2012 - 2013

Florida Department of Education
Curriculum Framework

Program Title: **Water Treatment Technologies**
Program Type: **Career Preparatory**
Career Cluster: **Agriculture, Food and Natural Resources**

	PSAV
Program Number	P150507
CIP Number	0715050603
Grade Level	30, 31
Standard Length	405 hours
Teacher Certification	WSP OPER @7 G
CTSO	N/A
SOC Codes (all applicable)	51-8031
Facility Code	263 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: N/A Language: N/A Reading: N/A

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the career Agriculture, Food and Natural Resources cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Water Treatment sector of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to source water or influent characteristics; treatment facility unit processes and operational techniques; water quality and identification; identifying treatment goals and measuring their achievement; disinfection; process control techniques; sampling, testing, and laboratory analysis; supervision; operation maintenance and inspection of facility equipment; application of current DEP regulations and standards; facility administration and management techniques; and troubleshooting operational control problems. The emphasis is on skills that are needed for effective treatment process control and troubleshooting.

Program Structure

This program is a planned sequence of instruction consisting of three occupational completion points.

When offered at the postsecondary adult career and technical level, this program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44(3)(b), F.S.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	EVS0133	Water Treatment Plant Operator C	155 hours	51-8031
B	EVS0143	Water Treatment Plant Operator B	130 hours	51-8031
C	EVS0153	Water Treatment Plant Operator A	120 hours	51-8031

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

This program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Identify professions related to the water technology field.
02.0 Identify scientific concepts common in water and wastewater treatment.
03.0 Identify safety hazards associated with water technologies.
04.0 Identify federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials.
05.0 Solve basic math problems common to water technologies.

06.0 Define pumping and basic hydraulic principles.
07.0 Define principles of disinfection.
08.0 Define sampling techniques.
09.0 Define federal, state, and local regulations that apply to water technologies.
10.0 Demonstrate employability skills.
11.0 Identify sampling techniques and explain the significance of the steps.
12.0 Identify chemical, biological, and physical constituents of water entering the water-treatment facility or distribution systems.
13.0 Describe the principles, operational and troubleshooting practices of the aeration process.
14.0 Describe the principles, operational and troubleshooting practices of the mixing, coagulation, and flocculation processes.
15.0 Describe the principles, operational and troubleshooting practices of the sedimentation process.
16.0 Describe the principles, operational and troubleshooting practices of the filtration process.
17.0 Describe the principles, operational and troubleshooting practices of the water-softening process.
18.0 Describe the principles, operational and troubleshooting practices of the stabilization process.
19.0 Describe the principles, operational and troubleshooting practices of the corrosion-control process.
20.0 Describe the principles, operational and troubleshooting practices of the disinfection process.
21.0 Describe the principles, operational and troubleshooting practices for the control and treatment of trihalomethanes.
22.0 Describe the principles, operational and troubleshooting practices of the iron-and manganese-removal processes.
23.0 Describe the principles, operational and troubleshooting practices for taste and odor control.
24.0 Describe the principles, operational and troubleshooting practices of the demineralization processes.
25.0 Describe the principles, operational and troubleshooting practices of the fluoridation process.
26.0 Identify facility operational problems.
27.0 Describe basic hydraulics and pumping operations.
28.0 Identify appropriate federal, state, and local regulations for the operation and maintenance of a public potable-water facility.
29.0 Perform equipment inspection, and identify basic maintenance for the treatment train, treatment residuals disposal, and solids management.
30.0 Analyze the constituents of water and select the appropriate treatment.
31.0 Identify advanced sampling techniques and interpret the results.
32.0 Solve algebra, ratio, and proportion problems in the water treatment process.
33.0 Demonstrate process optimization for water treatment.
34.0 Analyze and correct facility operational problems.
35.0 Demonstrate equipment inspection and preventive maintenance for water treatment.
36.0 Apply appropriate federal, state and local regulations for operation and management of a public potable water facility.
37.0 Apply federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials.

38.0 Describe energy conservation and identify ways to conserve energy in the water treatment facility.
39.0 Demonstrate supervisory skills.
40.0 Describe theoretical facility management skills.
41.0 Demonstrate methods of organization and control.
42.0 Develop a plan for cost management.
43.0 Prepare budgets and personnel assignments.
44.0 Develop standard operating procedures for the training and orientation of new employees.
45.0 Demonstrate personnel selection and discipline.
46.0 Demonstrate contingency planning.
47.0 Develop a plan for energy conservation.
48.0 Describe record keeping and use of computer applications in planning.
49.0 Explain process optimization for water or wastewater treatment facilities.
50.0 Interpret permits and blueprints.
51.0 Develop a laboratory plan for process control.
52.0 Discuss public-relations skills in community interactions.

2012 - 2013

Florida Department of Education
Student Performance Standards

Program Title: **Water Treatment Plant Technologies**
PSAV Number: **P150507**

Course Number: EVS0133
Occupational Completion Point: A
Water Treatment Plant Operator C – 155 Hours – SOC Code – 51-8031

01.0 Identify professions related to the water technology field--The student will be able to:

- 01.01 List duties of water technology workers such as wastewater operator, water operator, systems operator, stormwater operator, residual (bio-solids) hauler operator, cross connection operator, pretreatment operator, and meter reading/maintenance operator.
- 01.02 Identify the basic terms and concepts involved in processes used in these professions.
- 01.03 List potential employers in the water technology field: federal, municipal, county, state and private.
- 01.04 Identify resources to assist in finding employment in the field.
- 01.05 Identify professional organizations related to the water technology field.
- 01.06 Identify career ladder levels in the water technology field: trainee, C Level, B Level, A Level.

02.0 Identify scientific concepts common in water and wastewater treatment--The student will be able to:

- 02.01 Identify chemical symbols used in water and wastewater treatment.
- 02.02 Describe the hydrologic cycle.
- 02.03 Describe the basic concepts of the pH scale and its importance in the treatment process.
- 02.04 Identify the differences between mixtures, elements, and compounds, and organic and inorganic chemicals.
- 02.05 Identify principle states of matter: liquid, solid, and gas.
- 02.06 Identify the basic nitrogen, phosphorous, and carbon cycles.

03.0 Identify safety hazards associated with water technologies--The student will be able to:

- 03.01 Identify the types of hazards common to water technology facilities.
- 03.02 Recognize unsafe conditions and prescribe corrective measures.
- 03.03 Identify and safely handle hazardous chemicals common to water technology facilities.
- 03.04 Recognize electrical hazards.
- 03.05 Recognize fire hazards, identify types of fires, and describe appropriate extinguishing techniques.

04.0 Identify federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials--The student will be able to:

04.01 Identify the kinds of information presented on Material Safety Data Sheets (MSDS).
04.02 Describe requirements for in-plant training and the accessibility of information on hazardous and toxic substances (chapter 442, F.S.).

05.0 Solve basic math problems common to water technologies--The student will be able to:

05.01 Perform basic arithmetic problems, including addition, subtraction, multiplication, division, fractions, decimals, percentages, rounding (significant figures), graphing, etc.
05.02 Identify metric measurements and perform conversions.
05.03 Perform calculations that involve areas, volumes, capacities, retention times, pounds, mg/L, velocities, flow rates, pressure, and head.

06.0 Define pumping and basic hydraulic principles--The student will be able to:

06.01 Identify types of pumps.
06.02 Discuss application and use of different types of pumps.
06.03 Identify components/characteristics of pumps including pump operation and basic pump curves including centrifugal pumps, positive displacement pumps, and air lift pumps.
06.04 Identify types of pipes, valves, and fittings.
06.05 Define cross connections.
06.06 Identify the appropriate equipment used in the treatment processes.

07.0 Define principles of disinfection--The student will be able to:

07.01 List the need/reasons for disinfection (list of waterborne diseases).
07.02 Define concepts related to disinfection.
07.03 List methods and chemicals used in disinfection.
07.04 Define the physical properties of chlorine.
07.05 List kinds of disinfection equipment used.

08.0 Define sampling techniques--The student will be able to:

08.01 Define the reasons for sampling and types of samples.
08.02 Define methods of sample collection and handling.
08.03 Define the basic procedure for quality control and quality assurance in sampling.
08.04 Define the chain of custody for samples.
08.05 Perform chlorine residual analysis.
08.06 Perform pH analysis.

09.0 Define federal, state, and local regulations that apply to water technologies--The student will be able to:

09.01 List regulatory agencies and their roles in monitoring the water technology field.
09.02 Define regulations associated with the appropriate federal, state or local agencies.
09.03 Define training and certification requirements for water technology workers.

10.0 Demonstrate employability skills--The student will be able to:

10.01 Conduct a job search.
10.02 Secure information about a job.
10.03 Identify documents that may be required for a job application.
10.04 Complete a job application.
10.05 Demonstrate competence in job-interview techniques.
10.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.
10.07 Identify acceptable work habits.
10.08 Demonstrate knowledge of how to make job changes appropriately.
10.09 Demonstrate acceptable employee-health habits for the treatment facility environment.
10.10 Identify materials and documents needed for a professional library.
10.11 Demonstrate productive and positive customer interactions.
10.12 Demonstrate effective interpersonal communication skills.

11.0 Identify sampling techniques and explain the significance of the steps--The student will be able to:

11.01 Identify the laboratory tests that are commonly performed by operators in Florida water-treatment facilities, including those required by the Safe Drinking Water Regulation.
11.02 Define pathogenic organisms, including bacteria, protozoa, and virus, and describe their disease associations.
11.03 Describe the laboratory test performed for the presence of bacteria.
11.04 Describe the correct procedure for obtaining a bacteriological sample.
11.05 Describe correct sample collection procedures for inorganic and organic analyses.
11.06 Describe the laboratory quality-control checks and required documentation.
11.07 Identify the chain of custody for a sample.

12.0 Identify chemical, biological, and physical constituents of water entering the water-treatment facility or distribution systems--The student will be able to:

12.01 Determine which constituents are inherent to groundwater and/or surface water.
12.02 Describe the relationship between turbidity and the microbiological quality of water.
12.03 Describe the uses of chemical analysis in water-treatment operations.
12.04 Identify symbols and common names for elements and chemical compounds.
12.05 Select the primary constituents to be measured and the most commonly used units of measurement for each.
12.06 Explain the importance of water treatment for the control of coliform bacteria and algae.

13.0 Describe the principles, operational and troubleshooting practices of the aeration process--The student will be able to:

13.01 Describe the aeration and air stripping processes, and explain how they differ.
13.02 Identify the types of aeration systems.
13.03 Identify the benefits of aeration.
13.04 Describe the components of an air-stripping system.

13.05 Troubleshoot aeration and air stripping processes.

14.0 Describe the principles, operational and troubleshooting practices of the mixing, coagulation, and flocculation processes--The student will be able to:

14.01 Define concepts such as turbidity, color, coagulation, and flocculation.
14.02 Define the difference between sweep and enhanced coagulation.
14.03 Identify the kinds of equipment used in the coagulation process.
14.04 Identify coagulant chemicals used in water-treatment facilities.
14.05 Identify the steps of coagulation, in order.
14.06 Identify the specific sampling locations for process control in a coagulation process.
14.07 Identify factors that would contribute to poor floc formation.
14.08 Compute the feed rate in pounds per day (lbs/d) when the chemical coagulant (mg/1) and flow rate (MGD) are known.
14.09 Compute the dosage (mg/1) of coagulant when the rate of flow (MGD) and the feed rate (lbs/day) of the chemical coagulant are known.
14.10 Compute the dosage rate that is needed to treat a different flow (MGD) at the current dosage when the current rate of flow (MGD) and the current coagulant feed rate (lbs/d) are known.
14.11 Describe troubleshooting techniques for basic mixing, coagulation, and flocculation processes.

15.0 Describe the principles, operational and troubleshooting practices of the sedimentation process--The student will be able to:

15.01 Describe an upflow clarifier and basin sedimentation.
15.02 Identify factors that affect efficient sedimentation.
15.03 Identify the measures that would be effective in preventing or controlling algae growth on surfaces of coagulation and sedimentation basins.
15.04 Identify methods of sludge removal from sedimentation basins.
15.05 Describe troubleshooting techniques for sedimentation and upflow clarifier processes.

16.0 Describe the principles, operational and troubleshooting practices of the filtration process--The student will be able to:

16.01 Explain concepts related to filtration, including types of filters, filter-system components, and the steps for normal filtration operations.
16.02 Explain common problems of filtering systems, including head loss, mudballs, and filter media loss.
16.03 Determine when to backwash a filter.
16.04 Identify the steps for backwashing a filter.
16.05 Describe troubleshooting techniques for filtration processes.

17.0 Describe the principles, operational and troubleshooting practices of the water-softening process--The student will be able to:

17.01 Describe the two types of hardness.
17.02 Identify the appropriate chemical(s) to use in chemical-precipitation softening processes for the two kinds of hardness.

17.03 Describe alkalinity and its components.
17.04 Identify treatment processes used for water softening.
17.05 Calculate the distribution of bicarbonate, carbonate, and/or hydroxide ions when given the total alkalinity and phenolphthalein alkalinity.
17.06 Describe selective carbonate removal.
17.07 Identify the important zones of an upflow clarifier unit.
17.08 Describe the lime soda ash softening process, including its control.
17.09 Compute lime demand from raw-water analyses.
17.10 Describe the reasons for recarbonation.
17.11 Compute carbon dioxide demands for recarbonation.
17.12 Compute hardness removal when the ion-exchange capacity is known.
17.13 Describe troubleshooting techniques for water-softening processes.

18.0 Describe the principles, operational and troubleshooting practices of the stabilization process--The student will be able to:

18.01 Identify the chemicals used in stabilization.
18.02 Identify two stabilization indices.
18.03 Determine water stability, using the Langelier index and the marble test.
18.04 Troubleshoot stabilization processes.

19.0 Describe the principles, operational and troubleshooting practices of the corrosion control process--The student will be able to:

19.01 Identify the factors that influence corrosion.
19.02 Describe the problems that can be created by corrosive waters.
19.03 Describe the basic concepts related to electrolysis.
19.04 Define electrochemical reaction.
19.05 Identify the chemicals used in corrosion control.
19.06 Describe the conditions for calcium carbonate film formation.
19.07 Define cathode film formation.
19.08 Define cathodic protection and describe its application in water-treatment facilities.
19.09 Describe troubleshooting techniques for corrosion-control processes.

20.0 Describe the principles, operational and troubleshooting practices of the disinfection process--The student will be able to:

20.01 Identify the chemicals used in primary disinfection.
20.02 Identify commonly used chlorinators and hypochlorinators.
20.03 Determine the maximum amount of chlorine gas (in pounds) that may be taken from a cylinder in a 24-hour period.
20.04 Identify proper maintenance procedures for equipment chlorination.
20.05 Identify terminology related to chlorination and disinfection.
20.06 Identify common safety problems or emergency situations that might occur during chlorination.
20.07 Identify the properties of chlorine and describe its use in water treatment.
20.08 Explain the points at which chlorine is applied most effectively in water treatment.
20.09 Compute the feed rate (lbs/d) when given the rate of flow (MGD) and dosage of chlorine (mg/1).

20.10 Compute the feed rate (lbs/d) of a hypochlorite compound that contains a given percentage of available chlorine when given a problem where the rate of flow (MGD) and the chlorine dosage (mg/1) are known.
20.11 Compute the new rate of flow and the feed rate that will be needed to maintain the current dosage when given the current rate of flow (MGD), the current chlorine feed rate (lbs/d), and the amount by which the rate of flow is to be increased or decreased.
20.12 Compute the feed rate needed to treat a given amount of water when given a chlorine demand and the desired chlorine residual.
20.13 Describe troubleshooting techniques for disinfection processes.

21.0 Describe the principles, operational and troubleshooting practices for the control and treatment of trihalomethanes--The student will be able to:

21.01 Describe the formation of total trihalomethanes (TTHM).
21.02 Identify the specific procedure for collecting samples to determine trihalomethane levels.
21.03 Compute the quarterly average and the annual TTHM measurements when sample results are given.
21.04 Identify processes that remove trihalomethane precursors.
21.05 Identify processes that remove trihalomethanes after they are formed.
21.06 Identify the benefits of alternate disinfectants.
21.07 Describe chloramination as a control of TTHM.
21.08 Describe troubleshooting techniques for the control and treatment of trihalomethanes.

22.0 Describe the principles, operational and troubleshooting practices of the iron- and manganese-removal processes--The student will be able to:

22.01 Explain the occurrence of iron and manganese in source water and in treated water.
22.02 Describe the importance of controlling iron and manganese.
22.03 Describe sample-collection and analysis procedures for iron and manganese.
22.04 Describe remedial processes for controlling iron and manganese.
22.05 Compute the potassium permanganate dosage for a known concentration of iron and manganese in the water being treated.
22.06 Describe troubleshooting techniques for iron and manganese-removal processes.

23.0 Describe the principles, operational and troubleshooting practices for taste and odor control--The student will be able to:

23.01 Identify common types of complaints about water quality.
23.02 Identify causes of tastes and odors.
23.03 Describe how microbial growths affect tastes and odors.
23.04 Describe how eutrophication contributes to surface-water tastes and odors.
23.05 Describe a cross-connection.
23.06 Identify the chemicals used in the control and treatment of tastes and odors.
23.07 Describe the Threshold Odor Number (TON) test.
23.08 Determine the TON when dilution volumes and positive samples are given.
23.09 Describe troubleshooting techniques for taste and odor control.

24.0 Describe the principles, operational and troubleshooting practices of the demineralization processes--The student will be able to:

24.01 Define concepts related to demineralization, such as reverse osmosis (RO), flux, feedwater, permeate, and salinity.
24.02 Describe the structure, composition, and performance of an RO membrane.
24.03 Describe feedwater impurities, physical parameters, and conditions potentially harmful to the RO process.
24.04 Identify items included in a typical RO-facility-operation checklist.
24.05 Describe the common causes of membrane damage.
24.06 Describe the procedure for membrane cleaning.
24.07 Compute the percent of recovery when product flow and feed flow are known.
24.08 Compute the percent of mineral rejection when total dissolved solids are known for the feedwater and product water.
24.09 Describe the basic concepts of electrodialysis (ED), such as the cathode and anode relationship and the removal of typical inorganic salts.
24.10 Describe the most common problem of ED operation in a facility.
24.11 Explain how the cation membrane and the anion membrane differ.
24.12 Describe the multi-compartment unit used in the ED process.
24.13 Describe ED operating procedures in detail.
24.14 Describe the two most common chemical solutions used to flush ED stack membranes.
24.15 Describe troubleshooting techniques for demineralization processes.

25.0 Describe the principles, operational and troubleshooting practices of the fluoridation process--The student will be able to:

25.01 Define the basic concepts related to fluoridation, including its purpose and the kinds of chemicals used.
25.02 Identify the properties of fluoride and describe its use.
25.03 Identify the types of equipment used in fluoridation.
25.04 Describe proper maintenance procedures for fluoridation equipment.
25.05 Describe potential safety problems or emergency situations in the fluoridation process, and ways to avoid them.
25.06 Compute the feed rate of chemicals used in the fluoridation process.
25.07 Describe troubleshooting techniques for the fluoridation processes.

26.0 Identify facility operational problems--The student will be able to:

26.01 Respond to customer questions about taste or odor in the water.
26.02 Respond to customer questions about red water or rust stains.
26.03 Identify the probable cause(s) for a sudden change in chlorine demand; take corrective action.

27.0 Describe basic hydraulics and pumping operations--The student will be able to:

27.01 Describe the relationship between the system head and pressure, and make conversions between them.
27.02 Describe three types of head, i.e., pressure, suction, and atmospheric.
27.03 Describe proper operation of centrifugal and displacement pumps.

27.04 Describe causes and methods that are effective in preventing “water hammer.”
27.05 Troubleshoot pump operations.

28.0 Identify appropriate federal, state, and local regulations for the operation and maintenance of a public potable-water facility--The student will be able to:

28.01 Complete the Drinking Water Bacteriological Analysis Form correctly.
28.02 Complete the DEP daily operation report (DOR) form correctly.
28.03 Complete the DEP monthly operation report (MOR) form correctly.
28.04 Identify the DEP requirements for the operation of standby and emergency equipment.
28.05 Identify the DEP requirements for microbiological monitoring and analyses.
28.06 Identify the DEP requirements for sampling and testing.

29.0 Perform equipment inspection, and identify basic maintenance for the treatment train, treatment residuals disposal, and solids management--The student will be able to:

29.01 Identify the appropriate equipment used in the treatment train, treatment residuals disposal, and solids management.
29.02 Describe a preliminary site inspection of the equipment used in the treatment train, treatment residuals disposal, and solids management.
29.03 Identify the maintenance needs of equipment used in the treatment train, treatment residuals disposal, and solids management, including safe procedures for maintenance.
29.04 Describe proper record keeping for preventive and corrective maintenance.
29.05 Describe preventive and corrective maintenance procedures for equipment used in the treatment process, treatment residuals disposal, and solids management

Course Number: EVS0143
Occupational Completion Point: B
Water Treatment Plant Operator B – 130 Hours – SOC Code – 51-8031

30.0 Analyze the constituents of water, and select the appropriate treatment--The student will be able to:

30.01 Describe the water-treatment processes common in Florida.
30.02 Describe those processes that may reduce or control a contaminant for which maximum contaminant levels (MCL) exist.

31.0 Identify advanced sampling techniques, and interpret the results--The student will be able to:

31.01 Demonstrate the need for chemical analyses in water treatment.
31.02 Select the appropriate treatment for a problem identified through laboratory testing.
31.03 Determine whether the finished water is acceptable or unacceptable according to laboratory results.

32.0 Solve algebra, ratio, and proportion problems in the water-treatment process--The student will be able to:

32.01 Perform advanced math problems including ratio and proportion.
32.02 Identify metric measurements and perform conversions.
32.03 Perform algebraic calculations essential to water treatment, when given values for components.

33.0 Demonstrate process optimization for water treatment--The student will be able to:

33.01 Describe the advanced principles and operational practices of sweep and enhanced coagulation and flocculation.
33.02 Describe the advanced principles and operational practices of sedimentation.
33.03 Describe the advanced principles and operational practices of disinfection.
33.04 Describe the advanced principles and operational practices of filtration.
33.05 Describe the advanced principles and operational practices of corrosion control.
33.06 Describe the advanced principles and operational practices of taste and odor control.
33.07 Describe the advanced principles and operational practices of iron and manganese control.
33.08 Describe the advanced principles and operational practices of fluoridation.
33.09 Describe the advanced principles and operational practices of softening.
33.10 Describe the advanced principles and operational practices of demineralization.
33.11 Describe the advanced principles and operational practices of trihalomethanes.
33.12 Demonstrate process optimization for coagulation and flocculation.
33.13 Demonstrate process optimization for sedimentation.
33.14 Demonstrate process optimization for disinfection.
33.15 Demonstrate process optimization for filtration.
33.16 Demonstrate process optimization for corrosion control.
33.17 Demonstrate process optimization for taste and odor control.
33.18 Demonstrate process optimization for iron and manganese control.
33.19 Demonstrate process optimization for fluoridation.
33.20 Demonstrate process optimization for softening.
33.21 Demonstrate process optimization for demineralization.
33.22 Demonstrate process optimization for trihalomethanes.

34.0 Analyze and correct facility operational problems--The student will be able to:

34.01 Demonstrate troubleshooting techniques and corrective action for sweep and enhanced coagulation and flocculation.
34.02 Demonstrate troubleshooting techniques and corrective action for sedimentation.
34.03 Demonstrate troubleshooting techniques and corrective action for disinfection.
34.04 Demonstrate troubleshooting techniques and corrective action for filtration.
34.05 Demonstrate troubleshooting techniques and corrective action for corrosion control.
34.06 Demonstrate troubleshooting techniques and corrective action for taste and odor control.
34.07 Demonstrate troubleshooting techniques and corrective action for iron and manganese control.
34.08 Demonstrate troubleshooting techniques and corrective action for fluoridation.
34.09 Demonstrate troubleshooting techniques and corrective action for softening.
34.10 Demonstrate troubleshooting techniques and corrective action for demineralization.

34.11 Demonstrate troubleshooting techniques and corrective action for trihalomethanes.

35.0 Demonstrate equipment inspection and preventive maintenance procedures--The student will be able to:

35.01 Identify the components of a preventive maintenance plan.
35.02 Use trend analysis in preventive maintenance.
35.03 Perform a site inspection.
35.04 Develop a training plan (for a new employee) for inspection of equipment.

36.0 Apply appropriate federal, state, and local regulations for the operation and maintenance of a public potable-water facility--The student will be able to:

36.01 Explain the regulations in Chapter 62-602, F.A.C., covering duties, responsibilities, certification requirements, testing, renewal, staffing, and facility classification.
36.02 Explain the regulations in Chapter 62-550, F.A.C. concerning samples and analyses at water-treatment facilities.
36.03 Explain DEP regulations that apply to procedures such as reclaiming water and managing residuals.
36.04 Apply regulations concerning facility management.
36.05 Apply regulations concerning samples and analyses.
36.06 Apply regulations concerning laboratory management.

37.0 Apply federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials--The student will be able to:

37.01 Identify the reporting requirements as specified in SARA Title III and Chapter 252, F.S.
37.02 Describe the responsibilities toward the community as specified in SARA Title III and Chapter 252, F.S.

38.0 Describe energy conservation, and identify ways to conserve energy in the water-treatment facility--The student will be able to:

38.01 Identify the causes of energy loss.
38.02 Rank various pieces of equipment in order of energy consumption.
38.03 Describe procedures for performing an energy survey.
38.04 Describe methods to conserve energy, such as equipment and process adjustments.

39.0 Demonstrate supervisory skills--The student will be able to:

39.01 Identify supervisory skills and various leadership styles.
39.02 Delegate responsibility and assign tasks to employees.
39.03 Follow the proper procedure for handling employee grievances.
39.04 Follow the proper procedure for disciplining employees.
39.05 Follow staffing guidelines in planning.
39.06 Conduct an orientation of a new employee, and follow the training program.
39.07 Evaluate employees objectively.

39.08 Identify emergency situations and respond appropriately.
39.09 Identify the components of the budgeting process.
39.10 Demonstrate inventory-control procedures.
39.11 Explain the importance of ethics in supervision.
39.12 Identify the role of the supervisor in a facility safety program.
39.13 Identify the role of the supervisor in customer relations.

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40.0 Describe theoretical facility-management skills--The student will be able to:

40.01 Describe the principles of management and supervision.
40.02 Describe concepts related to management and supervision.

41.0 Demonstrate methods of organization and control--The student will be able to:

41.01 Demonstrate organizational methods.
41.02 Develop an organizational chart.
41.03 Develop a staffing pattern.
41.04 Identify formal and informal lines of communication.

42.0 Develop a plan for cost management--The student will be able to:

42.01 Identify the costs of operation, such as personnel, inventory, operations, energy consumption, and equipment maintenance.
42.02 Perform cost surveys.
42.03 Develop a plan for efficient operations.
42.04 Explain system-efficiency balance.

43.0 Prepare budgets and personnel assignments--The student will be able to:

43.01 Identify budget activities and categories of expense accounts related to water- or wastewater-treatment facilities.
43.02 Identify techniques of budget control.
43.03 Prepare a budget, including long-range projections.
43.04 Prepare a staffing schedule, including the appropriate levels of staff for all required shifts.

44.0 Develop standard operating procedures for the training and orientation of new employees--The student will be able to:

44.01 Develop a written plan for an in-house orientation program for new employees.
44.02 Identify information that a supervisor should give new employees, including leave procedures, insurance procedures, safety procedures, chain of command, etc.
44.03 Develop a written plan for an in-house training program that includes safety measures and hazardous or toxic materials in the work place.
44.04 Develop a written plan for a cross-training program in facility operations.

45.0 Demonstrate personnel selection and discipline--The student will be able to:

45.01 Identify appropriate interviewing and hiring practices.
45.02 Develop a job description.
45.03 Identify control factors that are important in an organizational plan and that set limits on delegated authority.
45.04 Identify appropriate actions of the supervisor, the employee, etc., in a grievance procedure.
45.05 Identify characteristics important to the role of a supervisor.
45.06 Determine requirements for a new position.
45.07 Advertise for the position, including the job description, job responsibilities, education requirements, and job conditions.
45.08 Analyze job applications to select qualified candidates to interview.
45.09 Conduct interviews.
45.10 Notify interviewees of the results, and conduct follow-up activities.
45.11 Use appropriate human-relations and communication skills.
45.12 Train, evaluate, and discipline employees objectively.
45.13 Identify appropriate actions of a supervisor in evaluating personnel performance.

46.0 Demonstrate contingency planning--The student will be able to:

46.01 Analyze potential emergency situations that can occur in a facility.
46.02 Develop a plan for handling problems caused by emergency situations, including what equipment would be used and what sampling would be needed.
46.03 Develop procedures for responding to customer complaints.
46.04 Develop procedures to ensure employee safety.
46.05 Develop procedures to ensure continuous operations, including preventive maintenance, alternative procedures, etc.

47.0 Develop a plan for energy conservation--The student will be able to:

47.01 Describe concepts related to energy conservation.
47.02 Identify energy-conservation measures.

48.0 Describe record-keeping and use of computer applications in planning--The student will be able to:

48.01 Develop a plan for inventory control.
48.02 Develop a plan for an analysis of operation and maintenance (O&M) logs and for the optimum operation of equipment.
48.03 Identify the various types of facility automation.
48.04 Review available hardware and software, based on record-keeping needs.

49.0 Describe process optimization for water or wastewater treatment facilities--The student will be able to:

49.01 Develop a plan for process control to achieve efficient, energy-saving, cost-effective operation.
49.02 Develop a plan for testing and analyzing the treatment operations for use in long-range facility operations.
49.03 Develop a plan for the systematic troubleshooting of operational problems.

49.04 Develop a plan for documenting operations and problems in order to anticipate and avoid potential problems.

50.0 Interpret permits and blueprints--The student will be able to:

50.01 Read and interpret blueprints for water and wastewater facilities.
50.02 Read the facility construction and operating permits, and relate permit requirements to facility operations.

51.0 Develop a laboratory plan for process control--The student will be able to:

51.01 Identify laboratory equipment for process control.
51.02 Develop a plan for equipment calibration and maintenance.
51.03 Develop a laboratory-staffing plan.
51.04 Determine whether in-house laboratory operations are cost-effective.
51.05 Review procedures for quality assurance/quality control in a facility laboratory.
51.06 Review procedures for obtaining certification for a facility laboratory.
51.07 Develop a sampling/analysis schedule for effective process control.

52.0 Employ public-relations skills in community interactions--The student will be able to:

52.01 Plan facility tours for the public.
52.02 Demonstrate how to handle press and public inquiries appropriately.
52.03 Demonstrate how to inform the public if a potential emergency situation arises.