



A Non-Profit Educational Corporation

OCT ACADEMY
A U.S. Government Funded Education Contractor.
An ANSI/IACET Accredited School Nationwide.
Class Description submittal to OESAC

Title: **Water Plant Equipment Evaluation & Maintenance**

A Certification Preparation Workshop for ABC Water Plant Operators.

New Class, or Class Renewal

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

CLASS OVERVIEW:

This is a one (1) day **Water Plant Equipment Evaluation, Inspection & Maintenance** certification review class designed to help all water plant operator grades to successfully respond to the 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 plant 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 plant operators.



Upon completion of this class, 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 chemical feed pump equipment.

- Learn about chemical feed pump math.
- Learn about Maintenance Management and methods.
- 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. Chemical feed pumps.

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 Treatment Grade 1

Exam Content Outline

Number of Questions	Content Area	Job Task Complexity Levels
30	Treatment Process	12 18 0
13	Laboratory Analysis	5 8 0
27	Equipment Operation & Maintenance	11 16 0
10	Source Water Characteristics	4 6 0
20	Security, Safety, Compliance, & Administrative Procedures	9 11 0
100*	Total	41 59 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 Treatment Grade 2

Exam Content Outline

Number of Questions	Content Area	Job Task Complexity Levels
31	Treatment Process	8 17 6
14	Laboratory Analysis	5 8 1
24	Equipment Operation & Maintenance	7 15 2
11	Source Water Characteristics	2 7 2
20	Security, Safety, Compliance, & Administrative Procedures	9 11 0
100*	Total	31 58 11

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).

CLASS DESCRIPTION:

This class will be presented in one (1) seven (7) hour learning session.

At the time of this writing, no publication, nor class, exists to prepare water plant operators for Section 3 in the ABC May, 2017 water plant exams. The contents of this class are the first attempt to offer water plant operator exam candidates some measure of exam preparation based on ABC format.

OUTLINE:

All classes are offered by a qualified instructor in one (1) hour presentation segments. During the seven (7)-hour session, the instructor will attempt to complete as many of the chapter lessons as possible and duplicate a classroom experience.

Chapter Title:

1. Maintenance and Inspection Concepts
2. Monitoring Equipment
3. Safety
4. Maintenance Management
5. Chemical Feeder Equipment
6. Chemical Feed Pump Math
7. Disinfection Equipment Inspect and Maintenance
8. Pump Inspection and Maintenance

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.

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, H₂S, 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. Maintenance Management

- Control Costs and Budget
- Comply with Regulations
- Plan Maintenance Work
- Extend Useful Machine Life
- Develop Improved Policies, Procedures, and Standards



MAINTENANCE PLAN

Chapter 5. Chemical Feed Pump Equipment

- Feed System Components
- Delivery Systems
- Chemical Feed Systems
- Chemical control Systems
- Water Treatment Polymer Feed Systems



Chapter 6. Chemical Feed Pump Math

- Learn the basic chemical feed pump Sizing formula
- “Flow rate” is normally used to describe the raw water flow or the treatment water flow. Typically, it will be expressed in terms of millions of gallons per day (MGD) or gallons per minute (GPM)
- The terms “mg/L” and “ppm” are used to describe a weight or volume-based dose
- The calculation of how much chemical to add to the water is based on the ratios of chemicals to the water dosed



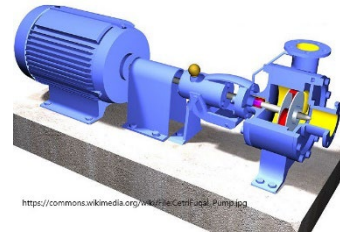
Chapter 7. Disinfection equipment Inspect and Maintain (disinfection and dechlorination)

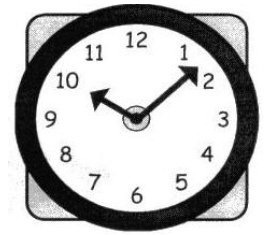
- Disinfection equipment (e.g., Chemical Feeders, UV, and ozone)
- Ozone equipment
- pH adjustment equipment
- Dechlorination –
 - a. Sulfur based, sodium bisulfite - feed, monitoring and calibration
 - b. Non-sulfur based, Vitamin C, Ascorbic acid
- Residual measurement equipment and receiving water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

Day 1

Start Time	End Time	Instructional Time	Allotted Break Time	Chapter/Discussion/Quiz
8:00am	8:50am	50 minutes	8:50am–9:00am	Introduction, Glossary of Words and Terms
9:00am	9:50am	50 minutes	9:50am–10:00am	Maintenance & Inspection Concepts
10:00am	10:50am	50 minutes	10:50am-11:00am	Monitoring Equipment & Safety
11:00am	12:00pm	60 minutes	12:00pm-12:30pm	Maintenance Management
12:30pm	1:20pm	50 minutes	1:20pm-1:30pm	Chemical Feeder Equipment
1:30pm	2:20pm	50 minutes	2:20pm-2:30pm	Chemical Feed Pump Math
2:30pm	3:20pm	50 minutes	3:20pm-3:30pm	Disinfection Equipment Inspect & Maintenance
3:30pm	4:30pm	60 minutes		Pump Inspection & 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