Course Name	Maintaining Wastewater Equipment
Credit Hours	2 Hours
Course Description	This course provides details on a variety of wastewater equipment, including pumping stations, screening equipment, grinding equipment, grit removal systems, sludge and scum collection apparatus', and flow measurement devices. For each piece of equipment, we will cover major parts, start-up, operation, shutdown, maintenance, and safety.
Course Objectives	After completing this course, the licensee should be able to: • Describe a typical collection system layout. • Name the three types of pumping stations currently in use and explain how they differ. • Use the following terms in an explanation of pump operation: impeller, shroud, volute case, stuffing box, shaft sleeve, wearing ring. • Name the importance of a pump station ventilation system. • Demonstrate the necessary procedures to follow before pump start-up. • Name the two basic parts of a hand-cleaned bar screen and explain their functions. • Describe the operation of a mechanically cleaned bar screen. • Explain why grinders are used and how they are maintained. • Compare and contrast a rotating drum comminutor and a stationary screen comminutor with an oscillating cutter. • Explain how a barminutor combines the functions of a bar screen and a comminutor. • Give examples of important safety rules to follow when working with screening and grinding equipment. • Tell why grit removal is important. • Name the three phases of the grit removal process. • Explain the functions of slide gates and dewatering drains in handcleaned grit chambers. • Describe the action of a reciprocating rake and explain its purpose.

- List several maintenance checks to make on chain and flight grit collectors.
- Explain how an aerated grit chamber works and how to tell if it is not working correctly.
- Describe the operation of a cyclone grit separator.
- List the five major components common to all clarifiers.
- Describe the operation of slotted-pipe and helicaltype skimmers.
- Name the two flow patterns possible in circular clarifiers.
- Discuss the daily maintenance requirements of clarifers.
- Explain the importance of laboratory testing on the contents of a clarifer.
- Identify possible safety hazards associated with clarifer operation.
- Define flow and differentiate between flow rate and total flow.
- List the three basic types of flow systems.
- Distinguish between direct and indirect flow measurements, and between primary and secondary devices.
- Five a brief description of a current meter, a pitot tube, a weir, and a flume, and tell how each functions in open channels.
- Describe several methods of measuring flow from freely discharging pipes.
- Name at least five level detection devices and explain their operation.
- Describe the following flow measurement devices as they are used in completely filled pipes: orifice, venturi, flow nozzle, rotameter, magnetic flowmeter, and ultrasonic flowmeter.

Course Timed Syllabus Attached

Method of Presentation This online course uses instructor-led video, animation, text, and images. Multiple choice questions are used to test how well the student understands the material between each section. Each answer choice has a response which tells the student whether the selected answer is correct or not.

Schedule and Location This course may be taken at any time at www.aypotech.com. The student may sign in and out of the course as many times as needed to complete the course.

Attendance Verification	Licensees can only access the training course using a secure username and password, linked to their unique email address.
Method of Evaluation	The licensee must complete all multiple-choice questions between sections correctly to get credit for the course. If their first response is incorrect, students will have to try again until they choose the correct answer. Question choices are randomized, so each participant will have a unique testing experience. The course is also timed; participants will not get credit until they spend at least 120 active minutes in the course. After successful completion of the course, the licensee is required to complete and submit a questionnaire in order to access their certificate of completion.
Instructor(s)	Ralph Stevens
Cost	$25

Maintaining Wastewater Equipment Timed Syllabus

Section	Topic		Questions	Minutes*
	Pumping Stations			
1		Collection Systems	**1**	**1.7**
2		Pumping Stations	**2**	**4.2**
3		Pump Operation	**3**	**5.5**
4		Pump Types	**1**	**2.6**
5		Pump Maintenance	**2**	**3.5**
6		Pump Drive Units	**1**	**2.1**
7		Piping, Ventilation, and Control Systems	**2**	**5.5**
8		Level Detection	**1**	**3.4**
9		Station Operation and Maintenance	**1**	**4.2**
10		Safety Considerations	**1**	**2.0**
	Screening and Grinding Equipment			
11		Hand-Cleaned Bar Screens	**2**	**4.4**
12		Mechanically Cleaned Bar Screens	**3**	**9.2**
13		Grinders	**1**	**2.2**
14		Rotating Drum Comminutors	**1**	**3.5**
15		Stationary Screen Communutors	**1**	**3.4**
16		Barminutors	**2**	**4.7**
	Grit Removal Systems			
17		The Nature of Grit	**1**	**2.9**
18		Hand-Cleaned Grit Chambers	**2**	**4.3**
19		Maintaining Hand-Cleaned Grit Chambers	**1**	**2.0**
20		Detritus Tanks	**3**	**5.2**
21		Maintaining Detritus Tanks	**1**	**2.7**
22		Chain and Flight Grit Collectors	**2**	**3.0**
23		Maintaining Chain and Flight Grit Collectors	**1**	**2.5**
24		Aerated Grit Chambers and Cyclone Separators	**2**	**3.8**
25		Maintaining Aerated Grit Chambers	**1**	**6.2**
	Sludge and Scum Collection Apparatus			
26		Sedimentation	**2**	**3.6**
27		Rectangular Clarifiers	**2**	**4.3**
28		Scum Removal	**1**	**1.7**
29		Circular Clarifiers	**2**	**5.9**
30		Sludge Removal	**1**	**2.8**
31		Laboratory Testing	**1**	**1.6**
32		Troubleshooting	**2**	**3.6**
33		Safety Considerations	**1**	**2.1**
	Flow Measurement Devices			
34		Properties of Flowing Liquids	**2**	**3.4**
35		Flow Measurement Methods, Including Batch Processes	**1**	**2.5**
36		Flow Measurement in Open Channels	**2**	**4.7**
37		Measuring Flow from Freely Discharging Pipes	**1**	**1.7**
38		Methods of Depth Measurement	**2**	**6.5**
39		Flow Measurement in Completely Filled Pipes	**1**	**6.0**
40		Methods of Pressure Measurement	**1**	**2.4**
41		Maintenance of Flow Measurement Devices	**1**	**2.0**
		Totals:	**62**	**149.7**
		Time Required to Complete Course:		**120**

*Time per section is based on 250 words/minute plus one minute per question

Ralph Stevens

Certificates/Licenses

- Certified Maintenance Reliability Professional
- Grade 4 Electrical/Instrumentation & Grade 3 Water Treatment Operator Licenses (CA)
- Grade 3 Operator, Maintenance Technician, & Grade 1 Collection Operator Licenses (AZ)

Instructional Experience

TPC Training/JADE Learning/American Safety Council **2017 - present**
Conducts training seminars, assessing the training needs and comprehension of the students, preparing training material and agenda, continually enhancing technical instructional delivery and presentation skills, adjusting course content in accordance with business needs and regulatory requirements, and ensuring the quality of the course content throughout a course life cycle. Over 600 hours of classroom instructional experience per year.

California Water Environment Association
Class trainer for Electrical/Instrumentation licensees. Workshop trainer for Reliability Centered Maintenance.

Technical Experience

Maintenance Reliability Supervisor (CCWRD) **2017 - 2020**
Helping leadership enhance the district into RCM, RCD, and Operational Excellence.

Planner/Scheduler (Clark County Water) **2012 - 2014**
Planned, scheduled, inspected work performed along with mentoring staff at the WWTP, lift stations and lagoons. Instructed staff on the install, repair, and maintenance of motors, pumps, SCADA, controls, plant facilities and project management. Used Maximo EMS to monitor and control work flow, budgets, assets, and cost roll up. Served as onsite safety trainer, odor compliant person, and site inspector. Performed root cause analysis and predictive maintenance on plant equipment.

Electrical Supervisor (Metropolitan Water Reclamation) **1978 - 2012**
Supervised Electrical Department in all wastewater processes, SCADA control wave, lift stations, deep tunnel, power plant sub-stations, control structures, disinfection, ozone, pumps, tide gates, and day-to-day operations. Supervised 4 WWTP operators, 24 electricians, support trades and contract workers. Setup the Mainsaver CMMS system, asset management, job and safety plans, and RCM implementation. Used CMMA and SAP to track progress, order parts, schedule work, and oversee work order completion. Worked on general construction from the sub-contractor side of the Deep Tunnel Storm Water Collection Systems.