

San Bernardino Valley College
Curriculum Approved: 12/10/2013
Board Approval: 01/16/2014
Unique course Identification Number: CCC000553031
TOP Code: 0958.00 - Water and Wastewater Tech

I. CATALOG DESCRIPTION:

A. Department Information:

Division: Applied Technology, Transportation & Culinary Arts

Department: WATER SUPPLY TECHNOLOGY

Course ID: WST011

Course Title: Test Review for Water Distribution Operators D2

Units: 0.5

Lecture: 0.5 contact hour(s) per week
8 - 9 contact hours per semester

Departmental Advisory:

WST 052

Prerequisite:

WST 061

B. Catalog Description:

This course is a review of the expected Range of Knowledge (ROK) required to obtain the California Department of Public Health (CDPH) Distribution Operator certification at the Distribution Operator II level. The review topics include distribution system operations, disinfection, related mathematics, and safety.

C. Schedule Description:

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II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1

III. COURSE OBJECTIVES FOR STUDENTS:

Upon successful completion of the course the student should be able to:

- A. Identify the Range of Knowledge (ROK) required to successfully pass the California Department of Public Health (CDPH) Distribution Operator License examination at D2 level
- B. Identify reliable sources of information which is likely to contain accurate information about water distribution
- C. Identify what information is needed to successfully pass licensing examination and understand how it is organized to find the best sources of information

IV. COURSE CONTENT:

- A. Water distribution system operator

1. Typical work and duties
 2. Job opportunities and sources to locate openings
 3. CDPH requirements for certification, application deadlines, and continuing education units
- B. Hydrologic cycle
- C. Sources of supply and source water protection
1. Groundwater and surface water
 2. Well location, construction, protection, yield, and terminology
 3. Surface water, storm water runoff, and infiltration
 4. Sanitary survey
- D. Water quality and its impact on human health
1. Chemical, physical, and bacteriological characteristics
 2. Safe Drinking Water Act and its reporting requirements
 3. Significance of organic and inorganic matter in water
 - a. Fluoride and the prevention of cavities in teeth
 - b. Nitrates and nitrite formation and the disease methemoglobinemia
 - c. Lead and copper impacts on mental development, kidney and liver damage
 - d. Calcium and magnesium as the root cause of hardness
 - e. Iron, manganese and iron bacteria
 - f. Coliform groups and their occurrence, significance in potential waterborne diseases
 4. pH scale, measurement, significance
 5. Maintenance of water quality in a distribution system (line flushing operation)
 6. Sampling requirements and collection procedures
 - a. Bacteriological samples
 - b. Copper and lead samples
 - c. Volatile organic compound (VOC) samples
 7. Chlorine demand: its significance and relation to dose
 8. Chlorine residual measurement and reagents used
- E. Purpose, configuration, and operation of a distribution system
1. Water storage facilities such as elevated, standpipe, hydropneumatic, surge, clearwell, underground
 2. Valves such as gate, butterfly, globe, check, ball, and plug
 3. Meters such as positive displacement, current, compound, venturi, proportional
 4. Hydrants such as wet barrel and dry barrel
 5. Pumps and electric motors
 - a. Causes of water hammer and cavitation
 - b. Routine maintenance such as packing, bearings, alignments, priming
 6. Piping installation, operation capacities and pressure
 - a. Selection
 - b. System lay-out and maps
 - c. Service connections
 - d. Joints and fittings
 - e. Thrust restraints
 - f. Effects of pipe size, type and C factor
 - g. Significance of head loss
 - h. Causes and effects of tuberculation
 - i. Inspection, repair, cleaning, disinfection, flushing

- j. Leak detection
 - 7. Access system demands, peak demand, peak hour, maximum daily demand, per capita demand
 - 8. Power generators
 - 9. SCADA
 - 10. Chemical feeders
 - 11. Water hammer
 - 12. Corrosion control
- F. Disinfection
- 1. Purpose
 - 2. Coliform groups-occurrences, significance, surrogate
 - 3. Chlorine and chlorine compounds
 - a. Characteristics
 - b. Chlorine curve chemistry
 - c. Breakpoint chlorination
 - d. Disinfection by products (DBPs) and formation of Trihalomethanes (THMs)
 - e. Storage
 - f. Containers
 - g. Detection of leaks
 - h. Hazards and safety requirement
 - i. Effects of pH, turbidity and temperature on chlorination
 - j. Standard disinfection methods for new/repared distribution mains
- G. Safety
- 1. Tailgate meeting
 - 2. Basic first aid
 - 3. Confined space entry
 - 4. Traffic control
 - 5. AC pipe handling
 - 6. Trenching and shoring
 - 7. Occupational Safety and Health Administration (OSHA) compliance
 - 8. Respiratory protection and chlorine leaks
 - 9. Material Safety Data Sheets (MSDS)
 - 10. Lock-out/tag-out procedures
- H. Utility management
- 1. Public relations
 - 2. Emergency response
 - 3. Security
- I. Water distribution mathematics
- 1. Units and conversion factors
 - a. Cubic feet to gallons and cubic yards
 - b. Pressure, head to pounds per square inch (psi) and psi to head
 - c. Gallons per minute (gpm) to cubic feet per second (CFS)
 - 2. Volume of water in cylindrical, rectangular tank, pipes
 - 3. Water level, given the volume of water and diameter of tank
 - 4. Well drawdown given the static and dynamic level
 - 5. Relation between the flow, velocity, and area
 - 6. Relation between chlorine dosage, demand and residual
 - 7. Thrust block calculations

V. METHODS OF INSTRUCTION (May include any, but do not require all, of the following):

- A. Lecture
- B. Use of films, videotapes, or other media
- C. Use of written materials: texts, journals, etc.
- D. Instructor generated handouts

VI. TYPICAL OUT-OF-CLASS ASSIGNMENTS:

- A. Reading assignments are required and may include (but are not limited to) the following:
Read the handout on "Expected Range of Knowledge for Water Distribution Operator" published by the California Department of Public Health and be prepared for a class discussion.
- B. Critical thinking assignments are required and may include (but are not limited to) the following:
A 32' diameter tank, 20' tall, is 60% full. Calculate the amount of water in gallons contained in the tank.
- C. Writing assignments are required and may include (but are not limited to) the following:
List the types of water storage facilities commonly used to store potable water. Be prepared to present the advantages and disadvantages of each type of facility to your class.

VII. METHODS OF EVALUATION

- A. Class participation
- B. Presentations (oral or visual)

VIII. TYPICAL TEXT(S):

- A. American Water Works Association. Water Distribution Operators Training Handbook. 4th ed. American Water Works Association, 2010.
- B. American Water Works Association. Water Operator Field Guide. 2nd ed. American Water Works Association, 2012.
- C. Kerri, Ken. Water Distribution System Operator and Maintenance. 6th ed. California State University, 2009.

IX. OTHER SUPPLIES REQUIRED OF STUDENTS:

- A. A scientific calculator