covers pH adjustments, aeration, phosphate, passivating films, and silicate additions.
GR. 1-2 WD, WT, SWS

Disinfection of Public Water Supplies
The microbiology of common waterborne diseases, E.Coli and fecal coliforms are major indicators of pollution and flag the need for disinfection of our public water supplies. With the mandating of filtration by the SDWA combined with mandatory disinfection, these are the double-barrier efforts necessary to achieving safe drinking water. The study of chlorination theory and chemistry, breakpoint chlorination, dosage/ demand/ residual and dosage levels are valuable at all levels of water knowledge.
GR. 1-2 WD, WT, SWS

Distribution Operators Mathematics Grades 1-2
This class utilizes the Step-by-step method to show work and algebraic formulas, and conversions to find the solutions to volume, pounds, dosage/demand/ residual and PSI problems are learned and reinforced with practical water math application problems. Included in the class workbook are extra math problems with detailed solutions for practice at home.
GR. 1-2 WD, SWS

Electrical Fundamentals for Water Operators
Circuitry basics, electromagnetism, inductance and capacitance are included in this study of electricity in water and water operations. The class will also focus upon power and control system components, reading electrical diagrams, electrical measurements and troubleshooting electrical problems.
GR. 1-2 WD, WT, SWS

Filtration - Media
This class for small water system and municipal filtration operators reviews the history of turbidity levels, compliance standards, and turbidity reporting units from JTUs – NTUs. It also addresses raw water bacteria, virus and protozoa levels. The class presents all aspects of single media, dual media, and mixed media filtration. Math problems review GPM filtration unit output, GPM loading rates, GPM backwash rates and volumes, Rate of rise, and temperature considerations. The class addresses operational problems relating to mud-balling, air binding, excessive head loss, filter bed cracks, and channeling. Iron and manganese removal, and slow sand filtration are also presented.
GR. 1-2 WT, SWS

Filtration - Package Plants
Package filtration plants are most appropriate for plant sizes ranging from 25,000 to 6,000,000 GPD output. They are pre-engineered and pre-fabricated units which can be quickly installed at new sites. Common treatment elements in a package plant include coagulation, flocculation, settling / sedimentation, and filtration. Typical design standards for these plants include: 20 - 30 Min. flocculation and detention, 2.0 hour sedimentation, and filtration rates of 2 - 3 GPM/sq. ft., or higher. Influent water quality is a very important consideration in determining the suitability of a package plant application. There are three (3) basic types of package plant units and they include conventional package plants, tube-type clarification units, and adsorption clarifier package plants. Pilot testing may be necessary before installing large units.
GR. 1-2 WD, WT, SWS

Fire Hydrants
Proper procedures for inspecting, testing and maintaining fire hydrants are the focus of this class. Types of hydrants and terminology, installation, performing inspections, repairs, flow testing, flushing, disinfecting and repairing the distribution system to insure the safety of your community are the thrust of this class.
OIT, GR. 1-2 WD, SWS

Groundwater and Wells / Drawdown
This class reviews basic geology, hydrogeology, drilling and well rehabilitation techniques, and wellhead protection. Discussion of groundwater exploration; well siting, well drilling technologies and techniques; drilling fluids; subsurface sampling methods and techniques; water well design and construction; aquifer testing and well yield are supported by practice test questions.
GR. 1-2 WD, WT, SWS

Groundwater Microbes, Treatment and Public Health
This is a comprehensive class that focuses on groundwater microorganisms. These include: identification of well biofilm, E. coli, the three strains of iron bacteria, Hips and helicobacter organisms, nuisance and pathogenic organisms, and the disinfection and treatment techniques available to control a wide range of groundwater viruses and other organisms.
GR. 1-2 WD, WT, SWS

Hydropneumatic Tanks
Hydropneumatic tanks are utilized in residential and small municipal well and small municipal water systems. They are designed to deliver water under pressure between pump cycles and to provide sufficient flow to meet demands. Learn to calculate gallons of air in these tanks based on pressure settings. The tanks are available as vertical bladder style units which prevent water logging, function of a sight glass, the need for installation of compressors to maintain proper pressure, and pressure adjustments ranges.
GR. 1-2 WD, WT, SWS

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Ion-Exchange Water Softening
Municipal water systems which use "hard" groundwater may be required to blend "soft" water to approximately 60 mg/L of hardness to protect the municipality's investment in piping, valves, pumps, and appurtenances to extend the service life of the water system. Hard water is an O & M money issue for many groundwater districts. This class reviews the two most common types of municipal water softening; ionic exchange and lime – soda ash softening. The class reviews ion exchange chemistry; carbonate and non-carbonate hardness, the use of "grains" and kilograin in process math problems, percentage of soft water by-pass, hardness removed, and gallons of soft water per service run. Also presented is regeneration of ion exchange resins with salt, and the need for lime and soda ash chemicals when operating the lime – soda ash process.
GR. 1-2 WT, SWS

Instrumentation and Controls
Basic instrumentation; measurement devices, pressure, flow and levels are all important in the basic design and operation of a water system. Study these and analytical instruments, controls, SCADA, communications and troubleshooting technologies in this "hands-on", class.
GR. 1-4 WD, WT, SWS

Laboratory Test Methods
This combination interactive lecture and test methods demonstration class covers the basics in water quality testing for compliance and operational needs, including basic colorimetric, titrimetric, nephelometric, electrometric and turbidimetric testing methods for operators.
GR. 2-4 WD, WT, SWS

Maps, Record Keeping and Vulnerability
Comprehensive, sectional, arterial and grid maps are invaluable to maintaining a system that can readily identify important locations for leaks, pressure zones, valves and hydrants. Accurate records that are used for legal compliance as well as the rapid retrieval of data and information serve as the foundation for maintaining a facility that is safe and secure from negative influences. Discover how vulnerable your facility is to vandalism, natural occurrences and the threat of terrorism.
GR. 1-2 WD, WT, SWS

Mathematics for Water Treatment Operators, Grade 1-2
This class is an entry and lower grade Water Treatment Plant Operators study of process math with an emphasis on the Step-by-step solution method, process formulas, conversions, pounds problems and volume formulas, dosage/demand/residual, simple solution problems, velocity, filtration, hydraulics and pump problems. Disinfection and sedimentation problems are taught and practiced in this class. The class workbook includes problems with detailed solutions for home review and test preparation.
GR. 1-2 WT, SWS

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Piping (Metal and PVC) and Installation
The class will learn to identify multiple types of water pipe including the metal pipe group; ductile iron pipe (DIP), steel, asbestos cement, and pretensioned concrete. The plastic pipe group; C-900 PVC, and HDPE polyethylene C-901. The lesson will identify the variety of pipe joints available including flanged, mechanical (MJ), and bell & spigot with rubber ring. Pipe materials will be evaluated on the basis of pressure ratings, available sizes, advantages, disadvantages, durability, pipe strength, corrosion resistance, economic factors, hydraulic capabilities, and standard trench bedding.
GR. 1-2 WD, WT, SWS

Pumps and Motors
Every component of the water industry is dependent upon pumps and their motors. This class covers types of centrifugal pumps, pump terminology, hydraulic fundamentals, pump components, cavitation, friction energy losses, net positive suction head, pump curves, safety, trouble shooting, and pumps mathematics. Included are practice questions for home study. This topic is of major importance at all grades of our industry.
GR. 1-2 WD, WT, SWS

Pumps Electrical Control Systems
In this two day class attendees will study, discuss, and apply pumps and motors technology with increased attention on Motors, Controls, and Electrical conditions that Operators and Equipment Maintenance Technologists encounter in daily Water Management Systems operational environments. Pump, Motor, Electrical and Instrumentation components interface with RTU, PLC, and SCADA is introduced. Enhanced Communication perspectives will be introduced, shared, and discussed. Benefits would be recognized as improved trouble reporting- internal and external, increased operator and technologist confidence specific to operational interface with supervision, lateral, or with contractors tasked to support our Water Systems. Specific conditions discussion relative to individual field and control room experiences is fostered.
GR. 1-2 WD, WT, SWS

Pump Hydraulics for Water / Wastewater Operators
Information on basic water hydraulics, properties of fluids and resulting force from elevation are presented in this class. Pipes and piping and the Hazen-Williams “C” factor theory are integrated into flow testing, thrust block sizing and open channel flow discussion.
GR. 1-2 WD, WT, SWS

Polymers and Coagulants/ Jar Testing
This class is specifically designed to increase the working knowledge of water and wastewater treatment plant operators. Operators will learn to make up jar testing solutions, experience the result of dosage changes, and learn the advantage / disadvantage of a variety of coagulant salts, coagulant aids, and polymers. Learn how jar testing can aid in proper corrosion control, polymer feed, disinfection, and other applications.
GR. 1-2 WT, SWS

Sedimentation and Clarification
This class reviews the operation of rectangular sedimentation tanks, and circular clarifiers. Learn the operations steps necessary to achieve 95 – 99% removal of bacteria, viruses, protozoa, and solids in raw water. The use of Enhanced Coagulation, pH adjustment and the need to monitor TOC levels is reviewed. The four major parts of sedimentation and clarifier units, the need to monitor flow, settling rates, sludge removal rates, and the problems related to temperature inversion are instructed. Identify process control indicators and the need for SVI measurements. Process control mathematics will review the four hydraulic cross check math formulas; detention time, surface loading rate, weir overflow rates, and solids loading rate. The need to maintain dissolved oxygen (DO) in sedimentation tanks and clarifiers and its important role will be illustrated.
GR. 1-4 WT, SWS

Small Water Systems Mathbook
This manual contains material especially selected for small water systems operators who must be prepared for across-the-board water math problems. 1st Edition published in 2004 contains 14 chapters, formulas, conversions, volumes, chemical dosage calculations, chlorine demand, a special chapter on liquid chlorine solutions, filtration, hydraulics, pumping, velocity, sedimentation tanks and water softening. Step-by-Step solutions to math problems appear at the end of the workbook.
GR. 1-2 SWS

Small Water Systems
Workshop manual intended for those who design and maintain small water systems, such as pump installation contractors, water conditioning dealers, and circuit riders. The manual's 12 chapters cover these subjects: Federal & State regulations, water sources, well systems, small water systems and plant, problem water solutions, disinfection, clarification and filtration, storage tanks and pressure systems, water quality data, water rates & funding, construction & operating cost estimating.
GR. 1-2 SWS

State of California Title 22 Regulations
The "Why's and How's" of the State of California Water Code: Title 22. MCLs, record keeping requirements, Distribution and Treatment Plant operational regulations and personnel legislation are discussed in this class. The practical application of these laws as they relate to all areas of the water industry in California is stressed. Knowledge of Title 22 is tested throughout the State of California, DHS water certification examination. This class is offered only in the State of California.
GR. 1-2 WD, WT, SWS

Storage Tanks
Municipal water tanks are liquid storage containers and in a small water system, they are usually used to store water for potable water consumption. Additionally, storage tanks made of welded steel, concrete or bolted construction can be installed in the ground or be elevated to meet constant pressure needs. Tanks are sized on GPH peak demands needs, state water quality laws, and ISO fire-fighting requirements. They are usually a capital improvement project budget item. With regard to microbial water quality, tanks must be covered and sealed to prevent contamination from air blown fecal matter and bird droppings which contain coliforms and salmonella typhimurium bacteria. The class also reviews maintenance needs that include water circulation, residual chlorination not to exceed 4.0 mg/L, exterior and interior paints, and anti-corrosion measures to prevent interior and exterior corrosion. Wineries usually utilize poly tanks for water storage. Specifications for water tank applications are listed in AWWA standards.
GR. 1-2 WD, WT, SWS

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Utility Finance
Utility finances include accounting management, accounting systems, bank checking, statements, and reconciliation, general accounting & finance, water invoices, payroll operations and maintenance accounts, capital improvement accounts, financial reporting, customer service, and legal documentation.
GR. 1-2 WD, WT, SWS

Water Audits
Operators learn about the first steps in performing a water audit, including checking records for accuracy and testing water meters. A water audit can be linked to water loss as a management tool. Unaccounted for water loss is reviewed and calculated to determine the percentage (%) of loss which exists within a system, and the associated cost of "unaccounted-for-water loss" to the water system. A water audit starts with the collection of all records for the review. The records help determine the Water in – Water Out = Unaccounted for water loss. Once meters are tested for accuracy and water lines are indentified for replacement, operators will learn to "rate and rank" defective and corroded water lines to determine the costs associated with correcting loss conditions so funding can be secured.
GR. 1-2 WD, WT, SWS

Water Meters
Beyond flat rate systems, water meters are the cash registers in public water systems. There are several types of water meters in common usage. Selection is often based on different flow measurement methods, the type of end user, the required flow rates, and accuracy requirements for cold potable water. Learn to read water meters in cubic feet and gallons. Learn the principles of positive displacement meters vs. venture meters and how to install water meters which best fit the application.
GR. 1-2 WD, WT, SWS

Water Distribution Certification Review Grades 1-2
Testing can be an anxious time. This overview class reviews the information that is tested on your State's Grade 1-2 Water Distribution Certification Examination. The math and technical knowledge discussed in this review class are tied directly to each state's "Expected Range of Knowledge".
GR. 1-2 WD, SWS

Water Distribution Operations and Technology
This general review class provides information regarding the distribution system; water supply sources, water quality parameters, water reservoirs and storage, water meters, system hydraulics, types of piping and its uses, fire hydrants, cross-connection, corrosion, pumps, bacteriological sampling, maps, drawings and records keeping are included in this overview of Water Distribution Operations and Technology.
GR. 1-2 WD, SWS

Water Distribution System Construction
This class acquaints operators with the basics of water system construction including; pre-planning, blueprint reading, traffic control, trenching, cave-in protection, pipe laying procedures, bedding, backfill and clean-up.
GR. 1-2 WD, SWS

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Water Loss and Leak Detection
Water loss means a loss in revenue for each small water system. Unchecked water losses also generate higher electrical costs, and operating costs for treating, pumping and storing water. The class will learn to review unmetered services, leaks, and leak detection methods by referring to maps of the systems, completing a preliminary survey, zone detection, and pinpointing leaks with leak detection equipment. After quantifying the amount of leakage in the system, operators will learn to calculate the financial impact of leaks in the system.
GR. 1-2 WD, WT, SWS

Water Rates
This is a class in small water system finance and discusses a) Increasing income, and b) Water Rate Structures. Small water systems need to increase income to meet increasing operating expenses, system expansion or renovation, changes in customer base, regulatory demands, operation certification costs, emergencies, and possible loss of financial support. Operators will learn how to develop water rates utilizing flat rates, and block rates. to meet each system's financial needs.
GR.1-2 WD, WT, SWS

Water Sciences
The sciences of chemistry, microbiology, disinfection and microbes in surface and ground water join together to supply information basic to understanding water from its raw state, treatment, distribution and return to the environment. Topics discussed include the identification of waterborne pathogenic organisms, structure of matter, chemical dosage and disinfection contact time. This class is an excellent overview of the integration of the different sciences and water.
GR. 1-2 WD, WT, SWS, LS

Water Sources, Quality Parameters, Sanitary Hazards and the SDWA
This class on ground and surface water is basic to all water employees. From the hydrologic cycle to bacteria, viruses, protozoa and the SDWA regulations that govern drinking water, this all inclusive class is a must for operators studying for certification testing at any level.
GR. 1-2 WD, WT, SWS

Water Treatment Certification Review Grade 1-2
Testing can be an anxious time. This overview class reviews the information that is tested on your State's Grade 1-2 Water Treatment Certification Examination. The math and technical knowledge discussed in this review class are tied directly to each state's "Expected Range of Knowledge".
GR. 1-2 WT, SWS

Water Treatment Operations and Technology
This introductory class provides a basic review of all aspects of conventional surface water treatment. Conventional surface water treatment including process parameters, contaminants and their removal, hydraulic diversion coagulation, flocculation and sedimentation, filtration, chemical post-treatment and design and operation of ground water and surface water treatment systems are studied.
GR. 1-2 WT, SWS

Workshops

Certified Pump Technologist (4 Days)
This is a very comprehensive four (4) day class designed to provide an in-depth learning experience for all operators who work with, or maintain, pumps within a treatment plant, distribution system or collection system.

The **first two (2) days** of the program concentrates on foundation theory of operating centrifugal pumps; pump terminology, pump hydraulic fundamentals, correcting cavitation problems, troubleshooting tips. The workbook contains over 250 typical water or wastewater examination multiple choice questions. An answer key is included at the end of each chapter.

The remaining **two (2) days** is a "hands on" program working with a major pump manufacturer of municipal pump products. This portion of the program concentrates on pump problem solving, repair, and maintenance practices. Pumps and pump parts in the classroom are identified, disassembled, and then re-assembled under the direction of a factory instructor. It's the **"real thing"** and leads to certification as a **Certified Pump Technologist** upon satisfactory conclusion of the program and receiving a passing score of 70% on the final examination.
GR. 1 – 2 WD, SWS

Certified Water Sampling (3 days)
This three day class is ideal for all distribution and small water system personnel charged with the responsibility of collecting water samples in their water system. Heavily impacted by the federal Coliform Rule, California Title 22 outlines in section 64415 that sample collection and field tests shall be performed by a certified operator trained by qualified personnel from a certified lab. Other states have similar training regulations. The **Certified Water Sampler** certificate is earned by attending 18 hours of classes and receiving a passing score of 70% on the final examination.
GR. 1-2 WD, WT, SWS

Instrumentation and SCADA (2 days)
This class is designed for water – wastewater personnel and related to the **Basic Wastewater Process Control** class. Operators gain a basic understanding of the operation and functions of a variety of instruments used throughout water and wastewater systems to measure and record flow, pressure, levels, and many other necessary measurements. The class reviews basic layouts, the operation of individual systems, and troubleshooting. The SCADA class reviews analytical instruments, controls, SCADA, and communications.
GR. 1-2 WD, WT, SWS

Water Distribution (**WD**); Water Treatment (**WT**); Small Water Systems (**SWS**)

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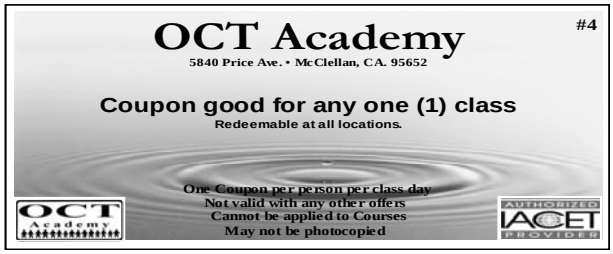

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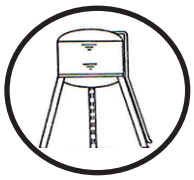

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