

# Course Description Sheet

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## COURSE TITLE

Groundwater Treatment

## COURSE DURATION

1 Hour

## OVERVIEW

Untreated or inadequately treated ground water poses a serious problem in public water supply systems. The U.S. Environmental Protection Agency (EPA) has estimated that about 70 percent of ground water systems provide either untreated or inadequately treated ground water. This means that 20 million people receive water that has not been disinfected—70 million if we include those who receive water that has not been properly treated by 4—log inactivation or removal of viruses. According to the U.S. Centers for Disease Control and Prevention (CDC), ground water is responsible for most waterborne disease outbreaks.

## PREREQUISITES

No prior knowledge is required.

## BEHAVIORAL OBJECTIVES

After successfully completing this course, you will be able to:

- Discuss groundwater properties, including its abundance, its relation to the hydrologic cycle, and its uses by public water systems
- Explain the regulations related to the treatment of groundwater by public water systems
- Describe the different constituents that can occur in groundwater and their corresponding treatment strategies
- Discuss the disinfection and chlorination processes used in groundwater systems

## COURSE OUTLINE

Chapter	Minutes
Introduction	3
Groundwater Sources	18
Groundwater Rule	8
Groundwater Treatment	19
Disinfection	10
Conclusion	1
Summary	1
<b>Course Total</b>	<b>60</b>

## AVAILABILITY

This course is offered online and is available 24 hours a day, 7 days a week, 365 days a year.

## **TRAINING METHODOLOGY & EVALUATION**

This course is self-paced online training. Review exercises reinforce the content, and students are evaluated with a multiple-choice exam. Upon completion, students are prompted to submit a course evaluation.

## **REFERENCES**

American Water Works Association (AWWA). 2016. WSO: Water Treatment. Denver, Colo.: AWWA.

Association of State Drinking Water Administrations (ASDWA). (April 1999). Guidance Manual for Conducting Sanitary Surveys of Public Water Systems; Surface Water and Groundwater Under the Direct Influence . EPA 815-R-99-016.

Regulating Disinfectants and Disinfection Byproducts, Washington Department of Health, Office of Drinking Water, Publication 331-254, January 6, 2020.

Water System Design Manual, Washington Department of Health, Office of Drinking Water, Publication 331-123, June 2020.

Groundwater Rule, Washington State Department of Health, Office of Drinking Water, Publication 331-447, February 2019.

Groundwater, Freeze and Cherry, Prentice Hall, 1979.

American Water Works Association (AWWA), Groundwater, Manual of Practice M21, Fourth Addition, 2014.

EPA, Rule Fact Sheet: Stage 2 Disinfectants and Disinfection Byproducts Rule. December 2005

Corso PS, Kramer MH, Blair KA, Addiss DG, Davis JP, Haddix AC. Emerging Infectious Diseases. (April 2003). "Cost of illness in the 1993 Waterborne Cryptosporidium outbreak, Milwaukee, Wisconsin." 9(4). <http://wwwnc.cdc.gov/eid/article/9/4/02-0417.htm>.

U.S. Geological Survey (USGS). Summary of Estimated Water Use in the United States. 2015.

EPA, Groundwater Rule (GWR) Fact Sheet, EPA 815-F-08-008, July 2008.

EPA, The Groundwater Rule (GWR) Implementation Guidance. EPA 816-D-07-001, November 2007