

## 360water - Drinking Water Series

Course titles and descriptions	Author	Value
<b><i>Accident Investigation</i></b>	Alan J. Tucci	1 hour

Treatment plant safety reflects literally thousands of hazards, regardless of their chance of occurring in one's particular circumstances, is an impossible task. However, implementation of an accident investigation program can effectively focus a facility on safety issues. An accident investigation includes a thorough investigation, a reasoned analysis, and follow-up actions.

<b><i>Basic Safety Fundamentals for the Water &amp; Distribution System Operator</i></b>	Troy Gallagher	1 hour
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Upon completing this course, the operator will understand the basic fundamentals and skills needed to work safely around a water plant and distribution system. Participants will be subjected to various dangers and the components to work safely and smarter when surrounded by the possibility of injury and dangers that can be associated with distribution system work.

<b><i>Confined Space Entry</i></b>	Alan J. Tucci	1 hour
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In the water and wastewater industry, much work takes place in confined spaces. Industry personnel perform TV inspections, flow monitoring, and the many other tasks of our profession. Confined space entry (CSE) is hazardous. Confined spaces can kill. Training about CSE can help reduce the risk of harm faced by treatment plant operators and staff.

<b><i>Cross Connection Control</i></b>	Troy Gallagher	1 hour
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This course describes the basic fundamental techniques, instruments, and skills needed for a water distribution operator to control and prevent contamination of potable water systems due to cross connections.

<b><i>Drinking Water Disinfection</i></b>	Steven I. Safferman	1 hour
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This course describes the purpose of drinking water disinfection and the desirable properties of a disinfectant. Pathogens and indicator organisms are defined, and various disinfectants and their advantages and disadvantages are discussed. Finally, disinfectant residuals, byproducts, and regulations are covered.

<b><i>Drinking Water Ion Exchange Softening</i></b>	Steven I. Safferman	1 hour
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This operator education course discusses ion exchange softening for drinking water. Hardness is defined and its associated problems are addressed. The ion exchange softening process for drinking water treatment is explained. Also discussed is the general concept, advantages and disadvantages, regeneration process and design terms.

<b><i>Drinking Water Precipitation Softening Course</i></b>	Steven I. Safferman	1 hour
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The operator education course discusses precipitation softening for drinking water. Hardness and its associated problems and the chemistry of precipitation softening is addressed with an emphasis on the chemistry of softening.

<b><i>Fundamentals of Coagulation and Flocculation</i></b>	Steven I. Safferman	1 hour
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This operator education course defines colloidal particles and the processes of coagulation and flocculation, as related to removing turbidity from drinking water. Included are the characteristics of coagulants and the basics of flocculation. Jar testing, used to select coagulants and optimize the coagulation/flocculation process is also addressed.

**Hazard Communication Training Course**

Larry Wadsworth

1 hour

This course is provided to give water and wastewater operators information on the Hazard Communication Program requirements in OSHA regulation 29CFR1910.1200. As with other OSHA regulations, the hazard communication program is a requirement for workplaces with greater than ten employees. OSHA regulations may not apply directly to your water/wastewater facility but most states have adopted these regulations. An example of this would be the State of Ohio Public Employees Risk Reduction Program (PERRP) which adopted the OSHA regulations for protection of the health and safety of state, county, and municipal staff. Additional facility specific information on chemical use and storage program needs to be provided by your employer to meet all training requirements included in the cited OSHA regulation. General requirements for chemical identification, chemical storage, and chemical handling are covered in this course.

**How to Perform Total Coliform Analytical Test for Drinking Water Quality Course**

Sheree Gossett-Johnson

1 hour

This course explains in a step by step method, how to perform the Total Coliform Analytical test, including quality assurance and control measures. Upon completion of this course, the analyst shall understand how to prepare needed solutions, media, and correctly interpret the test results with respect to drinking water quality. Additionally, a table is provided outlining suggested volumes for nine water sources, including drinking water to assist the analyst with sample calculations to correctly report the Total Coliform density and how to determine the statistical reliability of the results.

**Introduction to Distribution System Piping and Valving**

Troy Gallagher

1 hour

Water distribution systems have played an important role in supplying water for our everyday needs. Proper installation and maintenance of these systems depends on the operator's knowledge of the system and regular inspections and upkeep of equipment. Pipes and valves need to be properly selected for the water system that best meets the needs of the system. Environment, type of water treatment system, and location are key factors to keep in mind the installation of the proper piping and valving equipment. Water treatment systems must function properly to support private home and industrial needs. System failure would be catastrophic. This course outlines and discusses piping and valving of a water distribution system and how they interact with the needs of a growing population.

**Introductory to the Development of a Quality Assurance/Quality Control Plan**

Sheree Gossett-Johnson

1 hour

This operator education course will enable the operator/analyst to understand and develop a QA/QC plan for a Water and Wastewater Treatment Plant laboratory. Even though the Water and Wastewater Treatment Plant have different functions, the importance of the laboratory data accuracy remains the same. The QA/QC plan will enable the operator/analyst to produce trackable, legally defensible analytical records and assure that the treated water from a Water or Wastewater Treatment Plant meets the Federal, State and local requirements. In addition, accurate analytical test results, scrutinized through statistical analysis, provides knowledge to the operator on what changes, if any, are needed in operating the Plant more efficiently. To develop a plan specific to your laboratory, this course identifies, describes and provides examples of the following necessary elements; Cover sheet, staff organization, sample chain of custody, operator/analyst responsibilities and certifications, operator/analyst training requirements, sample collection controls/documentation and procedure for each analytical method with the Quality Control check, equipment calibration and preventative maintenance procedures, in house analytical quality control, performance audit, statistical analysis for data assessment, validation and reporting.

**Leadership and How to Affect Change in Public Organizations**

James A. Parrot

1 hour

This course explains the importance of leadership in organizational change processes. Specifically, effective leadership provides direction, motivation, and support employees while getting out of their way.

**Lockout/Tagout - The Control of Hazardous Energy**

James Borton

1 hour

Developed in 1989, under the Occupational Safety and Health Administration (OSHA), the "Control of Hazardous Energy" or lockout/tagout program was designed to prevent injuries from the sudden and unexpected release of stored energy. Lockout/tagout

requires employers to establish a program...for affixing appropriate lockout devices or tagout devices to energy isolating devices, and to otherwise disable machines or equipment to prevent unexpected energization, start up or release of stored energy in order to prevent injury to employees. Stored energy can be electrical, hydraulic, pneumatic or mechanical in nature. The lockout/tagout program is designed to ensure that hazardous energy sources are isolated so that workplace injuries are prevented.

<b>Math Class 1</b>	Steven I. Safferman	1 hour
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Math Class 1, along with the other math oriented operator education courses in this series (Math Classes 2 & 3), discusses basic mathematical concepts associated with treatment facilities. This class specifically discusses unit conversions, average, standard deviation, flow, calculating suspended solids and biochemical oxygen demand, and removal efficiency.

While the facts of each math problem concern wastewater, the math concepts are applicable to drinking water operators. Further, there are many dual license holders (water + wastewater) so this class is helpful for both types of treatment facility operators.

<b>Media Filtration for Drinking Water</b>	Steven I. Safferman	1 hour
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This course discusses the gravity filtration process as used for domestic drinking water treatment. An overview of filtration media and backwashing are included and filter design is described. Upon completing this course, the operator should understand the basis of gravity filtration. The operator should also understand how the filtration media is selected and the theory associated with backwashing.

<b>Introduction to Membrane Operations for Small Utilities</b>	Michael B. Pilutti	1 hour
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Many small utilities struggle with aging, obsolete, or nonexistent treatment facilities and require immediate action to become compliant with government regulations. Some face multicontaminant issues and lack funding and staff to implement complicated treatment processes. In these situations, many utilities turn to membrane treatment because of the many benefits associated with technology.

<b>Membrane Unit Operations</b>	Michael B. Pilutti	1 hour
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This course will familiarize the operator with the basic types of membrane operations available for water treatment and will focus specifically on Reverse Osmosis and Nanofiltration membrane elements. This course is divided into the following sections: types of membrane operations; RO/NF membrane element construction; membrane materials; how membranes work.

<b>System Design and Flow Configurations for Membrane Operations</b>	Michael B. Pilutti	1 hour
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There are numerous flow configurations for Reverse Osmosis (RO) treatment systems that allow the operator to maximize system capability and meet end-use requirements. This course will provide the operator with an understanding of reverse osmosis membrane system design and some of the various flow configurations used in RO design to optimize system performance.

<b>Ultraviolet Disinfection</b>	Laura Tegethoff	1 hour
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This course examines ultraviolet light disinfection technology. The impact of ultraviolet disinfection technology on water and wastewater treatment is described. Treatment zones, system safety, and costs are examined. Equipment features,

<b>United States Water and Wastewater Utility Industry - Fed, State, and Local Control</b>	Patrick Karney	1 hour
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How do federal, state, and local authorities regulate water and wastewater utilities? How are these authorities organized and what is their purpose? How do laws, regulations, inspections, and reporting affect facilities? How does franchising and financial considerations present themselves in the industry? These are questions this operator education course addresses.

**United States Water and Wastewater Utility Industry**

Patrick Karney

1 hour

The water utility industry in the United States is a mixture of singular and jointly operated water and wastewater entities (some of which might include solid waste), publicly owned, privately owned, publicly owned & privately operated service delivery organizations of vastly varying sizes and organizational philosophies. How do United States water resource management firms, public utilities and government operate? What influence does the federal government have on industry? What of state and local governmental influence? How do financial considerations present themselves in the industry? What happens when a public entity delegates its water and wastewater treatment responsibility to a private entity? These are questions this operator education course will address. This course is a companion course to United States Water and Wastewater Utility Industry - Federal, State, and Local Control.

**Terms and Equations of Membrane Operations**

Michael B. Pilutti

1 hour

This course introduces the most common terms and equations used when discussing membrane treatment. This course is divided into two sections - Theoretical terminology and Practical Terminology. The Theoretical Terminology section discusses the equations and theories used in membrane system design. The Practical Terminology section discusses terminology used in the construction and operation of membrane treatment systems.