

San Bernardino Valley College

Curriculum Approved:

Board Approval:

Unique course Identification Number:

TOP Code: 0000.00 -

I. CATALOG DESCRIPTION:

A. Department Information:

Division: Applied Technology, Transportation & Culinary Arts

Department: WATER SUPPLY TECHNOLOGY

Course ID: WST012

Course Title: Test Review for Water Distribution Operations D3

Units: 0.5

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

Prerequisite:

WST-062

and WST-052

Departmental Advisory: WST-063

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 III level. The review topics include distribution system operations, disinfection, related mathematics, and safety.

C. Schedule 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 III level. The review topics include distribution system operations, disinfection, related mathematics, and safety.

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 the D3 level.
- B. 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. Operator certification requirements
- B. Water distribution mathematics
 1. Units and conversion factors-convert map scale to actual distance
 2. Water measurement formulas
 - a. Area
 - b. Volume
 - c. Metering
 - d. Flow rates
 - e. Velocity

3. Well calculations
 - a. Depth in a well
 - b. Well drawdown
 - c. Well yield
 - d. Specific yield
4. Pressure-convert pressure reading to depth of water
5. Disinfectant dosages-calculate chlorine/ammonia ratio for chloramination
6. Thrust block size calculations
7. CT calculations
8. Horsepower calculations
 - a. Brake and water
 - b. Pump efficiency
9. Cost of water production calculations
- C. Distribution system operation
 1. Purpose
 2. Water storage
 3. Assess system demands
 - a. Peak demand
 - b. Peak hour demand
 - c. Maximum daily demand
 - d. Per capita demand
 4. Water storage facilities
 - a. Types
 - b. Purposes
 - c. Corrosion control methods
 - d. Facility components
 - e. Draining, cleaning and disinfection
 5. Pumps
 - a. Types
 - b. Cavitation
 - c. Operational principles
 - d. Maintenance procedures
 - e. Troubleshooting
 - f. Repair and replace pump motor and components
 6. Pipe material
 - a. Selection
 - b. "C" factor
 - c. Joints and fittings
 - d. Thrust restraints
 - e. Excavation
 - f. Installation
 - g. Inspection
 - h. Repair
 - i. Cleaning
 - j. Disinfection
 - k. Flushing
 - l. Leak detection
 - i. Pipe location
 - ii. Methods
 - iii. Allowable loss
 - iv. Repair
 7. System lay-out and maps
 - a. Types of water systems
 - b. Trunk and transmission lines
 - c. Interpret map symbols
 - d. System pressure zones

8. Service connections-record-keeping
9. Meters-mechanical components
10. Valve
 - a. Types
 - b. Uses
 - c. Exercise and testing
 - d. Pressure ratings
11. Hydrants
 - a. Types
 - b. Uses
 - c. Unidirectional flushing
 - d. Testing
 - e. Permitting
12. Cross connection and backflow devices
13. Power generators
14. SCADA
 - a. Components
 - b. Communication techniques
 - c. Interpretation of information
15. Static head - meaning and significance
16. Head loss and friction-relationships
17. Chemical feeders
 - a. Types
 - b. Components
 - c. Troubleshooting
18. Corrosion control-
 - a. Cathodic protection
 - b. Types and applications
 - c. Galvanic series
 - d. Principles of operation
 - e. Langlier index
 - f. Control techniques
 - g. Tuberculation - causes and effects
- D. Sources and supply
 1. Hydrologic cycle
 2. Ground and surface water
 - a. Wells-location
 - b. Well construction
 - c. Well protection
 - d. Components and term
 3. Chemical, physical and bacteriological characteristics
 4. Sanitary survey
- E. Water quality sampling
 1. Safe drinking water act
 - a. Reporting and record-keeping
 - b. Maximum contaminant levels
 - i. Maximum disinfectant residual level
 - ii. Primary and secondary MCL
 - iii. MCL violations
 2. Elements, compound, conductivity, turbidity, hardness and pH
 3. Significance of organic and inorganic contaminants
 4. Heterotrophic bacteria
 5. Lead and copper rule
 6. Nitrate formation
 7. Public notification-
 - a. AWWA disinfection standards
 - b. Monitoring and sampling requirements

- c. Coliform groups - occurrences and significance
- d. Potential waterborne diseases
- e. Disinfection by-products, (i.e. Trihalomethanes)

F. Disinfection

- 1. Coliform groups-occurrences, significance and surrogate
- 2. Potential waterborne diseases
- 3. Chlorine curve chemistry
- 4. Breakpoint chlorination
- 5. Factors that affect chlorine
- 6. Chlorine analysis techniques
- 7. Disinfection by-products
- 8. Chlorine containers
- 9. Hazards and safety precautions
- 10. Standard disinfection methods for new/repared mains and storage facilities
- 11. Chlorine demand, dosage and residual

G. Safety

- 1. CAL-OSHA safety regulations
- 2. Traffic control
- 3. Trenching and shoring
- 4. AC pipe handling
- 5. Confined spaces
- 6. Emergency response planning
- 7. Vulnerability assessment

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 small town's 4800 residents use on average 190,000 gallons of water a day. What would the average daily water demand per resident be for the month of June?
- C. Writing assignments are required and may include (but are not limited to) the following:
Explain the purposes of each type of valve and what application each is designed for. Be prepared to present the advantages and disadvantages of each valve to your class.

VII. METHODS OF EVALUATION

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

VIII. TYPICAL TEXT(S):

- A. American Water Works Association AWWA Water Distribution Operators Training Handbook. 4th ed. American Water Works Association, 2010.
- B. American Water Works Association AWWA Water Operator Field Guide. Softbound ed. American Water Works Association, 2004.
- C. Kerri, Ken Water Distribution Operation and Maintenance. 6th ed. California State University , 2009.

IX. OTHER SUPPLIES REQUIRED OF STUDENTS:

- A. A Scientific Calculator