

Water and Wastewater Technician

Provincial Occupational Analysis 2011

ACKNOWLEDGEMENTS

Apprenticeship Manitoba would like to express sincere appreciation for the contribution of the Water and Wastewater industry representatives who contributed, directly or indirectly, to this publication.

Special acknowledgement is extended to the Water and Wastewater Industry Working Group (IWG) composed of:

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| Iva Last | Manitoba Water and Wastewater Association Inc. |
| Ken Mattes | Manitoba First Nation Water and Wastewater Instruction Program |
| Dale E. Scott | City of Selkirk |
| Alan Turner | City of Portage La Prairie |
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OTHER RELATED OCCUPATIONAL TITLES

In developing this analysis, the Industry Working Group (IWG) consulted the following publications related to water and wastewater:

- ABC Association of Boards of Certification “ABC Need-to-Know Criteria for Water Treatment Operators” (2007).
- Eco Canada, “National Occupational Guidelines for Canadian Water and Wastewater Operators: Competency Reference Guide” (2005).
- Eco Canada, “2005 National Occupational Guidelines for Canadian Water and Wastewater Operators: Final Report” (2005).
- NAIT “Water and Wastewater Technician Program” www.nait.ca (2010).
- National Occupational Standards for Canadian Water and Wastewater Operators “Water Treatment” (Canadian Council for Human Resources in the Environment Industry).
- Office of Water Programs College of Engineering and Computer Science California State University, Sacramento in cooperation with California Water Environment Association. “Operation of Wastewater Treatment Plants: A Field Study Training Program,” Volume I, Seventh Edition (2008)
- Office of Water Programs College of Engineering and Computer Science California State University, Sacramento in cooperation with California Water Environment Association. “Operation of Wastewater Treatment Plants: A Field Study Training Program,” Volume II, Seventh Edition (2007).
- SIAST “Water and Wastewater Technician Program” www.siastr.ca (2010).

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GUIDE TO ANALYSIS

DEVELOPMENT OF ANALYSIS

A draft analysis is developed by a knowledgeable consultant who, with the assistance of a committee of experts in the field, identifies all the tasks performed in the occupation.

STRUCTURE OF ANALYSIS

To facilitate the understanding of the nature of the occupation, the work performed is divided into the following divisions:

- BLOCK** largest division within the analysis and reflects a distinct operation relevant to the occupation
- TASK** distinct activity that combined with others makes up the logical and necessary steps the worker is required to perform to complete a specific assignment within a "BLOCK."
- SUB-TASK** smallest division, into which it is practical to subdivide any work activity and, combined with others, fully describes all duties constituting a "TASK."

Supporting Knowledge and Abilities:

The element of skill and knowledge that an individual must acquire to adequately perform the task is identified under this heading.

Trends:

Any shifts or changes in technology or the working environment which affect the block are identified under this heading.

VALIDATION METHOD

Several Water and Wastewater Technicians validated the sub-tasks and applied percentage ratings to blocks and tasks. This method for the validation assisted in the completion of the time weighting section of the position description.

DEFINITIONS:

- Yes:** You perform this sub-task.
- No:** You do not perform this sub-task.
- Block %:** Percentage of time you spend on a monthly basis performing this component.
- Task %:** Percentage of time you spend on a monthly basis performing this task.

SCOPE OF THE OCCUPATION

This occupational analysis identifies the tasks performed by qualified Water and Wastewater Technicians in Manitoba. Technicians ensure the safety of potable water and the safe processing of wastewater to meet public health, environmental and consumer concerns.

Water and Wastewater Technicians have very specialized industry knowledge and technical skills. Technicians rely on their trade knowledge of codes, operating licenses and legislation related to water and wastewater. Technicians must have an extensive knowledge of chemistry, biology, hydrology, hydraulics and systems applications.

Technicians must be skilled in the operating systems for water treatment, water distribution, wastewater collection and wastewater treatment. Technicians work with a wide variety of collection, treatment and distribution systems. Technicians are involved in a specific process at a facility and are routinely involved in a variety of tasks.

Water and Wastewater Technicians must also possess mathematical, communication and problem solving skills in order to monitor, assess and adjust the conditions for the treatment of water and wastewater. The consequences of their treatment decisions have an effect on public health and safety.

Water and Wastewater Technicians are routinely required to work closely with other trades and engineers.

Most Technicians work at facilities that operate 24 hours a day, 7 days per week in municipalities and small communities.

The industry uses best practices for the trade, workers, and workplace health and safety.

A water and wastewater technician performs tasks that comprise the subcomponent trades water distribution operator, water treatment operator, wastewater collection operator and wastewater treatment operator.

Water distribution operator, performs the tasks that comprise the subcomponent trade of water distribution operator to the standard indicated in the occupational analysis, including

- a) receiving and distributing store of treated water:
- b) reading distribution water flow meters
- c) operating, maintaining and repairing pipeline systems
- d) installing new distribution systems and meters; and
- e) preventing cross connections

Wastewater treatment operator, performs the tasks that comprise the subcomponent trade of wastewater treatment operator to the standard indicated in the occupational analysis, including

- a) receiving samples and testing wastewater:
- b) maintaining pumps: and
- c) operating headworks as well as
 - i. primary, secondary and tertiary treatment systems,

- ii. residual handling systems, and
- iii. disinfection systems

Wastewater collection operator, performs the tasks that comprise the subcomponent trade of wastewater collection operator to the standard indicated in the occupational analysis, including

- a) operating and maintaining wastewater collection systems: and
- b) installing new wastewater collection systems

Water treatment operator, performs the tasks that comprise the subcomponent trade of water treatment operator to the standard indicated in the occupational analysis, including

- a) monitoring intake facilities receiving raw water:
- b) sampling and testing water: and
- c) maintaining pumps and operating treatment systems

OCCUPATIONAL OBSERVATIONS

Water and Wastewater Technicians are primarily male, with a large portion close to retirement. A shortage of Technicians is anticipated at the entry level and the more senior positions. There is a growing need to attract qualified people to the industry.

The trade is increasingly skilled and specialized as a result of new technologies, automation, national environment standards, more stringent final effluent standards and legislation related to water and wastewater. As well, there is greater awareness of the trade because of societal concern over water quality, water conservation and energy conservation.

The facility size, level and location affect the recruitment and training of Water and Wastewater Technicians. Larger communities with Level 3 or Level 4 facilities offer more positions and opportunity for advancement. Smaller communities tend to have smaller systems using a variety of technologies.

ANALYSIS

BLOCK A

OCCUPATIONAL SKILLS AND PROCEDURES

Trends: *The trade of Water and Wastewater Technician is more skilled and specialized as a result of new technologies, automation, regionalization, and public/private partnerships. There are more stringent standards and legislation related to water and wastewater, public health and safety.*

Task 1 **Monitors Control Systems.**

Sub-task

1.01 **Monitors electrical systems.**

Supporting Knowledge and Abilities

- 1.01.01 knowledge of monitor electrical systems
- 1.01.02 ability to use electrical systems
- 1.01.03 ability to read and interpret blueprints

Sub-task

1.02 **Utilizes systems such as Supervisory Control and Data Acquisition (SCADA), Program Logic Controller (PLC), Distributed Control System (DCS).**

Supporting Knowledge and Abilities

- 1.02.01 knowledge of SCADA, PLC and DCS
- 1.02.02 ability to use SCADA, PLC and DCS

Sub-task

1.03 **Applies computer knowledge and skills.**

Supporting Knowledge and Abilities

- 1.03.01 knowledge of computer skills
- 1.03.02 ability to operate SCADA, PLC and DCS

Sub-task

1.04 Monitors generators and back-up systems.

Supporting Knowledge and Abilities

1.04.01 knowledge of generators and back-up systems

1.04.02 ability to operate generators and back-up systems

Sub-task

1.05 Ability to perform tests on water and wastewater.

Supporting Knowledge and Abilities

1.05.01 knowledge of water chemistry

1.05.02 knowledge of trade math

1.05.03 knowledge of sampling and testing procedures

1.05.04 ability to conduct tests, calculate and record results

Task 2 Applies, follows and conforms with legislation, regulation and by-laws.

Sub-task

2.01 Complies with water and wastewater legislation, by-laws and codes.

Supporting Knowledge and Abilities

2.01.01 knowledge of legislation, by-laws and codes

2.01.02 ability to follow legislation, by-laws and codes

Sub-task

2.02 Complies with operation license and environment licence. **Supporting Knowledge and Abilities**

2.02.01 knowledge of operation license and environment license

2.02.02 ability to comply with operation license and environment license

Task 3 Performs record keeping.

Sub-task

3.01 Records data (e.g, daily, monthly yearly). **Supporting Knowledge and Abilities**

3.01.01 knowledge of manual and automated data entry

3.01.02 ability to enter manual and automated data

Sub-task

3.02 Generates reports. **Supporting Knowledge and Abilities**

3.02.01 knowledge of policies and procedures for reports

3.02.02 ability to generate manual and automated reports

Task 4 Communicates with internal and external personnel.

Sub-task

4.01 Accesses computerized management maintenance system. **Supporting Knowledge and Abilities**

4.01.01 knowledge of computerized management maintenance management systems

4.01.02 ability to use computerized management maintenance management systems

Sub-task

4.02 Communicates in accordance with policies and procedures.

Supporting Knowledge and Abilities

- 4.02.01 knowledge of policies and procedures
- 4.02.02 ability to communicate effectively
- 4.02.03 about to use computers (e.g., keyboard)

Task 5 Maintains safe workplace.

Sub-task

5.01 Follows provincial safety regulations.

Supporting Knowledge and Abilities

- 5.01.01 knowledge of provincial safety regulations
- 5.01.02 ability to follow provincial safety regulations

Sub-task

5.02 Follows workplace safety policies and procedures.

Supporting Knowledge and Abilities

- 5.02.01 knowledge of workplace safety policies and procedures such as Workplace Hazardous Materials Information System (WHMIS), First Aid/CPR, Personal Protective Equipment, Materials Safety Data Sheet, Transportation of Dangerous Goods
- 5.02.02 ability to follow safety policies and procedures

Sub-task

5.03 Follows standard operating procedures.

Supporting Knowledge and Abilities

- 5.03.01 knowledge of procedures such as trenching, shoring and gas monitoring
- 5.03.02 knowledge of procedures such as confined space entry, lock-out and tag-out
- 5.03.03 ability to follow procedures

Task 6 Participates in security protocols.

Sub-task

6.01 Follows emergency response plan.

Supporting Knowledge and Abilities

6.01.01 knowledge of emergency response plan

6.01.02 ability to follow emergency response plan

Sub-task

6.02 Performs inspections.

Supporting Knowledge and Abilities

6.02.01 knowledge of inspection policies and procedures

6.02.02 ability to perform inspections

Sub-task

6.03 Performs record keeping.

Supporting Knowledge and Abilities

6.03.01 knowledge of manual and automated record keeping

6.03.02 ability to perform manual and automated record keeping

Sub-task

6.04 Maintains security systems.

Supporting Knowledge and Abilities

6.04.01 knowledge of security systems

6.04.02 ability to maintain security systems

Sub-task

6.05 Operates security systems.

Supporting Knowledge and Abilities

6.05.01 knowledge of security systems

6.05.02 ability to operate security systems

Sub-task

6.06 Troubleshoots security systems.

Supporting Knowledge and Abilities

6.06.01 knowledge of security systems

6.06.02 ability to troubleshoot security systems

BLOCK B

WATER TREATMENT

Trends: Water treatment has increasingly stringent standards. The trend to raise water standards can be attributed to more water containments (e.g., pharmaceuticals), better detection methods and growing consumer awareness of water pollution and water treatment.

Task 7 Monitors intake facility.

Sub-task

7.01 Operates intake facility. Supporting Knowledge and Abilities

7.01.01 knowledge of intake facility

7.01.02 ability to operate intake facility

Sub-task

7.02 Maintains intake facility. Supporting Knowledge and Abilities

7.02.01 knowledge intake facility

7.02.02 ability to maintain intake facility

Task 8 Receives raw water.

Sub-task

8.01 Checks influent flow. Supporting Knowledge and Abilities

8.01.01 knowledge of raw water types

8.01.02 ability to identify raw water characteristics

Sub-task

8.02 Checks reservoir level. Supporting Knowledge and Abilities

8.02.01 knowledge of reservoir systems

8.02.02 ability to maintain reservoir levels

Sub-task

8.03 Adjusts influent flow.

Supporting Knowledge and Abilities

8.03.01 knowledge of flow rate

8.03.02 ability to adjust flow rate to maintain reservoir levels

Task 9 Sampling and testing of water.

Sub-task

9.01 Collects water samples.

Supporting Knowledge and Abilities

9.01.01 knowledge of sampling procedures

9.01.02 ability to collect samples

9.01.03 ability to interpret results to recognize abnormal conditions

9.01.04 ability to record and communicate findings

Sub-task

9.02 Performs laboratory tests.

Supporting Knowledge and Abilities

9.02.01 knowledge of laboratory testing such as bench test, chlorine, turbidity, hardness, pH, alkalinity, etc

9.02.02 ability to conduct laboratory tests

9.02.03 ability to interpret results to recognize abnormal conditions

9.02.04 ability to record and communicate findings

Sub-task

9.03 Adjusts water treatment process.

Supporting Knowledge and Abilities

9.03.01 knowledge of process control

9.03.02 ability to adjust process

Task 10 Maintains pumps.

Sub-task

10.01 Operates pumps.

Supporting Knowledge and Abilities

10.01.01 knowledge of pump operations

10.01.02 ability to operate pumps such as positive displacement pumps, centrifugal pumps

Sub-task

10.02 Maintains pumps.

Supporting Knowledge and Abilities

10.02.01 knowledge of pump maintenance

10.02.02 ability to perform routine maintenance procedures

Sub-task

10.03 Troubleshoots pumps.

Supporting Knowledge and Abilities

10.03.01 knowledge of abnormal operating conditions

10.03.02 ability to recognize abnormal operating conditions

Task 11 Operates treatment systems.

Sub-task

11.01 Operates chemical handling system.

Supporting Knowledge and Abilities

11.01.01 knowledge of safe handling procedures

11.01.02 ability to operate chemical handling system

11.01.03 ability to calibrate chemical feed systems

Sub-task

11.02 Maintains chemical handling system.

Supporting Knowledge and Abilities

11.02.01 knowledge of maintenance procedures for chemical handling system

11.02.02 ability to perform procedures

Sub-task

11.03 Troubleshoots chemical handling system.

Supporting Knowledge and Abilities

11.03.01 knowledge of chemicals used such as soda ash, polymers, lime, calcium hypochlorite, pH

11.03.02 ability to calculate flow rates, concentrations and feed rates

Sub-task

11.04 Operates clarification system.

Supporting Knowledge and Abilities

11.04.01 knowledge of clarification system

11.04.02 ability to adjust clarification system

Sub-task

11.05 Maintains clarification system.

Supporting Knowledge and Abilities

11.05.01 knowledge of maintenance procedures for clarification system

11.05.02 ability to maintain clarification system

Sub-task

11.06 Troubleshoots clarification system.

Supporting Knowledge and Abilities

11.06.01 knowledge of clarification agents such as soda, ash, polymers, lime

11.06.02 ability to adjust clarification process

Sub-task

11.07 Operates sedimentation system.

Supporting Knowledge and Abilities

11.07.01 knowledge of sedimentation system

11.07.02 ability to operate sedimentation system

Sub-task

11.08 Maintains sedimentation system.

Supporting Knowledge and Abilities

11.08.01 knowledge of maintenance procedures for sedimentation system

11.08.02 ability to perform maintenance procedures

Sub-task

11.09 Troubleshoots sedimentation system.

Supporting Knowledge and Abilities

11.09.01 knowledge of maintenance procedures for sedimentation system

11.09.02 ability to perform maintenance procedures

Sub-task

11.10 Monitors coagulation process.

Supporting Knowledge and Abilities

11.10.01 knowledge of coagulation process

11.10.02 ability to monitor and adjust coagulation process

Sub-task

11.11 Maintains coagulation process.

Supporting Knowledge and Abilities

- 11.11.01 knowledge of equipment
- 11.11.02 knowledge of maintenance procedures for coagulation process
- 11.11.03 ability to perform maintenance procedures

Sub-task

11.12 Troubleshoots coagulation process.

Supporting Knowledge and Abilities

- 11.12.01 knowledge of equipment
- 11.12.02 knowledge of maintenance procedures
- 11.12.03 knowledge of coagulants, polymers
- 11.12.04 ability to diagnose process upset in coagulation process
- 11.12.05 ability to adjust coagulation process

Sub-task

11.13 Operates softening system.

Supporting Knowledge and Abilities

- 11.13.01 knowledge of operation of softening system
- 11.13.02 knowledge of processes such as ion exchange, lime softening
- 11.13.03 ability to operate softening system

Sub-task

11.14 Maintains softening system.

Supporting Knowledge and Abilities

11.14.01 knowledge of maintenance procedures for softening system

11.14.02 ability to perform maintenance procedures

Sub-task

11.15 Troubleshoots softening system.

Supporting Knowledge and Abilities

11.15.01 knowledge of softening system

11.15.02 ability to troubleshoot softening system

11.15.03 ability to diagnose process upset in softening system process

Sub-task

11.16 Operates a filtration system.

Supporting Knowledge and Abilities

11.16.01 knowledge of filtration systems such as membrane filtration, slow sand, activated carbon, fixed growth biofilters, rapid sand, multimedia filters, pressure filters

11.16.02 knowledge of water quality such as turbidity, colour, taste and odour

11.16.03 ability to adjust filtration system

Sub-task

11.17 Maintains filtration system.

Supporting Knowledge and Abilities

11.17.01 knowledge maintenance procedures for filtrations systems

11.17.02 ability to perform maintenance procedures

Sub-task

11.18 Troubleshoots filtration system.

Supporting Knowledge and Abilities

- 11.18.01 knowledge filtrations systems
- 11.18.02 ability to determine water quality
- 11.18.03 ability to adjust filtration process

Sub-task

11.19 Operates disinfection system.

Supporting Knowledge and Abilities

- 11.19.01 knowledge of disinfection system types such as chloramination, ozone, ultraviolet, chlorine, chlorine dioxide
- 11.19.02 ability to operate disinfection system

Sub-task

11.20 Maintains disinfection system.

Supporting Knowledge and Abilities

- 11.20.01 knowledge of disinfection system equipment such as pumps, heaters and injectors
- 11.20.02 ability to perform maintenance procedures

Sub-task

11.21 Troubleshoots disinfection system.

Supporting Knowledge and Abilities

- 11.21.01 knowledge of equipment and process
- 11.21.02 ability to diagnose system problems
- 11.21.03 ability to troubleshoot system problems

Sub-task

11.22 Operates recarbonation system.

Supporting Knowledge and Abilities

- 11.22.01 knowledge of recarbonation systems such as carbon dioxide, pH control
- 11.22.02 ability to operate recarbonation systems
- 11.22.03 ability to adjust feed rates
- 11.22.04 ability to perform tests such as Langelier saturation test

Sub-task

11.23 Maintains recarbonation system.

Supporting Knowledge and Abilities

- 11.23.01 knowledge of recarbonation systems
- 11.23.02 ability to maintain recarbonation system equipment

Sub-task

11.24 Troubleshoots recarbonation system.

Supporting Knowledge and Abilities

- 11.24.01 knowledge of recarbonation systems, equipment and process
- 11.24.02 ability to adjust recarbonation system

Sub-task

11.25 Operates solid handling system.

Supporting Knowledge and Abilities

- 11.25.01 knowledge of solid handling systems such as mechanical dewatering systems, drying beds
- 11.25.02 ability to operate solid handling system

Sub-task

11.26 Maintains solid handling system.

Supporting Knowledge and Abilities

11.26.01 knowledge of solid handling systems

11.26.02 ability to perform maintenance procedures for mechanical dewatering systems, dry beds

Sub-task

11.27 Troubleshoots solid handling system.

Supporting Knowledge and Abilities

11.27.01 knowledge of equipment and processes

11.27.02 ability to diagnose solid handling system problems

BLOCK C

WATER DISTRIBUTION

Trends: Manitoba municipalities and small communities are experiencing expansion in their wastewater distribution systems. There are changes in materials, new technologies and systems. In larger municipalities, wastewater collection centres are now servicing more outlying areas. Communities have aging infrastructure that need upgrading or replacement. Communities are using new technology and systems.

Task 12 Receives treated water.

Sub-task

12.01 Performs point sampling. Supporting Knowledge and Abilities

- 12.01.01 knowledge of sampling procedures
- 12.01.02 knowledge of testing such as chlorine residual and bacteriological testing
- 12.01.03 ability to obtain samples
- 12.01.04 ability to perform tests

Sub-task

12.02 Collects samples for bacteriological analysis. Supporting Knowledge and Abilities

- 12.02.01 knowledge of bacteriological testing
- 12.02.02 knowledge of sampling procedures
- 12.02.03 ability to perform tests
- 12.02.04 ability to take corrective action depending on results

Sub-task

12.03 Performs chlorines residual tests.

Supporting Knowledge and Abilities

- 12.03.01 knowledge of sampling procedures
- 12.03.02 knowledge of chlorine residual testing
- 12.03.03 ability to obtain samples
- 12.03.04 ability to perform tests

Sub-task

12.04 Performs turbidity tests.

Supporting Knowledge and Abilities

- 12.04.01 knowledge of turbidity testing
- 12.04.02 knowledge of sampling procedures
- 12.04.03 ability to obtain samples
- 12.04.04 ability to perform tests

Task 13 Stores treated water.

Sub-task

13.01 Operates storage facilities.

Supporting Knowledge and Abilities

- 13.01.01 knowledge of storage facilities operations
- 13.01.02 knowledge of fire flow requirements
- 13.01.03 knowledge of operations
- 13.01.04 ability to operate storage facilities

Sub-task

13.02 Maintains storage facilities.

Supporting Knowledge and Abilities

- 13.02.01 knowledge of disinfection of storage facilities
- 13.02.02 knowledge of storage facility operations
- 13.02.03 ability to perform routine maintenance procedures

Sub-task

13.03 Troubleshoots storage facilities.

Supporting Knowledge and Abilities

13.03.01 knowledge of storage facility operations

13.03.02 ability to recognize abnormal operating conditions

Task 14 Distributes treated water.

Sub-task

14.01 Operates distribution pumps and/or water tower.

Supporting Knowledge and Abilities

14.01.01 knowledge of pump operations

14.01.02 knowledge of tower operations

14.01.03 ability to operate pumps such as centrifugal pumps

Sub-task

14.02 Maintains distribution pumps and/or water tower.

Supporting Knowledge and Abilities

14.02.01 knowledge of pump operations

14.02.02 knowledge of tower operations

14.02.03 ability to perform routine maintenance procedures

Sub-task

14.03 Troubleshoots distribution pumps and/or water tower.

Supporting Knowledge and Abilities

14.03.01 knowledge of pump operations

14.03.02 knowledge of tower operations

14.03.03 ability to recognize abnormal operating conditions

Task 15 Reads distribution flow meters.

Sub-task

15.01 Reads meter.

Supporting Knowledge and Abilities

15.01.01 knowledge of flow meters

15.01.02 knowledge of basic calculations

15.01.03 ability to record results

Sub-task

15.02 Interprets results.

Supporting Knowledge and Abilities

15.02.01 knowledge of flow meters

15.02.02 knowledge of basic calculations

15.02.03 ability to interpret results

15.02.04 ability to respond to abnormalities

Task 16 Operates pipeline system.

Sub-task

16.01 Operates valves.

Supporting Knowledge and Abilities

16.01.01 knowledge of manual and automated valves

16.01.02 ability to adjust valves

Sub-task

16.02 Maintains valves.

Supporting Knowledge and Abilities

16.02.01 knowledge of manual and automated valves

16.02.02 ability to adjust valves

16.02.03 ability to locate, maintain, repair/replace and exercise valves

Sub-task

16.03 Maintains fire protection flows.

Supporting Knowledge and Abilities

16.03.01 knowledge of fire flow requirements

16.03.02 ability to test fire flow

Sub-task

16.04 Operates hydrants.

Supporting Knowledge and Abilities

16.04.01 knowledge of water hammer

16.04.02 knowledge of hydrant operation

16.04.03 ability to operate hydrants

Sub-task

16.05 Maintains hydrants.

Supporting Knowledge and Abilities

16.05.01 knowledge of hydrant maintenance

16.05.02 ability to operate hydrants

Task 17 Maintains pipeline system.

Sub-task

17.01 Swabbing pipeline (a.k.a. pigging).

Supporting Knowledge and Abilities

17.01.01 knowledge of swabbing procedures

17.01.02 ability to perform swabbing procedures

Sub-task

17.02 Flushing pipeline.

Supporting Knowledge and Abilities

17.02.01 knowledge of flushing procedures

17.02.02 ability to flush pipeline

Sub-task

17.03 Maintains meters.

Supporting Knowledge and Abilities

- 17.03.01 knowledge of meter calibration
- 17.03.02 knowledge of meter maintenance
- 17.03.03 ability to repair/replace meters

Sub-task

17.04 Installs cathodic protection system.

Supporting Knowledge and Abilities

- 17.04.01 knowledge of cathodes
- 17.04.02 knowledge of electrolytic corrosion
- 14.04.03 ability to install cathodes

Sub-task

17.05 Performs leak detection.

Supporting Knowledge and Abilities

- 17.05.01 knowledge of lead detection methods
- 17.05.02 ability to conduct leak detection surveys

Task 18 Repairs pipeline system.

Sub-task

18.01 Repairs leaks.

Supporting Knowledge and Abilities

- 18.01.01 knowledge of leak repair methods
- 18.01.02 knowledge of repair options
- 18.01.03 ability to repair leaks

Sub-task

18.02 Thaws frozen line.

Supporting Knowledge and Abilities

- 18.02.01 knowledge of thawing methods
- 18.02.02 ability to operate thawing equipment

Sub-task

18.03 Replaces pipe.

Supporting Knowledge and Abilities

- 18.03.01 knowledge of pipe types
- 18.03.02 knowledge of pipe applications
- 18.03.03 ability to replace pipes

Sub-task

18.04 Replaces curbstops.

Supporting Knowledge and Abilities

- 18.04.01 knowledge of curbstops
- 18.04.02 ability to locate and replace curbstops

Task 19 Installs new distribution systems.

Sub-task

19.01 Installs new distribution piping and valves.

Supporting Knowledge and Abilities

- 19.01.01 knowledge of distribution systems
- 19.01.02 knowledge of testing procedures
- 19.01.03 knowledge of disinfection processes
- 19.01.04 knowledge of sampling water
- 19.01.05 ability to perform tests
- 19.01.06 ability to evaluate test results
- 19.01.07 ability to disinfect pipe

Sub-task

19.02 Installs service lines.

Supporting Knowledge and Abilities

- 19.02.01 knowledge of live taps
- 19.02.02 knowledge of curb stops
- 19.02.03 knowledge of corporation cocks
- 19.02.04 ability to install live taps

Task 20 Installs distribution meters.

Sub-task

20.01 Maintains meters.

Supporting Knowledge and Abilities

20.01.01 knowledge of meter types

20.01.02 ability to maintain meters

Sub-task

20.02 Troubleshoots meters.

Supporting Knowledge and Abilities

20.02.01 knowledge of meter types

20.02.02 ability to diagnose problems

Sub-task

20.03 Repairs meters.

Supporting Knowledge and Abilities

20.03.01 knowledge of meter types

20.03.02 ability to repair problems

Sub-task

20.04 Flushing service line connections.

Supporting Knowledge and Abilities

20.04.01 knowledge of flushing procedures

20.04.02 ability to flush and connect line

20.04.03 ability to test line

Task 21 Prevents cross connections.

Sub-task

21.01 Inspects pipeline systems.

Supporting Knowledge and Abilities

21.01.01 knowledge of cross connections

21.01.02 knowledge of consequences of cross connections

21.01.03 ability to identify sources of cross connection

Sub-task

21.02 Installs backflow prevention devices.

Supporting Knowledge and Abilities

- 21.02.01 knowledge of cross connection
- 21.02.02 knowledge of consequences of cross connections
- 21.02.03 knowledge of backflow prevention devices
- 21.02.04 ability to install prevention devices

Sub-task

21.03 Maintains backflow prevention devices.

Supporting Knowledge and Abilities

- 21.03.01 knowledge of maintaining backflow prevention
- 21.03.02 ability to install prevention devices

BLOCK D

WASTEWATER COLLECTION

Trends: Manitoba municipalities and small communities are experiencing expansion in their wastewater collection systems. In larger municipalities, wastewater collection centres are now servicing more outlying areas. There is a trend to replace combined sewer systems with separate sanitary and storm sewer systems. In municipalities, there is an increase in the use of new technology and systems.

Task 22 Operates wastewater collection system.

Sub-task

22.01 Collects wastewater with gravity system. Supporting Knowledge and Abilities

- 22.01.01 knowledge of wastewater gravity systems
- 22.01.02 ability to interpret engineering drawings

Sub-task

22.02 Operates lift stations. Supporting Knowledge and Abilities

- 22.02.01 knowledge of lift station design
- 22.02.02 knowledge of lift station operation such as pumps, level controls, ventilation, odour control
- 22.02.03 ability to operate lift station

Sub-task

22.03 Maintains lift stations. Supporting Knowledge and Abilities

- 12.03.01 knowledge of lift station design
- 12.03.02 knowledge of lift station operation such as pumps, level controls, ventilation, odour control
- 12.03.03 ability to maintain lift station

Sub-task

22.04 Troubleshoots lift stations.

Supporting Knowledge and Abilities

- 22.04.01 knowledge of lift station design
- 22.04.02 knowledge of lift station operation such as pumps, level controls, ventilation, odour control
- 22.04.03 ability to perform troubleshooting procedures

Sub-task

22.05 Operates force main systems.

Supporting Knowledge and Abilities

- 22.05.01 knowledge of force main design
- 22.05.02 ability to operate force main systems

Sub-task

22.06 Maintains force main systems.

Supporting Knowledge and Abilities

- 22.06.01 knowledge of valves such as air/vacuum relief valves
- 22.06.02 ability to maintain force main systems

Sub-task

22.07 Troubleshoots force main systems.

Supporting Knowledge and Abilities

- 22.07.01 knowledge of force main design
- 22.07.02 ability to perform troubleshooting of force main systems

Sub-task

22.08 Collects wastewater in low pressure system.

Supporting Knowledge and Abilities

- 22.08.01 knowledge of low pressure systems such as corrosion and gas
- 22.08.02 ability to operate low pressure system

Task 23 Maintains wastewater collection systems.

Sub-task

23.01 Inspects manholes.

Supporting Knowledge and Abilities

23.01.01 knowledge of manhole construction

23.01.02 ability to identify irregularities of manholes

Sub-task

23.02 Performs flushing and/or sewer jetting.

Supporting Knowledge and Abilities

23.02.01 knowledge of flushing and jetting procedures

23.02.02 ability to operate flushing and jetting equipment

Sub-task

23.03 Performs camera inspections.

Supporting Knowledge and Abilities

23.03.01 knowledge of sewer system

23.03.02 ability to interpret findings

Sub-task

23.04 Performs root control.

Supporting Knowledge and Abilities

23.04.01 knowledge of root control procedures

23.04.02 ability to perform root control procedures

Sub-task

23.05 Cleans bar screens.

Supporting Knowledge and Abilities

23.05.01 knowledge of bar screens

23.05.02 knowledge of irregularities

23.05.03 ability to clean bar screens

Sub-task

23.06 Performs smoke testing. Supporting Knowledge and Abilities

23.06.01 knowledge of smoke testing

23.06.02 ability to smoke test

Sub-task

23.07 Performs mandrel testing. Supporting Knowledge and Abilities

23.07.01 knowledge of mandrel testing

23.07.02 ability to mandrel test

Task 24 Installs new wastewater collection systems.

Sub-task

24.01 Installs new collection piping. Supporting Knowledge and Abilities

24.01.01 knowledge of collection systems

24.01.02 ability to install piping

Sub-task

24.02 Installs service lines. Supporting Knowledge and Abilities

24.02.01 knowledge of flow

24.02.02 knowledge of connections

24.02.03 ability to install piping

BLOCK E

WASTEWATER TREATMENT

Trends: Wastewater treatment has more stringent final effluent standards and environmental awareness. In communities, there is an increased use of new technologies and systems.

Task 25 Receives wastewater.

Sub-task

25.01 Monitors wet well levels. Supporting Knowledge and Abilities

25.01.01 knowledge of wet well design

25.01.02 ability to verify operating levels

Sub-task

25.02 Maintains wet well levels. Supporting Knowledge and Abilities

25.02.01 knowledge of wet well design

25.02.02 knowledge of pumping strategies

25.02.03 ability to verify operating levels

25.02.04 ability to operate pumps to maintain level

Sub-task

25.03 Troubleshoots wet wells. Supporting Knowledge and Abilities

25.03.01 knowledge of wet well design

25.03.02 ability to diagnose problems

25.03.03 ability to take corrective action

Task 26 Sampling and testing of wastewater.

Sub-task

26.01 Collects wastewater samples.

Supporting Knowledge and Abilities

- 26.01.01 knowledge of sampling procedures
- 26.01.02 ability to collect samples
- 26.01.03 ability to interpret results to recognize abnormal conditions
- 26.01.04 ability to record and communicate findings

Sub-task

26.02 Performs laboratory tests.

Supporting Knowledge and Abilities

- 26.02.01 knowledge of laboratory testing
- 26.02.02 ability to conduct laboratory tests such as suspended solids, biological oxygen demand, chemical oxygen demand, alkalinity
- 26.02.03 ability to interpret results to recognize abnormal conditions
- 26.02.04 ability to record and communicate findings

Sub-task

26.03 Adjusts wastewater treatment process.

Supporting Knowledge and Abilities

- 26.03.01 knowledge of process control
- 26.03.02 ability to adjust process

Task 27 Services pumps.

Sub-task

27.01 Operates pumps.

Supporting Knowledge and Abilities

27.01.01 knowledge of pump operations

27.01.02 ability to operate pumps such as positive displacement pumps, centrifugal pumps

Sub-task

27.02 Maintains pumps.

Supporting Knowledge and Abilities

27.02.01 knowledge of pump operations

27.02.02 ability to perform routine maintenance procedures

Sub-task

27.03 Troubleshoots pumps.

Supporting Knowledge and Abilities

27.03.01 knowledge of pump operations

27.03.02 ability to recognize abnormal operating conditions

Task 28 Services headworks.

Sub-task

28.01 Operates headworks.

Supporting Knowledge and Abilities

28.01.01 knowledge of headworks such as bar screens, grit removal systems and grinders

28.01.02 ability to operate headworks systems

Sub-task

28.02 Adjusts for conditions.

Supporting Knowledge and Abilities

28.02.01 knowledge of headworks such as bar screens, grit removal systems and grinders

28.02.02 ability to adjust headworks systems

Task 29 Services primary treatment systems.

Sub-task

29.01 Operates primary treatment systems.

Supporting Knowledge and Abilities

29.01.01 knowledge of primary treatment processes such as primary clarifiers and lagoons

29.01.02 ability to operate primary treatment systems

Sub-task

29.02 Operates sludge removal systems.

Supporting Knowledge and Abilities

29.02.01 knowledge of sludge removal systems

29.02.02 ability to operate sludge removal system

Sub-task

29.03 Maintains primary treatment systems.

Supporting Knowledge and Abilities

29.03.01 knowledge of primary treatment processes such as primary clarifiers and lagoons

29.03.02 ability to maintain primary treatment systems

Sub-task

29.04 Troubleshoots primary treatment systems.

Supporting Knowledge and Abilities

29.04.01 knowledge of primary treatment processes such as primary clarifiers and lagoons

29.04.02 ability to diagnose irregularities in primary treatment systems

Task 30 Services secondary treatment systems.

Sub-task

30.01 Operates secondary treatment systems.

Supporting Knowledge and Abilities

30.01.01 knowledge of secondary treatment systems such as stabilization retention ponds, sequencing batch reactors, rotating biological contactors

30.01.02 ability to operate secondary treatment systems

Sub-task

30.02 Maintains secondary treatment systems.

Supporting Knowledge and Abilities

30.02.01 knowledge of secondary treatment processes

30.02.02 ability to maintain secondary treatment systems

Sub-task

30.03 Troubleshoots secondary treatment systems.

Supporting Knowledge and Abilities

30.03.01 knowledge of secondary treatment processes

30.03.02 ability to diagnose irregularities in secondary treatment systems

Task 31 Services tertiary treatment systems.

Sub-task

31.01 Operates tertiary treatment systems.

Supporting Knowledge and Abilities

- 31.01.01 knowledge of tertiary treatment systems such as nutrient removal systems, phosphorous removal, membrane filtration, nitrification/de-nitrification systems
- 31.01.02 knowledge of chemical additions
- 31.01.03 ability to operate tertiary treatment systems

Sub-task

31.02 Maintains tertiary treatment systems.

Supporting Knowledge and Abilities

- 31.02.01 knowledge of tertiary treatment processes
- 31.02.02 knowledge of chemical additions
- 31.02.03 ability to maintain tertiary treatment systems

Sub-task

31.03 Troubleshoots tertiary treatment systems.

Supporting Knowledge and Abilities

- 31.03.01 knowledge of tertiary treatment processes
- 31.03.02 knowledge of chemicals
- 31.03.03 ability to diagnose irregularities in tertiary treatment systems

Task 32 Services residuals handling systems.

Sub-task

32.01 Operates residuals handling systems.

Supporting Knowledge and Abilities

32.01.01 knowledge of residuals handling systems such as digesters, mechanical dewatering systems, drying beds, land application

32.01.02 ability to operate residuals handling systems

Sub-task

32.02 Maintains residuals handling systems.

Supporting Knowledge and Abilities

32.02.01 knowledge of residuals handling systems

32.02.02 ability to perform maintenance procedures for mechanical dewatering systems, drying beds

Sub-task

32.03 Troubleshoots residuals handling systems.

Supporting Knowledge and Abilities

32.02.01 knowledge of equipment and processes

32.02.02 ability to diagnose problems with residuals handling systems

Task 33 Services disinfection systems.

Sub-task

33.01 Operates disinfection systems.

Supporting Knowledge and Abilities

33.01.01 knowledge of disinfection systems such as ultraviolet chlorination, de-chlorination

33.01.02 ability to operate disinfection systems

Sub-task

33.02 Maintains disinfection systems.

Supporting Knowledge and Abilities

33.02.01 knowledge of disinfection systems

33.02.02 ability to perform maintenance procedures for disinfection systems

Sub-task

33.03 Troubleshoots disinfection systems.

Supporting Knowledge and Abilities

33.03.01 knowledge of disinfection systems and processes

33.03.02 ability to diagnose problems with disinfection systems

APPENDIX "A"

Tools and Equipment

| | |
|--|--|
| Access covers and wet well accessories | Self-priming |
| Aeriation control systems | Septage receiving |
| Air scrubbers | Specialized wastestream treatment |
| Ammoniators | Specialized water pumps |
| Axial flow | Split case |
| Booster packages | Split case |
| Catch basin inserts | STEP system |
| Centrifugal | Stormwater treatment system |
| Chemicals | Submersible |
| Classification | Submersible grinders |
| Close coupled | Submersible grinders |
| Commercial building systems | Submersible mixers |
| Complete VED integration and control | Submersible non-clogs |
| Conveyance | Submersible non-clogs |
| Customized control panels | Sump/effluent systems |
| Customized control panels and centers | Sulphanators |
| Customized valve vaults | Temporary, trailer mounted or permanent |
| Deep set | Traditional dry pit pump |
| Disc screens | Trunkey biological solutions |
| Drip dispersal system | Ultrasonic level control |
| Dry pit non clogs | Vacuum assisted? |
| Dry-pit non-clogs | Vertical inline |
| End suction | Vertical inline |
| Fiberglass basin packages | Vertical sump |
| Flood suction | Vertical turbine |
| Gas chlorinators | Vertical turbine and deep well submersible |
| Groundwater treatment | Washing/Compacting |
| In-line | Water "reuse" systems |
| Inline /channel grinders | Wet-well mounted self-priming |
| Irrigation systems | Wet-well mounted vacuum prime |
| Macerators | |
| Mixed flow-propeller | |
| Mobile filtration units | |
| Multi-stage centrifugal | |
| Obround | |
| Odor control equipment | |
| Oil/grit separators | |
| On-site treatment systems | |
| Packaged water booster systems | |
| Packaged water booster systems | |
| PLC integration and programming | |
| Prefabricated water and sewage pump stations | |
| Progressing cavity | |
| Pump operation logic | |
| Regenerative turbine | |
| Sand filters | |
| Screening | |
| Self primers | |

APPENDIX “B”

GLOSSARY

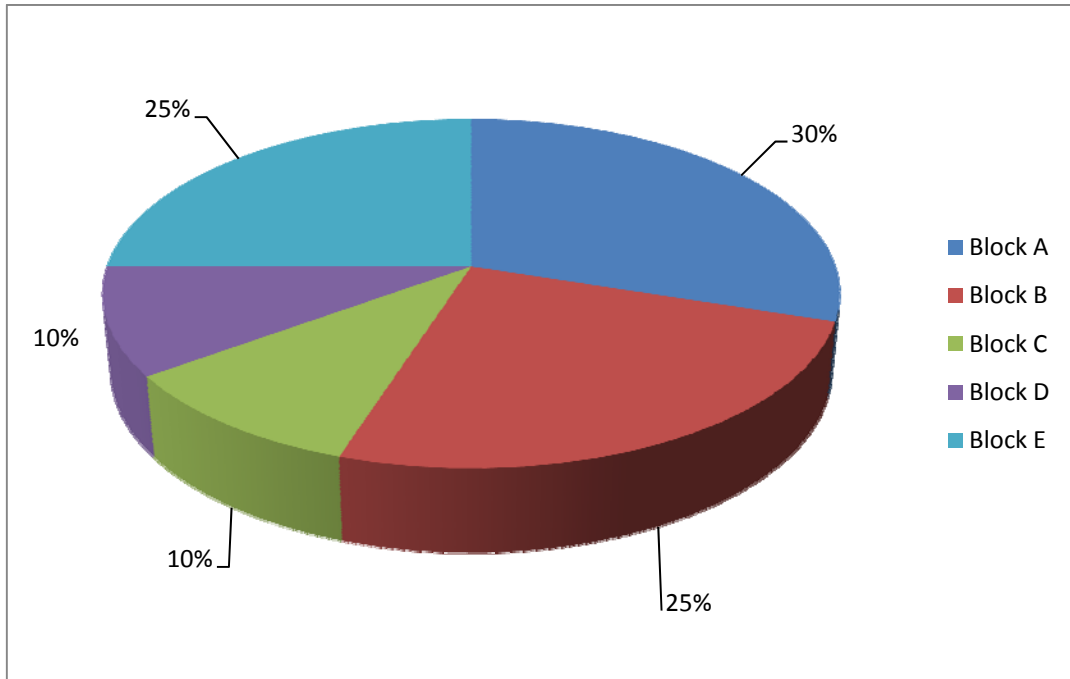
| ITEM | DESCRIPTION |
|--------------------------------------|--|
| Acidity | The quantitative capacity of water to neutralize a base, expressed in ppm or mg/L calcium carbonate equivalent. The number of hydrogen atoms that are present determines this. It is usually measured by titration with a standard solution of sodium hydroxide. |
| Activated sludge | Oxygen dependent biological process that services to convert soluble organic matter to solid biomass, that is removable by gravity or filtration. |
| Adsorption | Separation of liquids, gasses, colloids or suspended matter from a medium by adherence to the surface or pores of a solid. |
| Advanced water treatment | Level of water treatment that requires an 85 per cent reductions in pollutant concentration, also known as tertiary treatment |
| Advanced wastewater treatment | Any treatment of sewage water that includes the removal of nutrients such as phosphorus and nitrogen and a high percentage of suspended solids. |
| Aerated lagoon | A water treatment pond that speeds up biological decomposition of organic waste by stimulating the growth and activity of bacteria, which are responsible for the degradation. |
| Aeration | Technique that is used with water treatment that demands oxygen supply, commonly known as aerobic biological water purification. Either water is brought into contacts with water droplets by spraying or air is brought into contact with water by means of aeration facilities. Air is pressed through a body of water by bubbling and the water is supplied with oxygen. |
| Aerobic | A process that takes place in the presence of oxygen, such as the digestion of organic matter by bacteria in an oxidation pond. |
| Algae | Single or multi-celled organisms that are commonly found in surface water, such as duckweed. They produce their own food through photosynthesis. The algae population is divided up into green algae and blue algae, of which the blue algae are very damageable to human health. Excessive algae growth may cause the water to have undesirable odours or tastes. Decay of algae diminishes oxygen supplies in the water. |
| Alkalinity | The buffering capacity of water, the capacity of the water to neutralize itself. It prevents |
| Alluvium | Sediments deposited by erosion processes, usually by streams |
| Anaerobic | Process that takes places in the absence of oxygen, such as the digestion of organic matter by bacteria in a UASB-reactor. |
| Bacteria | Microscopic single cell organisms that reproduce by fission of spores. |
| Blackwater | Waters that contains waste of humans, animals or food |
| Chlorination | A water purification process in which chlorine is added to water for disinfection, for the control of present microorganisms. It is also used in the oxidation of compound impurities in water. |
| Clarity | The clearness of a liquid. |
| Coagulation | Destabilization of colloid particles by addition of a reactive chemical, called a coagulant. This happens through neutralization of the charges. |
| Contaminant | Foreign component in a substance, for example, in water. |
| Dewater | Separation of water from sludge to produce a solid cake. |
| Disinfection | Decontamination of fluids and surfaces. To disinfect a fluid or surface, a variety of techniques are used, such as ozone disinfection. Often disinfection means eliminating the present microorganisms with a |

| | |
|-------------------------------------|---|
| | biocide. |
| Filtration | Separation of a solid and a liquid by using a porous substance that only lets the liquid pass through. |
| Flow | Discharge rate of a resource, expressed in volume during a certain period of time. |
| Grey water | Domestic wastewater composed of wash wear from kitchen, bathroom and laundry sinks and tubs, and washers. |
| Influent | Stream of water that enters any system or treatment unit. |
| Lagoon | Shallow pond where sunlight, bacterial action and oxygen work to purify wastewater. |
| Langelier Index (LI) | Index reflecting the equilibrium pH of water with respect to calcium and alkalinity; used in stabilizing water to control both corrosion and scale deposition. |
| Leachate | Water that contains solute substances so that it contains certain substances in solution after percolation through a filter or soil. |
| Raw water | Intake water before any treatment or use. |
| Sewage | Liquid waster, originating from a community, composed of domestic wastewaters or industrial discharge. |
| Sludge | Semi-liquid residue that remains from the treatment of municipal water and wastewater. |
| Nutrient | Substance that promotes growth with living organisms. Term is generally applied to nitrogen and phosphorus in wastewater, but is also applied to other essential and trace elements. |
| PH | The value that determine is a substance is acid, neutral or basic, calculated from the number of hydrogen ions present. |
| Potable water | Water that is safe for drinking and cooking. |
| Primary wastewater treatment | Removal of suspended, floating and precipitated solids from untreated wastewater. |
| Raw water | Intake water before any treatment or use |
| Recarbonization | Process in which carbon dioxide is bubbled into treatment water in order to lower the pH. |
| Secondary treatment | Removal or reduction of contaminants and biochemical oxygen demand of effluent from primary wastewater treatment. |
| Sedimentation | Settling of solid particles in a liquid system due to gravity. |
| Softening | The removal of calcium and magnesium from water to reduce hardness. |
| Tertiary treatment | Advanced cleaning of wastewater that goes beyond the secondary or biological stage, removing nutrients such as phosphorus, nitrogen and most biochemical oxygen demand, and suspended solids. |
| Treatment plant | A structure built to treat wastewater before discharging it into the environment |
| Turbidity | A measure of non-transparency of water due to the presence of suspended matter. |
| UV | Ultraviolet radiation that has a wavelength shorter than visible light. It is often used to kill bacteria and destroy ozone. |
| Wastewater | The spent or used water from a home, community, farm or industry that contains dissolved or suspended matter. |
| Wastewater infrastructure | The plan or network for the collection, treatment and disposal of sewage in a community. |
| Water quality | The condition of water with respect to the amount of impurities in it. |

APPENDIX "C"

PIE CHART

| Titles of Blocks | | Percentage ¹ |
|------------------|------------------------------------|-------------------------|
| Block A | Occupational Skills and Procedures | 30 % |
| Block B | Water Treatment | 25 % |
| Block C | Water Distribution | 10 % |
| Block D | Wastewater Collection | 10 % |
| Block E | Wastewater Treatment | <u>25 %</u> |
| TOTAL | | 100% |



The percentages reflect the average amount of time workers within the occupation spend performing these tasks on a yearly basis.

APPENDIX “D”

DACUM CHART

WATER AND WASTEWATER TECHNICIAN

| BLOCKS | TASKS | SUB-TASKS | | | | |
|---|--|---|---|---|---|--|
| A OCCUPATIONAL SKILLS and PROCEDURES | 1. Monitors control systems | 1.01 Monitors electrical systems. | 1.02. Utilizes systems such as Supervisory Control and Data Acquisition (SCADA), Program Logic Controller (PLC), Distributed Control System (DCS). | 1.03 Applies computer knowledge and skills. | 1.04 Monitors generators and back-up systems. | 1.05 Ability to perform tests on water and wastewater. |
| | 2. Applies, follows and conforms with legislation regulations and by-laws | 2.01 Complies with water and wastewater legislation, by-laws and codes. | 2.02 Complies with operation license and environment license. | | | |
| | 3. Performs records keeping | 3.01 Records data (e.g., daily, monthly, yearly). | 3.02 Generates reports. | | | |
| | 4. Communicate s with internal and external personnel | 4.01 Accesses computerized management maintenance system. | 4.02 Communicates in accordance with policies and procedures. | | | |
| | 5. Maintains safe workplace | 5.01 Follows provincial safety regulations. | 5.02 Follows workplace safety policies and procedures. | 5.03 Follows standard operating procedures. | | |
| | 6. Participates in security protocols | 6.01 Follows emergency response plan. | 6.02 Performs inspections. | 6.03 Performs record keeping. | 6.04 Maintains security systems. | 6.05 Operates security systems. |

| BLOCKS | TASKS | SUB-TASKS | | | | |
|--|---|---|---|---|---|---------------------------------------|
| A OCCUPATIONAL SKILLS and PROCEDURES (continued) | | 6.06 Troubleshoots security systems. | | | | |
| B WATER TREATMENT | 7. Monitors intake facility | 7.01 Operates intake facility. | | 7.02 Maintains intake facility. | | |
| | 8. Receives raw water | 8.01 Checks influent flow. | 8.02 Checks reservoir level. | 8.03 Adjusts influent flow. | | |
| | 9. Sampling and testing of water | 9.01 Collects water samples. | 9.02 Performs laboratory tests. | 9.03 Adjusts water treatment process. | | |
| | 10. Maintains pumps | 10.1 Operates pumps. | 10.02 Maintains pumps. | 10.03 Troubleshoots pumps. | | |
| | 11. Operates treatment systems | 11.01 Operates chemical handling system. | 11.02 Maintains chemical handling system. | 11.03 Troubleshoots chemical handling system. | 11.04 Operates clarification system. | 11.05 Maintains clarification system. |
| | | 11.06 Troubleshoots clarification system. | 11.07 Operates sedimentation system. | 11.08 Maintains sedimentation system. | 11.09 Troubleshoots sedimentation system. | 11.10 Monitors coagulation process. |
| | | 11.11 Maintains coagulation process. | 11.12 Troubleshoots coagulation process. | 11.13 Operates softening system. | 11.14 Maintains softening system. | 11.15 Troubleshoots softening system. |
| | | 11.16 Operates a filtration system. | 11.17 Maintains filtration system. | 11.18 Troubleshoots filtration system. | 11.19 Operates disinfection system. | 11.20 Maintains disinfection system. |
| | | 11.21 Troubleshoots disinfection system. | 11.22 Operates recarbonation system. | 11.23 Maintains recarbonation system. | 11.24 Troubleshoots recarbonation system. | 11.25 Operates solid handling system. |
| | | 11.26 Maintains solid handling system. | | 11.27 Troubleshoots solid handling system. | | |

| BLOCKS | TASKS | SUB-TASKS | | | | |
|-------------------------------------|--|---|--|--|--|--------------------------------------|
| C WATER DISTRIBUTION | 12. Receives treated water | 12.01 Performs point sampling. | 12.02 Collects samples for bacteriological analysis. | 12.03 Performs chlorines residual tests. | 12.04 Performs turbidity tests. | |
| | 13. Stores treated water | 13.01 Operates storage facilities. | 13.02 Maintains storage facilities. | 13.03 Troubleshoots storage facilities. | | |
| | 14. Distributes treated water | 14.01 Operates distribution pumps and/or water tower. | 14.02 Maintains distribution pumps and/or water tower. | 14.03 Troubleshoots distribution pumps and/or water tower. | | |
| | 15. Reads distribution flow meters | 15.01 Reads meter. | 15.02 Interprets results. | | | |
| | 16. Operates pipeline system | 16.01 Operates valves. | 16.02 Maintains valves. | 16.03 Maintains fire protection flows. | 16.04 Operates hydrants. | 16.05 Maintains hydrants. |
| | 17. Maintains pipeline system | 17.01 Swabbing pipeline (a.k.a. pigging). | 17.02 Flushing pipeline. | 17.03 Maintains meters. | 17.04 Installs cathodic protection system. | 17.05 Performs leak detection. |
| | 18. Repairs pipeline system | 18.01 Repairs leaks. | 18.02 Thaws frozen line. | 18.03 Replaces pipe. | 18.04 Replaces curbstops. | |
| | 19. Installs new distribution systems | 19.01 Installs new distribution piping and valves. | 19.02 Installs service lines. | | | |
| | 20. Installs distribution meters | 20.01 Maintains meters. | 20.02 Troubleshoots meters. | 20.03 Repairs meters. | 20.04 Flushing service line connections. | |
| | 21. Prevents cross connections | 21.01 Inspects pipeline systems. | 21.02 Installs backflow prevention devices. | 21.03 Maintains backflow prevention devices. | | |

| BLOCKS | TASKS | SUB-TASKS | | | | |
|--|---|--|---|---|--|---|
| D WASTEWATER COLLECTION | 22. Operates wastewater collection system | 22.01 Collects wastewater with gravity system. | 22.02 Operates lift stations. | 22.03 Maintains lift stations. | 22.04 Troubleshoots lift stations. | 22.05 Operates force main systems. |
| | | 22.06 Maintains force main systems. | 22.07 Troubleshoots force main systems. | 22.08 Collects wastewater in low pressure system. | | |
| | 23. Maintains wastewater collection systems | 23.01 Inspects manholes. | 23.02 Performs flushing and/or sewer jetting. | 23.03 Performs camera inspections. | 23.04 Performs root control. | 23.05 Cleans bar screens. |
| | | 23.06 Performs smoke testing. | 23.07 Performs mandrel testing. | | | |
| | 24. Installs new wastewater collection systems | 24.01 Installs new collection piping. | 24.02 Installs service lines. | | | |
| E WASTEWATER TREATMENT | 25. Receives wastewater | 25.01 Monitors wet well levels. | 25.02 Maintains wet well levels. | 25.03 Troubleshoots wet wells. | | |
| | 26. Sampling and testing of wastewater | 26.01 Collects wastewater samples. | 26.02 Perform laboratory tests. | 26.03 Adjusts wastewater treatment process. | | |
| | 27. Services pumps | 27.01 Operates pumps. | 27.02 Maintains pumps. | 27.03 Troubleshoots pumps. | | |
| | 28. Services headworks | 28.01 Operates headwork. | 28.02 Adjusts for conditions. | | | |
| | 29. Services primary treatment systems | 29.01 Operates primary treatment systems. | 29.02 Operates sludge removal systems. | 29.03 Maintains primary treatment systems. | 29.04 Troubleshoots primary treatment systems. | |

| BLOCKS | TASKS | SUB-TASKS | | |
|--|---|--|---|---|
| E WASTEWATER TREATMENT (continued) | 30. Services secondary treatment systems | 30.01 Operates secondary treatment systems. | 30.02 Maintains secondary treatment systems. | 30.03 Troubleshoots secondary treatment systems. |
| | 31. Services tertiary treatment systems | 31.01 Operates tertiary treatment systems. | 31.02 Maintains tertiary treatment systems. | 31.03 Troubleshoots tertiary treatment systems. |
| | 32. Services residuals handling systems | 32.01 Operates residuals handling systems. | 32.02 Maintains residuals handling systems. | 32.03 Troubleshoots residuals handling systems. |
| | 33. Services disinfection systems | 33.01 Operates disinfection systems. | 33.02 Maintains disinfection systems. | 33.03 Troubleshoots disinfection systems. |