Water Sources

Course Overview

This course is designed to introduce students to the sources of water and the various threats to our water supply. Course material consists of reading assignments, video lectures, and lesson quizzes.

Course completion requires that the student successfully complete each component of each individual lesson. Students are not permitted to "challenge" the course quizzes to receive credit. Review questions and written assignments must be submitted either online or uploaded in a Word document for the professor's review. Lesson quizzes have a minimum passing score of 70%.

Upon successful completion of the course requirements, students will receive a certificate of completion for the *Water Sources* course, which is applicable toward a Certificate in Water Treatment Technology from American Water College.

Water Sources(2.1 CEUs)

- Water Supply Hydrology
- Groundwater Sources
- Surface Water Sources
- Emergency and Alternative Water Sources
- Use and Conservation of Water
- Water Quality
- Water Source Protection

Required Texts

Textbook: Water Treatment Operator Training Handbook
Edition: Third Edition
Author: Nicholas Pizzi and William C. Lauer
ISBN: 978-1-58321-861-7

Educational Objectives

- To provide students with an overview of water use and conservation
- To provide students with a foundational knowledge of water sources
- To acquaint students with various source water threats
- To provide students with an overview of source water protection
- To provide students with an overview of water quality, water quality regulations and the public health concerns regarding water quality

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Evaluation

Students will be graded on their performance on each lesson quiz, and their course participation. Unless each unit is completed, the student will not be permitted to advance to the next lesson, and the student will not be awarded credit for completion until all assignments, quizzes and lectures are completed. Please contact our office with any questions.

Support

Students can contact our student support staff with any course-related, content-related, or technology-related inquiries. Our office hours are Monday-Thursday, 9-5 CT, and Friday 9-12 CT.

Contact Info:
Phone Number: (661) 874-1655
Email Inquiries: Info@americanwatercollege.org

Additionally, students are encouraged to contact their professor directly with any questions or comments.

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Lesson 1 – Water Supply Hydrology

Summary of This Lesson

Hydrology is the branch of science concerned with the properties of the earth's water, especially water movement in relation to land. This lesson explores the 12 processes in the hydrologic cycle, from evaporation and transpiration to snowmelt and subsurface flow.

In the context of water treatment, the study of hydrology is primarily concerned with factors that interrupt or affect the water supply and quality of water to be treated. This lesson explores a few of those adverse factors and their impact. Additionally, this lesson will introduce students to water volume and flow measurement terminology.

Lesson Objectives

Upon completion of this lesson, students will be able to:

- Explain and identify the different processes in the hydrologic cycle
- Identify and explain groundwater sources and groundwater movement
- Identify and explain surface water sources and the impact of the hydrologic cycle on surface water sources
- Identify and explain water volume and flow measurements

Assignments for This Lesson

- Read Chapters 1-3 (pg. 1-44) in *Water Treatment Operator Training Handbook*
- Watch the video lecture for Lesson 1
- Write a 1-page paper describing the hydrologic cycle. Include the major processes and what happens during each process. Upload to professor for review.
- Complete the quiz for Lesson 1

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Lesson 2 - Groundwater Sources

Summary of This Lesson

Wells are the most common and efficient means of tapping a groundwater source. This lesson takes an in-depth look at the different types of wells, well drilling, well maintenance, well development and aquifer recharge. Additionally, students are introduced to the contamination factors associated with wells, and means of preventing groundwater contamination.

Finally, this lesson introduces springs and infiltration galleries as means of tapping a groundwater source.

Lesson Objectives

Upon completion of this lesson, students will be able to:

- Identify the different types of water wells
- Correctly identify and explain well terminology
- Identify the different types of wells
- Explain well construction procedures and methods
- Explain different methods of well development
- Identify and explain sanitary considerations in well construction and use
- Evaluate aquifer performance
- Explain well operation, maintenance and abandonment
- Define and explain springs and infiltration galleries

Assignments for This Lesson

- No reading assignment for this lesson
- Watch the video lecture for Lesson 2
- Write a 1-2 page paper describing the sequence of events required to drill and finish a new well. Include in your paper all of the major components of a well and their function. Upload to professor for review.
- Complete the quiz for Lesson 2

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Lesson 3 - Surface Water Sources

Summary of This Lesson

Surface water can be largely defined as water that is not under the ground; for the purposes of this lesson, surface water will describe water that is open to the atmosphere and subject to surface runoff. As a part of the hydrologic cycle, surface water makes up a significant source of treatable drinking water.

This lesson will explore the different sources, types and factors that influence surface water supply, as well as some methods of protecting surface water sources.

Lesson Objectives

Upon completion of this lesson, students will be able to:

- Identify surface water sources
- Explain surface runoff, and identify factors that influence surface runoff
- Explain surface source considerations
- Identify different methods of water storage
- Identify and explain intake structures and their purposes
- Identify and explain surface-supply operating problems and contamination concerns

Assignments for This Lesson

- No reading assignment for this lesson
- Watch the video lecture for Lesson 3
- Write a few paragraphs describing the types of intake structures. Include in your paper why there are different types of intake structures and the purpose they serve. Students are not required to submit this assignment.
- Complete the quiz for Lesson 3

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Lesson 4 - Emergency and Alternative Water Sources

Summary of This Lesson

When the public water supply is interrupted or contaminated, there is more at stake than just the inconvenience for the customers. There are potential health risks inherent in an interrupted supply, from microbiological to chemical contamination to the more obvious sanitary concerns.

Each utility should develop an emergency response plan in the event of anything from a water main break to direct contamination. We will also look at alternative sources of water utilities can and should tap if or when an emergency arises.

Lesson Objectives

Upon completion of this lesson, students will be able to:

- Identify causes of source disruption
- Identify causes of source contamination
- List and evaluate long and short-term solutions for disruption or contamination
- Identify and list alternative water sources
- List emergency water supply options
- Evaluate and explain water reuse options

Assignments for This Lesson

- No reading assignment for this lesson
- Watch the video lecture for Lesson 4
- Write a short paper describing the possible sources of source water contamination. Upload to professor for review.
- Complete the quiz for Lesson 4

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Lesson 5 - Use and Conservation of Water

Summary of This Lesson

Water is our most valuable, most plenteous and most vital resource. The availability of safe drinking water is often taken for granted, until there is a shortage or an emergency situation as we discussed in the previous lesson. It is important for both utilities and customers to be aware of their water usage, and to be educated on various ways to conserve water.

This lesson will take an in-depth look at the different categories of water use, conservation issues and methods, and water rights issues that may affect a municipality's water use or conservation.

Lesson Objectives

Upon completion of this lesson, students will be able to:

- List the three categories of water use
- Explain water use in each category
- Explain water conservation methods
- Explain water conservation benefits
- Explain water conservation problems
- Identify and explain water rights issues

Assignments for This Lesson

- No reading assignment for this lesson
- Watch the video lecture for Lesson 5
- Write a short paper describing steps a water utility can take to encourage the efficient use of water. Upload to professor for review.
- Complete the quiz for Lesson 5

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Lesson 6 - Water Quality

Summary of This Lesson

The public water supply must not only be reliable and continuous, the water must conform to state and federal standards for water quality. It is important for the public to have complete confidence in the quality of the water their utility supplies to their tap.

This lesson looks at the four different characteristics of water quality, the public health concerns and importance of water quality, and the major public drinking water regulations.

Lesson Objectives

Upon completion of this lesson, students will be able to:

- List and explain the four categories of water quality characteristics
- Identify and explain the factors that influence source water quality
- Explain the public health significance of water quality
- List the major public water supply regulations

Assignments for This Lesson

- No reading assignment for this lesson
- Watch the video lecture for Lesson 6
- Write a short paper describing the four broad categories of water quality characteristics and how they differ from each other. Give examples from each category. Upload to professor for review.
- Complete the quiz for Lesson 6

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Lesson 7 - Water Source Protection

Summary of This Lesson

There are myriad ways to protect a public drinking water supply, starting with protection at the source. There are natural threats and human threats; both groundwater and surface water sources are vulnerable to contamination.

This lesson will cover the different types of pollution, their effect, and different means of protecting groundwater and surface water sources from future pollution.

Lesson Objectives

Upon completion of this lesson, students will be able to:

- Explain the fundamental principles of source water protection
- Explain methods and evaluation of surface water protection
- Explain methods and evaluation of groundwater protection

Assignments for This Lesson

- No reading assignment for this lesson
- Watch the video lecture for Lesson 7
- Write a short paper discussing how the recreational use of lakes that are sources of drinking water can be accomplished. Upload to professor for review.
- Complete the quiz for Lesson 7