Water Distribution System Operation and Maintenance
Office of Water Programs
California State University, Sacramento
(9.0 Continuing Education Units)

COURSE DESCRIPTION

This course trains operators in the practical aspects of operating and maintaining water distribution systems, emphasizing safe practices and procedures. Topics include water distribution system operator duties; procedures for operating and maintaining clear wells and storage tanks; components and characteristics of distribution system facilities; operating and maintaining distribution systems; maintaining water quality in the system; disinfecting new and repaired facilities, as well as water delivered to consumers; and techniques for recognizing hazards and developing safe procedures and programs. The Chapter Review at the end of each chapter gives operators the ability to self-assess their understanding of the material by answering fill-in, matching, and multiple-choice questions.

COURSE OUTLINE

The course uses *Water Distribution System Operation and Maintenance, 7th edition* training manual.

CHAPTER 1. INTRODUCTION TO WATER DISTRIBUTION

Following completion of Chapter 1, students should be able to:

1. Describe the water supply system and distribution's part in it.
2. List the types and sources of water contamination in distribution systems and how to prevent or correct them.
3. Discuss typical job duties of water distribution system operators.

CHAPTER 2. WATER STORAGE FACILITIES

Following completion of Chapter 2, students should be able to:

1. Identify types, determine suitable locations, and inspect storage facilities.
2. Take a storage facility out of service and put it back on line.
3. Safely operate and maintain a storage facility, including selecting and applying protective coatings.
4. Collect samples from a storage facility.
5. Troubleshoot storage facility problems.
6. Protect a storage facility from corrosion.
7. Disinfect a storage facility.
8. Maintain records for a storage facility.

CHAPTER 3. DISTRIBUTION SYSTEM FACILITIES

Following completion of Chapter 3, students should be able to:

1. Explain the effect of hydraulics on the performance of a distribution system.
2. Describe the function of distribution storage facilities and pumping facilities.
3. Identify and install various types of pipes and joints.
   Identify and test various types of meters.
4. Determine the need for and install various types of backflow prevention devices.

CHAPTER 4. OPERATION AND MAINTENANCE

Following completion of Chapter 4, students should be able to:

1. Develop and conduct programs for water distribution system surveillance, water quality monitoring, and cross-connection control.
2. Locate and repair buried pipes and leaks.
3. Make pipe connections and flush and clean pipes.
4. Manage pipe lining jobs, thaw frozen pipes and hydrants, test and read meters, and disinfect mains and storage facilities.
5. Develop a recordkeeping system and keep accurate records.
6. Train operators to prepare for and respond to emergencies, deal with the public, maintain the distribution system facilities, and safely operate and maintain a water distribution system.

CHAPTER 5. DISINFECTION

Following completion of Chapter 5, students should be able to:

1. Explain the disinfection process using chlorine and hypochlorite.
2. Describe the breakpoint chlorination process.
3. Identify the points of disinfectant application and select the proper dosage.
4. Start up, shut down, troubleshoot, and maintain disinfection equipment and systems.
5. Handle disinfectants safely and develop and conduct a chlorine safety program.

CHAPTER 6. SAFETY

Following completion of Chapter 6, students should be able to:

1. Develop a safety program for a water utility agency, including delivering safety information and practices to other operators.
2. Operate and maintain pumps, wells, and other facilities safely, with attention to the safety of operators and consumers.
3. Work safely in streets while protecting road users and pedestrians from work areas in streets and sidewalks.
4. Conduct a safety inspection of waterworks facilities.

CHAPTER 7. MANAGEMENT

Following completion of Chapter 7, students should be able to:

1. Describe the functions and duties of a manager and understand authority, responsibility, delegation, and accountability.
2. Handle personnel tasks and issues so that all job applicants and employees are treated equally, fairly, and professionally during the employee selection process, employee evaluations, and disciplinary meetings.
3. Communicate effectively about operations, financial status, and other aspects of your utility within the organization, with media representatives, and with the community. Use written and oral reports, organizational charts identifying lines of authority and responsibility, and calculations such as operating ratio, coverage ratio, and simple payback.
4. Prepare long-term and short-term plans, emergency plans (including contingency plans), security plans, safety programs, and water and energy conservation programs (including best management practices) for your utility.
5. Collect, organize, use, and dispose of plant records.

Course Time Assignment

This course time assignment outlines the components of a distance learning (correspondence) training course offered by OWP for continuing education units (CEUs) or contact hours.

Title of course and training manual: Water Distribution System Operation and Maintenance, Seventh Edition
Number of text pages: 734

Average word count: 508 words per page
Average reading speed: 130 words per minute; 4 minutes per page
The training manual used for this course contains text, tables, graphs, illustrations, math example problems, section questions, and chapter review questions to enhance the presentation of information and the student learning experience. The course is designed for students to spend the same amount of time reading the tables, graphs, and illustrations as they spend reading the equivalent amount of related chapter text.

Number of math example problems: The course contains 177 math example problems. The math examples support and expand the concepts presented in the chapter text.
Average math example problem solution speed: 3 minutes per example problem

Number of section questions: The course contains 528 section questions, located in the "Check Your Understanding" sections integrated throughout the chapter text. These questions enable students to self-assess their understanding of a section of material before proceeding to the next section.
Average section question/answer speed: 2 minutes per question

Number of chapter review questions: The course contains 205 review questions, located in the "Chapter Review" at the end of each chapter. Question types include fill-in, multiple choice, and matching.
Average chapter review question/answer speed: 2 minutes per question

Objective test questions: The course contains 350 test questions. There is one objective test per chapter. Question types include true/false; best answer (one correct answer); multiple choice (one or more correct answers); and math (requiring students to work through equations to find solutions).
Average objective test question/answer speed: 2 minutes per question

The table summarizes the course components outlined above and shows the calculations for the total time assignment values in minutes and hours.

Course component	Number of component units		Minutes required to complete component unit		Total time assignment for component
Text pages	734	×	4	=	2,936
Math example problems	177	×	3	=	531
Section questions	528	×	2	=	1,056
Chapter review questions	205	×	2	=	410
Objective test questions	350	×	2	=	700
					5,633 minutes
					94 hours