

Appendix A

**WORK PROCESS SCHEDULE
WASTEWATER SYSTEMS OPERATOR
(Wastewater Treatment Plant Operator)
O*NET-SOC CODE: 51-8031.00 RAPIDS CODE: 0507**

This schedule is attached to and a part of these Standards for the above identified occupation.

1. TERM OF APPRENTICESHIP

The term of the occupation shall be two years (2) with an OJL attainment of 3,520 hours supplemented by the required hours of work process schedule and related instruction.

2. RATIO OF APPRENTICES TO JOURNEYWORKERS

One (1) apprentice may be employed in each shop department, and/or jobsite employing a qualified journey worker.

3. APPRENTICE WAGE SCHEDULE

Apprentices shall be paid a progressively increasing schedule of wages based on a percentage of the current journeyworker wage rate.

2 Year Term Example:

1 st	6 months + hours = ____	2 nd	6 months + hours = ____
3 rd	6 months + hours = ____	4 th	6 months + hours = ____

4. SCHEDULE OF WORK EXPERIENCE (See attached Work Process Schedule)

The Program Sponsor may modify the work processes to meet local needs prior to submitting these Standards to the appropriate Registration Agency for approval.

5. SCHEDULE OF RELATED INSTRUCTION (See attached Related Instruction Outline)

The Program Sponsor may modify the related instruction to meet local needs prior to submitting these Standards to the appropriate Registration Agency for approval.

6. OPERATOR CERTIFICATION

Apprentices shall successfully obtain the appropriate operator certification license to meet local requirements within the first term of apprenticeship.

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<u>Topic</u>	<u>Approximate Hours</u>
<p>1. Orientation and Safety</p> <ul style="list-style-type: none"> A. Delineate basic job duties B. Participate in site specific orientation programs C. List regulatory/permit specifications D. Read/interpret drawings (plan/section views, process and instrumentation diagram (PID), hydraulic profile, etc.) E. Demonstrate general plant safety and security operations <ul style="list-style-type: none"> 1) Wear PPE in accordance with safety guidelines 2) Follow lock-out and tag out procedures 3) Adhere to hazardous communication and right-to-know programs 4) Monitor air quality levels 5) Respond to emergencies using first aid/CPR 6) Apply security practices around the plant 7) Adhere to chemical safety programs 8) Earn and maintain CDL 	<p style="text-align: right;">440</p>
<p>2. Operations</p> <ul style="list-style-type: none"> A. Monitor plant operations as required <ul style="list-style-type: none"> 1) Review plant operations and maintenance manual 2) Analyze plant operating performance 3) Respond to plant alarm systems 4) Troubleshoot and solve operational problems effectively 5) Start and stop plant equipment 6) Apply knowledge of regulations to plant operations B. Manage treatment processes <ul style="list-style-type: none"> 1) Handle and add chemicals to disinfect and deodorize liquids 2) Inspect meters and gauges to determine load requirements 3) Operate disinfection equipment and technologies 4) Clean and maintain tanks and filter beds C. Manage wastewater treatment solids programs <ul style="list-style-type: none"> 1) Monitor sludge production 2) Perform sludge removal activities 3) Record treated sludge and solids information accurately 4) Dispose of treated sludge in accordance with permitting 5) Manage bio-solids program effectively D. Oversee collection systems/lift stations operations <ul style="list-style-type: none"> 1) List pump station components and different types of pumping stations 2) List types and components of force main systems 3) List types and components of gravity mains 4) Demonstrate understanding of inflow and infiltration 5) Demonstrate collection system safety requirements 	<p style="text-align: right;">1320</p>

<u>Topic</u>	<u>Approximate Hours</u>
<ul style="list-style-type: none"> 6) Demonstrate proficiency in responding, correcting, and reporting to alarms E. Demonstrate SCADA capability <ul style="list-style-type: none"> 1) Understand screen navigation 2) Interpret readings 3) Read and interpret trend charts F. Demonstrate proficiency in Standard Operating Procedures (SOPs) <ul style="list-style-type: none"> 1) List safety requirements 2) Detail environmental impacts 3) Review related documents 4) Demonstrate procedures G. Demonstrate proficiency in Manufacturer's Safety and Data Sheets (MSDS) <ul style="list-style-type: none"> 1) List safety requirements 2) Detail environmental impacts 3) Review related documents 4) Demonstrate procedures 	
3. Maintenance	800
<ul style="list-style-type: none"> A. Perform mechanical maintenance on equipment B. Exercise valves, pumps and other mechanical devices C. Troubleshoot and repair malfunctioning and inoperable equipment D. Perform preventative maintenance when scheduled E. Maintain lift stations F. Inspect and maintain collection system pipes and manholes G. Prepare/submit a maintenance work order H. Read and interpret process instrumentation <ul style="list-style-type: none"> 1) Understand normal range 2) Explain actions for out-of-range values I. Demonstrate unit process hydraulics and demonstrate impacts on subsequent processes 	
4. Quality Control	480
<ul style="list-style-type: none"> A. Collect samples according to established procedures B. Perform laboratory sampling and testing C. Verify results for accuracy D. Calibrate equipment and instrumentation E. Ensure consistent lab and sampling procedures F. Interpret lab results G. Ensure compliance with all relevant laws and regulations H. Report results to supervisors and community members as appropriate I. Perform process control <ul style="list-style-type: none"> 1) Define unit process performance variables 2) Collect samples 3) Perform process tests 4) Identify normal/out-of-range values 5) Analyze performance/trends 	

<u>Topic</u>	<u>Approximate Hours</u>
5. Logistics	120
A. Order equipment and supplies as needed	
B. Develop and execute routine maintenance schedule	
C. Conduct operational rounds	
1) Define normal operation	
2) Recognize abnormal operation	
3) Collect appropriate data	
D. Visit other facilities to learn about new procedures	
6. Administration/Management	360
A. Complete reports using computer software	
B. Demonstrate proper use of SCADA software	
C. Enter and retrieve data from computer systems	
D. Record plant information accurately	
E. Record maintenance data accurately	
F. Provide budget information	
G. Operate effectively within budget constraints	
H. Demonstrate proper workplace ethics	
TOTAL HOURS (over 2 years)	3520

**RELATED INSTRUCTION OUTLINE
WASTEWATER SYSTEMS OPERATOR
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The following related training outline identifies subject matter which must be mastered by the apprentice in order to successfully complete the program:

<u>Mathematics</u>	<u>Topics</u>	<u>Approximate Hours</u>
		24
	<ul style="list-style-type: none"> • Adding, subtracting, multiplying, dividing, calculator • Algebraic equations • Geometry • Principle of mathematics applications • Metric system • Area • Volume • Chemical usage • Loading rates • Conversions • Pump math 	
		16
	<ul style="list-style-type: none"> • Physical, chemical, and biological concepts • Disease transmission • Common elements • Cell structure • Natural water cycle and impact • Basic hydraulics • Alkalinity • Nitrification/denitrification • Aquatic chemistry • Flora/fauna activated solids 	
		8
	<ul style="list-style-type: none"> • Large/small systems • Liquid stream processes – biological, physical, and chemical • Solids handling/management • Systems integration • Disinfection • Chemical treatment • Natural/non-mechanical systems • Mechanically assisted biological treatment • Collection systems 	

<u>Topics</u>	<u>Approximate Hours</u>
<u>Drawings, Schematics, and Graphics</u>	8
<ul style="list-style-type: none"> • Process diagrams/pictures • Demonstration/examples • Trend charting • Reading and interpreting drawings and schematics 	
<u>Environmental Laws and Regulations</u>	24
<ul style="list-style-type: none"> • Regulatory basics • Permit requirements • Due diligence • Industrial pretreatment • Sewer use laws • Other regulations (503, air, source control, stormwater) 	
<u>Safety Process/OSHA</u>	50
<ul style="list-style-type: none"> • Personnel protective equipment • First responder • Decontamination • MSDS • Reporting requirements • Hazardous materials and controls • Hazardous communication • Confined space • Emergency response plan 	
<u>Communication Skills</u>	24
<ul style="list-style-type: none"> • Active listening • Verbal and nonverbal communication • Managing conflict • Critical thinking • Diversity and culture • Oral presentations • Report writing and written presentations • Budget • Team building • Public information • Customer service 	
<u>Basic Electricity and Electrical Systems</u>	20
<ul style="list-style-type: none"> • Basics of electricity • Symbols reading • Monitoring vs. Control • Calibrations • Common electrical components • Conduction and insulation • Electromagnetism • Arc flash 	

<u>Topics</u>	<u>Approximate Hours</u>
<ul style="list-style-type: none"> • Lock out/tag out 	
<u>Tests and Analysis/Process Control</u>	24
<ul style="list-style-type: none"> • Equipment • Laboratory safety • Sampling procedures • Testing requirements • Process control testing • Discharge permit testing • Quality assurance and control • Record keeping • Microbe identification • Chain of custody (COC) 	
<u>Professional Roles and Responsibilities</u>	12
<ul style="list-style-type: none"> • Chain of command • Critical thinking skills • Ethics • Organization • Personnel • Policies and procedures • Scheduling/management of preventive maintenance 	
<u>Computer Skills</u>	48
<ul style="list-style-type: none"> • Basic Suite • Microsoft applications (Excel, Word) • SCADA 	
<u>Certification Test Review</u>	20
<ul style="list-style-type: none"> • State statutes • Test preparations • Practice tests 	
<u>Introduction to Train-the-Trainer</u>	8
<ul style="list-style-type: none"> • Learning styles • Presentation techniques 	
<u>Introduction To Pumping Systems</u>	24
<ul style="list-style-type: none"> • Pumping theory • Types of pumps • Basic hydraulics • Pump maintenance • Pump troubleshooting • Pump system components • Mechanical systems 	
<u>Collection Systems</u>	40
<ul style="list-style-type: none"> • Long and short term controls 	

<u>Topics</u>	<u>Approximate Hours</u>
<ul style="list-style-type: none"> • System components and functions • Operation and maintenance of lift/pumping stations, force mains, and gravity mains • Inflow & infiltration (I & I) • Private property laterals • Odor control • Inspection of mains • Repair/Rehabilitation of manholes, pipes, laterals • Compliance (safety, hazards, regulatory, environmental impacts such as sanitary sewer overflows) 	
<u>Natural Systems/Non-Mechanical</u>	8
<ul style="list-style-type: none"> • Lagoons • Biological cycle • Detention time • Monitoring • Maintenance 	
<u>Mechanically Assisted Biological Systems</u>	40
<ul style="list-style-type: none"> • Unit processes and functions • Modifications to activated sludge systems • Long term controls • Short term controls • Activated sludge quality • Systems components • Oxidation ponds/ditches • Trickling filters • Rotating biological contactors (RBCs) • Biofilm reactors • Clarifiers • Equipment maintenance • Return activated sludge (RAS) and waste activated sludge (WAS) 	
<u>Chemical Treatment</u>	24
<ul style="list-style-type: none"> • Chemical safety • Reactions • Troubleshooting • Dosage • Equipment • Monitoring • Advanced testing 	
<u>Disinfection</u>	8
<ul style="list-style-type: none"> • Systems- chemical/physical • Testing/monitoring • Emergency response • Detention/kill rates 	

<u>Topics</u>	<u>Approximate Hours</u>
<ul style="list-style-type: none"> • Maintenance/cleaning • Equipment • Ozone (O₃) • Chlorination (Cl₂) • Ultra-Violet (UV) • Other disinfection methods 	
<u>Solids Management</u>	30
<ul style="list-style-type: none"> • Aerobic/anaerobic digestion • Drying/heat treatment/incineration • Beneficial reuse/landfill • Screenings • Physical equipment • Chemical applications • Odor control • Vector tracking and analysis • Thickening • Digestion • Dewatering • Disposal options/strategies • Regulations • Transportation • Cost analysis • Energy recovery • Public relations (customer service) 	
<u>Anaerobic Digestion</u>	20
<ul style="list-style-type: none"> • Process theory (basic terminology, process schematic, time and temperature relationship) • Process control (pumping impacts, basic chemical reactions) • Troubleshooting (impact of feedstocks, gas production, struvite chemistry) • Mechanical components (heat exchangers, boilers, pumps, mixing, flares, gas compressors, covers, gas storage, scrubbers, instrumentation) • Safety (methane and oxygen, sampling and monitoring, gas production, flares) 	
TOTAL MINIMUM HOURS (over 2 years)	480