



OCT WATER QUALITY ACADEMY
A U.S. Government Education Contractor
Class Description submittal to OESAC

Title: Equipment Evaluation, Inspection, & Maintenance

- New Class or Class Renewal
 Classroom or Distance Education

CEU Award requested: **1.4 CEUs**

CLASS OVERVIEW:

This is a two (2) day ***Equipment Evaluation, Inspection & Maintenance*** wastewater certification review class designed to help all wastewater operator grades to successfully respond to the new 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 wastewater 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 wastewater operators.



Upon completion of the course, students 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.
- Know about Headworks grit removal. Influent and process monitoring equip and charts, recorders, Mechanical and bar screens & fine screens.
- Review Activated sludge aeration systems (e.g., blowers, surface aerators, diffusers). air compressors, generators – inspections and more.

- Understand Digestion and sludge handling equipment.
- 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 the understanding of each topic.

CLASS DESCRIPTION:

This class will be presented in person or via Zoom with a live instructor in two, eight (8) hour learning sessions, or four, four (4) hour learning sessions depending on the requested schedule. Students will take a 30-minute break per 4 hours of class for a total of 14 hours of learning upon completion.

OUTLINE:

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.
- Composite sampling devices.
- Analyzers (e.g., DO, pH, H₂S, ORP).
- Chemical feed, influent/effluent, recording devices.



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.
- Digester gas safety devices.
- Chlorine gas.
- Blood borne disease.
- Confined space.



Chapter 4. Headworks Equipment Inspect and Maintenance: (equipment at headworks and influent)

- Influent and process monitoring equip and charts, recorders.
- Mechanical and bar screens & fine screens.
- Grit removal.
- Operator tasks and common problems, (such as seasonal flow variation due to I&I).
- Lift pumps station(s).



Chapter 5. Activated sludge Equipment Inspect & Maintain (aeration, clarification, filtration, chemicals)

- Aeration basins.
- Sequencing Batch Reactors.
- Membrane Bioreactors.
- Air compressors.
- Chemical feed systems (e.g., polymer, ferric).
- Clarifiers and Sedimentation basins.
- Filtration and exchange units (e.g., sand, membranes).
- Generators – inspections.



Chapter 6. Digestion and sludge handling equipment Inspect and Maintain (digestion and sludge handling)

- Aerobic digesters.
- Anaerobic digesters.
- DAF units.
- Mechanical dewatering equipment (e.g., presses, centrifuges).
- Odor control devices (e.g., biofilters, scrubbers).
- Solids thickening processes (e.g., DAF, belt, rotary drum).
- Drying beds.
- Sludge testing.
- Digester gas.
- Stuck digester causes, problems, etc.



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 - rags, clogs, grease, etc.
- On-off and control settings.
- Sludge pumping, return and waste.



TIME PRESENTATION OUTLINE: (Sample two, eight (8) hour sessions)

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, Chapter 1: Maintenance and Inspection – Preventative, Predictive, & Deferred maintenance; Asset Management and Emergency Response
9:00am	9:50am	50 minutes	9:50am–10:00am	Chapter 1 Continued: Maintenance and Inspection – Condition Assessment and Planning
10:00am	10:50am	50 minutes	10:50am-11:00am	Chapter 2: Monitoring Equipment
11:00am	12:00pm	60 minutes	12:00pm-12:30pm	Chapter 2 Continued: Monitoring Equipment
12:30pm	1:20pm	50 minutes	1:20pm-1:30pm	Chapter 3: Safety Rules and Guidelines
1:30pm	2:20pm	50 minutes	2:20pm-2:30pm	Chapter 3 Continued: Safety – Substances, Disease, Confined Space
2:30pm	3:20pm	50 minutes	3:20pm-3:30pm	Chapter 4: Headworks Equipment Inspection and Maintenance – Influent and Process Monitoring Equipment & Charts; Screens
3:30pm	4:30pm	60 minutes		Chapter 4 Continued: Equipment Inspection and Maintenance – Grit Removal; Operator Tasks & Common Problems; Lift Pumps Stations
		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

Day 2

Start Time	End Time	Instructional Time	Allotted Break Time	Chapter/Discussion/Quiz
8:00am	8:50am	50 minutes	8:50am–9:00am	Chapter 5: Activated Sludge Equipment Inspection & Maintenance – Aeration & Clarification
9:00am	9:50am	50 minutes	9:50am–10:00am	Chapter 5 Continued: Activated Sludge Equipment Inspection & Maintenance – Filtration & Chemicals
10:00am	10:50am	50 minutes	10:50am-11:00am	Chapter 6: Digestion and Sludge Handling Equipment Inspection and Maintenance – Aerobic & Anaerobic Digesters; DAF Units; etc.
11:00am	12:00pm	60 minutes	12:00pm-12:30pm	Chapter 6 Continued: Digestion and Sludge Handling Equipment Inspection and Maintenance – Drying beds; Sludge Testing; Digester Gas; Troubleshooting.
12:30pm	1:20pm	50 minutes	1:20pm-1:30pm	Chapter 7: Disinfection Equipment Inspection & Maintenance - Disinfection
1:30pm	2:20pm	50 minutes	2:20pm-2:30pm	Chapter 7 Continued: Disinfection Equipment Inspection & Maintenance - Dechlorination
2:30pm	3:20pm	50 minutes	3:20pm-3:30pm	Chapter 8: Pumps Inspection & Maintenance - Pumps
3:30pm	4:30pm	60 minutes		Chapter 8 Continued: Pumps Inspection & Maintenance – Electrical and Generators
		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