

Small Wastewater System Operation & Maintenance, Vol. II
Office of Water Programs
California State University, Sacramento
(9.0 Continuing Education Units)

COURSE OBJECTIVE

This course is designed to train operators in the daily aspects of safely operating and maintaining small wastewater treatment and disposal systems.

SCOPE

Volume II of this course is designed to train small wastewater system operators to safely operate and maintain the equipment for several package wastewater treatment processes. Operators will learn how to use wetland systems and land application methods to treat wastewater and discharge effluent. Volume II also describes how to perform basic lab procedures and manage a small wastewater system.

COURSE OUTLINE

The course uses *Small Wastewater System Operation & Maintenance, Vol. II* training manual.

CHAPTER 9. WASTEWATER STABILIZATION PONDS

Following completion of Chapter 9, students should be able to:

1. Explain how wastewater stabilization ponds work and what factors influence and control pond treatment processes.
2. Identify the different types of ponds.
3. Place a new pond into operation.
4. Schedule and conduct normal and abnormal operation and maintenance duties.
5. Collect samples, interpret lab results, and make appropriate adjustments in pond operation.
6. Recognize factors that indicate a pond is not performing properly, identify the source of the problem, and take corrective action.
7. Develop a pond operating strategy.
8. Conduct their duties in a safe fashion.
9. Determine pond loadings.
10. Keep records for a waste treatment pond facility.
11. Review plans and specifications for new ponds.

The main purpose of this chapter is to teach operators how to safely start up, operate, shut down, and maintain wastewater stabilization ponds.

CHAPTER 10. ACTIVATED SLUDGE

Following completion of Chapter 10, students should be able to:

1. Explain the principles of the activated sludge process and the factors that influence and control the process.
2. Inspect a new activated sludge facility for proper installation.
3. Place a new activated sludge process into service.
4. Schedule and conduct operation and maintenance duties.
5. Collect samples, interpret lab results, and make appropriate adjustments in treatment processes.
6. Recognize factors that indicate an activated sludge process is not performing properly, identify the source of the problem, and take corrective action.
7. Perform their job duties in a safe manner.
8. Determine aerator loadings and understand the application of different loading guidelines.
9. Maintain records for an activated sludge plant.
10. Review plans and specifications for an activated sludge plant.

The main purpose of this chapter is to teach operators how to safely start up, operate, shut down, and maintain package activated sludge plants and oxidation ditches.

CHAPTER 11. ROTATING BIOLOGICAL CONTACTORS

Following completion of Chapter 11, students should be able to:

1. Describe a rotating biological contactor and the purpose of each major part.
2. Start up and operate a rotating biological contactor.
3. Operate a rotating biological contactor under abnormal conditions.
4. Shut down and restart a rotating biological contactor.
5. Maintain and troubleshoot a rotating biological contactor.
6. Safely perform the operator duties for a rotating biological contactor.
7. Review the plans and specifications for a rotating biological contactor.
8. Calculate the hydraulic and organic loadings on a rotating biological contactor.

The main purpose of this chapter is to teach operators how to safely start up, operate, shut down, and maintain rotating biological contactors.

CHAPTER 12. DISINFECTION AND CHLORINATION

Following completion of Chapter 12, students should be able to:

1. Explain the principles of wastewater disinfection with chlorine.
2. Control the chlorination process to obtain the desired effluent disinfection.

3. Handle chlorine safely.
4. Inspect new chlorination facilities for proper installation.
5. Schedule and conduct chlorination operation and maintenance duties.
6. Recognize factors that indicate the chlorination process is not performing properly, identify the source of the problem, and take corrective action.
7. Conduct your duties in a safe manner.
8. Determine chlorine dosages.
9. Explain chlorine's applications and limitations for uses other than disinfection.
10. Keep records of chlorination operation.

NOTE: This chapter does not contain information on the safe operation and maintenance of gaseous chlorinators or sulfur dioxide dechlorinators. For information on these units, see *Operation of Wastewater Treatment Plants, Volume I*, Chapter 10, "Disinfection Processes."

CHAPTER 13. ALTERNATIVE WASTEWATER TREATMENT, DISPOSAL, AND REUSE METHODS

Following completion of Chapter 13, students should be able to:

1. Describe alternative wastewater treatment, discharge, and reuse methods for small systems.
2. Determine where wetlands can be used effectively.
3. Identify the components of subsurface constructed wetlands.
4. Start, operate, and maintain subsurface constructed wetlands.
5. Safely operate, maintain, and troubleshoot land treatment systems.
6. Monitor a land treatment system.
7. Review plans and specifications for a land treatment system.

The purpose of Chapter 13 is to teach operators of small wastewater treatment facilities how to operate and maintain wetlands and land treatment systems used for wastewater treatment and disposal or reuse.

CHAPTER 14. LABORATORY PROCEDURES

Following completion of Chapter 14, students should be able to:

1. Work safely in a laboratory.
2. Operate laboratory equipment.
3. Collect representative samples of influents to and effluents from a treatment process as well as sample the process.
4. Prepare samples for analysis in the plant lab.
5. Perform plant control tests.

6. Record laboratory test results.
7. Collect and prepare samples of plant effluent for analysis in accordance with NPDES permit requirements.

The main purpose of this chapter is to teach operators how to work safely in a laboratory, collect representative samples, accurately analyze samples, and properly record laboratory test results.

CHAPTER 15. MANAGEMENT

Following completion of Chapter 15, students should be able to:

1. Identify the functions of a manager.
2. Describe the benefits of short-term, long-term, and emergency planning.
3. Define the following terms:
 1. Authority
 2. Responsibility
 3. Delegation
 4. Accountability
 5. Unity of command
4. Read and construct an organizational chart identifying lines of authority and responsibility.
5. Prepare a written or oral report on the utility's operations.
6. Communicate effectively within the organization, with media representatives, and with the community.
7. Describe the financial strength of their utility.
8. Calculate their utility's operating ratio, coverage ratio, and simple payback.
9. Prepare a contingency plan for emergencies.
10. Prepare a plan to strengthen the security of your utility.
11. Set up a safety program for your utility.
12. Develop and implement capital improvement plans for your utility.
13. List and describe the types of funding sources available to the utility.
14. Collect, organize, file, retrieve, use, and dispose of utility records.

The main purpose of this chapter is to introduce students to the important aspects of management.

TIME ASSIGNMENT

Text Pages: The course uses the training manual *Small Wastewater System Operation and Maintenance, Volume II* (476 pages). The average word count on a page from the training manual is 950 words. Some pages contain tables, graphs, or illustrations to enhance the presentation of information. It is assumed that readers spend equal time studying tables, graphs, and illustrations as they would spend reading the equivalent amount of text. Therefore, each page is assumed to contain the equivalent of 950 words. Accepted average adult reading speed is 200 – 250 words per minute. Therefore, each page is projected to require four minutes of student time for each reading.

Math problems: The course contains 48 wastewater treatment math problems. Projected average time to solve each math problem is three minutes.

Questions: The course contains 251 assessment questions integrated into the reading. Each question requires a written response consisting one or more sentences. Projected average review question time is two minutes per question.

Discussion questions: The course contains 121 discussion questions. Each discussion question requires a written response consisting one or more sentences. Projected average discussion question time is two minutes per question.

Review questions: The course contains 144 comprehensive review questions. Projected average response time is one minute per question.

Objective test questions: The course contains 375 objective test questions. Projected average response time is one minute per question.

Component	Minutes per Component Unit	Number of Component Units	Time to Complete Units
Text pages	4	476	1,904
Math problems	3	48	144
Questions	2	251	502
Discussion questions	2	121	242
Review questions	1	144	144
Objective test questions	1	375	375
Total (minutes)			3,311
Total (hours)			55