



OCT ACADEMY  
Class Description submittal to OESAC



Title: **WD Equipment Evaluation, Operation, & Maintenance**

A Certification Preparation Workshop for ABC Water Distribution Operators.

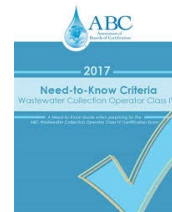
New Class, or  Class Renewal

CEU Award requested: **0.7 CEUs/day**

**ONLINE eLearning CLASS OVERVIEW:**

This is a one (1) day ***Distribution Equipment Evaluation, Inspection & Maintenance Job Tasks*** certification review class deigned to help all water distribution operator grades to successfully respond to the new (July 2017) ABC Need-to-Know criteria on Grade 1, 2 3, and 4 level examinations.

While the subject matter topics within this workbook listed in the Table of Contents responds to every topic listed by ABC in their Need-to-Know criteria outline, there is no implied claim that this certification preparation review class will cover every possible point that a water distribution operator will be tested on during an examination. Nevertheless, it is our intention to include as much essential basic information as possible that can be useful to all water distribution operators.



Upon completion of this chapter, learner will be able to:

- Understand preventative, predictive, and deferred maintenance, run to failure mode. How maintenance fits into and affects asset management plans, emergency response, compliance, staffing, and budgeting.
- Learn about Calibrating meters; Flow, level and pressure sensors and SCADA.
- Know Safety rules and guidelines when working with chemicals PPE and storage, as well as, safety rules and guidelines when working with mechanical equipment.
- Learn about water pressure concepts; statis, dynamic, and water system total pressure. Solve typical hydraulic math problems.

- Review the concepts of pipeline installation and methods.
- Learn about the valves installed in a pipeline.
- Learn about Disinfection equipment (e.g., Chemical Feeders, UV, Ozone equipment, pH adjustment equipment and Dechlorination).
- Review Pumps Inspect and Maintain, Pumps - centrifugal, positive displacement, etc.

At the end of each chapter, a true / false quiz and a multiple-choice quiz will measure your understanding of this topic.

### ABC Need to know topics, as of June, 2017

#### ABC - Water Distribution Grade 1

##### Exam Content Outline

Number of Questions	Content Area	Job Task Complexity Levels
25	Distribution System Components	10 15 0
24	Equipment Installation, Operation, & Maintenance	10 14 0
27	Disinfection Monitoring, Evaluation, Adjustment, & Laboratory Analysis/ Interpretation	19 8 0
24	Security, Safety, Administrative Procedures, & Public Interactions	10 14 0
100*	Total	49 51 0

This exam includes **8** calculation questions

\*Your exam may contain up to 10 extra unscored pre-test questions (see *Before You Dive In* for more details).

#### ABC - Water Distribution Grade 2

##### Exam Content Outline

Number of Questions	Content Area	Job Task Complexity Levels
26	Distribution System Components	10 16 0
24	Equipment Installation, Operation, & Maintenance	10 13 1
26	Disinfection Monitoring, Evaluation, Adjustment, & Laboratory Analysis/ Interpretation	18 8 0
24	Security, Safety, Administrative Procedures, & Public Interactions	9 14 1
100*	Total	47 51 2

This exam includes **10** calculation questions

\*Your exam may contain up to 10 extra unscored pre-test questions (see *Before You Dive In* for more details).

## OESAC ACCESS:

A state username has been created for evaluation purposes. To access class, please visit:

<https://elearning.octwqa.org/>

Username: oregonlearner1  
Password: W@t3rCl@ss3s

Name: Oregon elearner  
Email: oregon@octinc.com

## CLASS DESCRIPTION:

This class will be presented via Zoom in one eight (8)- one hour learning sessions.

At the time of this writing, no publication, nor class, exists to prepare water distribution operators for sections 2 and 3 in the new (as of May, 2017) ABC water distribution exams published by ABC. The contents of this class are the first attempt to offer wastewater exam candidates some measure of exam preparation.

## OUTLINE:

All eLearning classes are offered live by a qualified instructor in one (1) hour presentation segments. During the eight (8)-hour session, the instructor will attempt to complete as many of the chapter lessons as possible and duplicate a classroom experience.

<b>Chapter Title:</b>	<b>Time</b>
1. Maintenance and Inspection concepts - Expanded overview.	1 hour
2. Monitoring Equipment.	1 hour
3. Safety.	1 hour
4. Water Distribution System Hydraulics	1 hour
5. Pipeline Installation and Maintenance.	1.5 hour
6. Valves in the Distribution System.	0.5 hour
7. Disinfection equipment Inspect and Maintenance.	1 hour
8. Pumps Inspect and Maintenance.	1 hour

## **EXAMINATION PROCESS:**

Each chapter includes a comprehensive quiz which must be taken after completion of the chapter content. To earn a passing grade on each quiz, the learner must correctly answer at least 70% of the questions. All quizzes can be re-taken once in an effort to improve the score. An average score of 70% is required to receive credit for the class.

### **Time for Completion, per chapter:**

Each chapter is designed to take 50 – 60 minutes to complete in a time paced format. The end of chapter measure quiz is expected to take approximately 10 – 20 minutes to complete. On average, each chapter is designated to be a one (1) hour work effort.

## DETAILED SUPPORTING DESCRIPTION:

### Table of Contents

#### Glossary of Maintenance Words and Terms.

#### Chapter 1. Maintenance and Inspection concepts - Expanded overview.

- Preventative, predictive, and deferred maintenance, run to failure mode.
- How maintenance fits into and affects asset management plans, emergency response, compliance, staffing, and budgeting.
- Condition assessment - how it is used to establish priorities and establish action plans.
- Maintenance planning software, operator records/logs.



#### Chapter 2. Monitoring Equipment

- Calibrate meters.
- Flow, level and pressure sensors.
- SCADA.
- Weirs.
- Ultrasonic sensors.
- Chemical feed, influent/effluent, recording devices.
- Composite sampling devices.
- Analyzers(e.g., DO, pH, H<sub>2</sub>S, ORP).



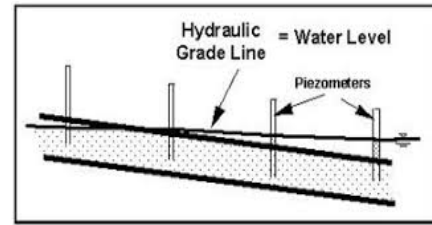
#### Chapter 3. Safety.

- Safety rules and guidelines when working with chemicals PPE and storage.
- Safety rules and guidelines when working with mechanical equipment.
- Electrical, traffic, trench, fall protection.
- Chlorine gas.
- Blood borne disease.
- Confined space.



## Chapter 4. Water Distribution System Hydraulics.

- Water Pressure Concepts.
  - i) - Static Pressure and Head.
  - ii) - Dynamic pressure.
  - iii) - Water Total Pressure.
- 20 Question MC Quiz.
- Math Problems #1 - #10 with Solutions.



## Chapter 5. Pipeline Installation and Maintenance.

- History of Pipes.
- System Design.
  - Pressure.
  - Layout and Looping.
  - Valving.
  - Water quality.
- Pipe Materials.
- Preventing corrosion.
- Pipe fittings and Appurtenances.
- Pressure and Head relationship.
- Water Main Installation.
- Safety / Traffic Safety.
- Trench safety.
- Thrust Blocks.
- Pressure Testing, DIP and PVC.
- Disinfection.
- Standard Trench bedding.
- Main Breaks.
- Operations summary – Piping.
- Distribution System Pipeline Materials
- Joints and fittings.
- Flushing.



## Chapter 6. Valves in the Water Distribution System.

- Need for valves in the Distribution system.
- Valves used in the distribution system.
- Gate valve layout and Applications.
  - control Valves.
- Valve Maintenance and Operation.



## Chapter 7. Disinfection equipment Inspect and Maintain (disinfection and dechlorination)

- Disinfection equipment (e.g., Chemical Feeders, UV, and ozone).
- Ozone equipment.
- pH adjustment equipment.
- Dechlorination –
  - a. Sulfur based, sodium bisulfite - feed, monitoring and calibration
  - b. Non-sulfur based, Vitamin C, Ascorbic acid.
- Residual measurement equipment and receiving water issues.
- Chemical handling and safety equipment related- storage issues, SCBA, PPE , sensors, and ventilation.



## Chapter 8. Pumps Inspect and Maintain (pumps, electrical and generators)

- Pumps - centrifugal, positive displacement.
- Lift pumps.
- Foot valves, throttling valves.
- Impeller clearance.
- Cavitation.
- Pressure testing,
- Amperage measurement imbalance, common problems, etc.
- On-off and control settings.
- Sludge pumping, return and waste.



## Time Schedule

### TIME PRESENTATION OUTLINE:

<b>Start Time</b>	<b>End Time</b>	<b>Instructional Time</b>	<b>Allotted Break Time</b>	<b>Chapter/Discussion/Quiz</b>
8:00am	8:50am	50 minutes	8:50am–9:00am	Maintenance and Inspection concepts - Expanded overview
9:00am	9:50am	50 minutes	9:50am–10:00am	Monitoring Equipment
10:00am	10:50am	50 minutes	10:50am-11:00am	Safety
11:00am	12:00pm	60 minutes	12:00pm-12:30pm	Water Distribution System Hydraulics
12:30pm	1:20pm	50 minutes	1:20pm-1:30pm	Pipeline Installation and Maintenance
1:30pm	2:20pm	50 minutes	2:20pm-2:30pm	Pipeline Installation and Maintenance Continued & Valves in the Distribution System
2:30pm	3:20pm	50 minutes	3:20pm-3:30pm	Disinfection equipment Inspect and Maintenance
3:30pm	4:30pm	60 minutes		Pumps Inspect and Maintenance
		420 minutes		

6 sessions of 50 minutes of instruction and 2 sessions of 60 minutes of instruction equals 420 minutes. 420 minutes equates to 7 hours of instruction divided by 10 which is 0.7 CEUs

END