

Operation of Wastewater Treatment Plants, Volume 1
A—Safety, Beginning Treatment, and Lagoon Systems
Office of Water Programs
California State University, Sacramento
(4.0 Continuing Education Units)

COURSE DESCRIPTION

This course trains operators in the basics of wastewater treatment processes, how those processes protect public health and the environment, and general wastewater treatment plant safety. Operators will also learn how to safely and effectively operate preliminary and primary treatment processes and equipment, as well as lagoon systems. This course uses the following chapters from *Operation of Wastewater Treatment Plants, Volume 1*: Chapter 1, “Introduction to Wastewater Operation”; Chapter 2, “Safety”; Chapter 3, “Preliminary Treatment”; Chapter 4, “Primary Treatment”; and Chapter 8, “Lagoon Systems (Secondary Treatment).” The information in this course provides operators with an understanding of basic operation and maintenance concepts, and an ability to analyze and solve problems when they occur on the job. The procedures and concepts discussed in this course can be adapted to fit the needs of different plants.

COURSE OUTLINE

The course uses selected chapters from the training manual, *Operation of Wastewater Treatment Plants, Volume 1*.

Chapter 1, Introduction to Wastewater Treatment

Learning Objectives

1. Describe various types of pollutants found in wastewater and explain the reasons to prevent discharging them, including regulatory prohibitions.
2. Describe wastewater collection, conveyance, and treatment systems.
3. Draw schematic plan layouts of typical wastewater treatment plants and list the major wastewater treatment processes and the purpose of each process.
4. Identify various methods of effluent discharge, reclamation, and reuse, as well as solids handling, disposal, and reuse.
5. Recognize safety hazards and take steps to eliminate them by corrective action.

The main purpose of this chapter is to give an overview of why and how wastewater is treated.

Chapter 2, Safety

Learning Objectives

1. Explain the duties and responsibilities of management and operators for safety in wastewater treatment facilities and collection systems.
2. Identify and correct hazards in treatment facilities such as unsafe conditions, fire hazards, and electrical hazards.
3. Describe the processes involved in safely maintaining and operating equipment, facilities, vehicles, and systems.

The main purpose of this chapter is to inform operators of safe procedures and how to implement them in a wastewater treatment plant.

Chapter 3, Preliminary Treatment

Learning Objectives

1. Explain the purposes of flow meters, racks, screens, shredders, grit channels, grit separators, preaeration, and emergency storage facilities.
2. Properly and safely start up, operate, shut down, and maintain preliminary treatment processes, preaeration wastewater treatment processes, and emergency storage facilities.
3. Read, calibrate, and maintain flow measuring devices in pipelines, open channels, or flumes.
4. Determine the volume of screenings and how long a disposal site will last before it is full.

The main purpose of this chapter is to train operators in the basic operation and maintenance of preliminary treatment processes at wastewater treatment plants.

Chapter 4, Primary Treatment

Learning Objectives

1. Develop an operational strategy for sedimentation and clarification based on the principles of clarifier processes.
2. Operate clarifiers efficiently using standard procedures, preventive maintenance, and performance indicators (including loading calculations and laboratory results) to manage normal and abnormal operating conditions and correct problems.
3. Recognize safety hazards in and around clarifiers and take steps to eliminate those hazards by corrective action.
4. Review plans and specifications for clarifiers.

The main purpose of this chapter is to train operators in the basic operation and maintenance of primary treatment processes at wastewater treatment plants.

Chapter 8, Lagoon Systems (Secondary Treatment)

Learning Objectives

1. Safely operate wastewater lagoons, including startup and shutdown using standard procedures, preventive maintenance, performance indicators (such as laboratory results and loading calculations), and recordkeeping.
2. Develop a lagoon operating strategy based on how lagoons work, the type of lagoon, and the factors influencing and controlling lagoon treatment processes.
3. Assess lagoon operation to identify sources of problems or abnormal operations and make operational adjustments to return to normal operation.
4. Review plans and specifications for new lagoons.

The main purpose of this chapter is to train operators in the basic operation and maintenance of lagoon systems for wastewater treatment.

TIME ASSIGNMENT

Text pages: The content from the training manual used in this course, *Operation of Wastewater Treatment Plants*, Volume 1, includes 302 pages. The average word count on a page from the training manual is 526 words. 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. Therefore, each page is assumed to contain the equivalent of 526 words. The average reading speed is 130 words per minute; therefore, each page is projected to require four minutes of student time for each reading.

Math example problems: The course contains 26 math example problems. The projected average time to solve each math problem is three 3 minutes.

Section questions: The course contains 229 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’s material before proceeding to the next section. The projected average response time is 2 minutes per question.

Chapter review questions: The course contains 135 review questions, located in the “Chapter Review” at the end of each chapter. Question types include fill-in, multiple choice, and matching. The projected average response time is 2 minutes per question.

Objective test questions: The course contains 190 test questions. There is 1 objective test per chapter. The projected average response time is 2 minutes per question.

Course component	Number of component units	Minutes required to complete component unit	Total time assignment for component
Text pages	302 ×	4 =	1,208
Math example problems	26 ×	3 =	78
Section questions	229 ×	2 =	458
Chapter review questions	135 ×	2 =	270
Objective test questions	190 ×	2 =	380
			2,394 minutes
			39.9 or 40 hours