

# LIMITED WATER SUBSYSTEM EXAM NEED-TO-KNOW

This guide was created to help trainers, supervisors and operators determine what topics to review while studying for the **Limited Groundwater Subsystem or Limited Surface Water Subsystem** exams.

Limited Subsystem exams only apply to operators of Non-Municipal Year Round Residential, Large Non-Municipal Non-Residential, or Large Municipal Non-Residential. The Limited Groundwater Subsystem exam also applies to operators of small municipal residential subsystems with a ground water source.

Both the Limited Groundwater Subsystem or Limited Surface Water Subsystem exams consist of 75 multiple-choice questions.

There is no one study guide designed specifically for the Limited Groundwater Subsystem nor the Limited Surface Water Subsystem exams; however, the Ministry of the Environment's Operation of Small Drinking Water Systems – A Correspondence Course for Non-Municipal Drinking Water Operators (2004 edition) is recommended to assist operators in preparing to write both exams.

**Table 1: Limited Groundwater Subsystem Exam Knowledge Requirements**

Topic	Number of Questions	Knowledge Requirements
Basic Math	3	<ul style="list-style-type: none"> <li>• Area, volume, flow, velocity calculations</li> <li>• Per capita consumption calculations</li> <li>• Conversions</li> </ul>
Disinfection	12	<ul style="list-style-type: none"> <li>• Chlorine dosage, demand, residual</li> <li>• Breakpoint chlorination terminology</li> <li>• Chlorine math</li> <li>• Chlorine residual testing</li> <li>• Disinfecting wells and watermains</li> <li>• Types of disinfection and their advantages/disadvantages</li> </ul>
Distribution/ Conveyance	10	<ul style="list-style-type: none"> <li>• Types of distribution lines</li> <li>• Corrosion control</li> <li>• Conveyance problems and maintenance</li> <li>• Procedures for flushing watermains</li> <li>• Types of valves and their purposes</li> </ul>
Public Health	5	<ul style="list-style-type: none"> <li>• Common public health concerns waterborne diseases</li> <li>• Distinguish between bacteria, viruses, and protozoa, be able to give examples of each</li> <li>• Characteristics of common water pathogens and their sources</li> <li>• Methods of removal of common water pathogens</li> </ul>

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Topic	Number of Questions	Knowledge Requirements
Pumps	6	<ul style="list-style-type: none"> <li>• Types of pumps and their purposes</li> <li>• Parts of pumps and their purposes</li> <li>• Pump problems and maintenance</li> <li>• Pressure tanks</li> <li>• Pressure measurement</li> <li>• Hydraulic concepts</li> </ul>
Regulatory	3	<ul style="list-style-type: none"> <li>• Operational checks under O. Reg. 170/03</li> <li>• Adverse test results and reporting adverse test results under O. Reg. 170/03</li> <li>• Corrective action under O. Reg. 170/03</li> <li>• Warning notices of potential problems under O. Reg. 170/03</li> <li>• Record keeping under O. Reg. 170/03</li> </ul>
Safety	7	<ul style="list-style-type: none"> <li>• Confined space entry</li> <li>• Electrical and fire safety</li> <li>• Protective clothing/equipment</li> <li>• Chemical safety</li> <li>• First-aid treatment</li> </ul>
Sampling & Testing	5	<ul style="list-style-type: none"> <li>• Sampling and testing requirements under O. Reg. 170/03</li> <li>• Performing routine monitoring tests</li> <li>• Preserving and transporting samples</li> </ul>
Sources & Characteristics	4	<ul style="list-style-type: none"> <li>• Characteristics of groundwater versus surface water</li> <li>• Treatment methods for groundwater versus surface water</li> <li>• Source quality</li> </ul>
Water Quality	11	<ul style="list-style-type: none"> <li>• Importance of high quality water</li> <li>• Causes and control (treatment) of water quality problems</li> <li>• Sources of water pollution</li> <li>• Physical, chemical, microbiological and radiological characteristics of water</li> <li>• Coliform bacteria</li> <li>• Customer relations</li> </ul>
Well Operations	9	<ul style="list-style-type: none"> <li>• Water cycle and sources of water</li> <li>• Well types and components</li> <li>• Well terminology</li> <li>• Well equipment</li> <li>• Well problems and maintenance</li> <li>• Well regulations (O. Reg. 903)</li> </ul>

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**Table 2: Limited Surface Water Subsystem Exam Knowledge Requirements**

Topic	Number of Questions	Knowledge Requirements
Basic Math	3	<ul style="list-style-type: none"> <li>• Area, volume, flow, velocity calculations</li> <li>• Per capita consumption calculations</li> <li>• Conversions</li> </ul>
Disinfection	11	<ul style="list-style-type: none"> <li>• Chlorine dosage, demand, residual</li> <li>• Breakpoint chlorination terminology</li> <li>• Chlorine math</li> <li>• Chlorine residual testing</li> <li>• Disinfecting wells and watermains</li> <li>• Types of disinfection and their advantages/disadvantages</li> </ul>
Distribution/ Conveyance	11	<ul style="list-style-type: none"> <li>• Types of distribution lines</li> <li>• Corrosion control</li> <li>• Conveyance problems and maintenance</li> <li>• Procedures for flushing watermains</li> <li>• Types of valves and their purposes</li> </ul>
Filtration	9	<ul style="list-style-type: none"> <li>• Purpose of filtration</li> <li>• Importance of turbidity</li> <li>• Removal of pathogens</li> <li>• Types of filtration (e.g. conventional, direct, slow sand, DE, bag and cartridge, membrane)</li> <li>• Filter problems and maintenance</li> </ul>
Public Health	5	<ul style="list-style-type: none"> <li>• Common public health concerns waterborne diseases</li> <li>• Distinguish between bacteria, viruses, and protozoa, be able to give examples of each</li> <li>• Characteristics of common water pathogens and their sources</li> <li>• Methods of removal of common water pathogens</li> </ul>
Pumps	6	<ul style="list-style-type: none"> <li>• Types of pumps and their purposes</li> <li>• Parts of pumps and their purposes</li> <li>• Pump problems and maintenance</li> <li>• Pressure tanks</li> <li>• Pressure measurement</li> <li>• Hydraulic concepts</li> </ul>
Regulatory	3	<ul style="list-style-type: none"> <li>• Operational checks under O. Reg. 170/03</li> <li>• Adverse test results and reporting adverse test results under O. Reg. 170/03</li> <li>• Corrective action under O. Reg. 170/03</li> <li>• Warning notices of potential problems under O. Reg. 170/03</li> <li>• Record keeping under O. Reg. 170/03</li> </ul>

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Sources & Characteristics	4	<ul style="list-style-type: none"> <li>• Characteristics of groundwater versus surface water</li> <li>• Treatment methods for groundwater versus surface water</li> <li>• Source quality</li> <li>• Purpose of screening</li> </ul>
Water Quality	11	<ul style="list-style-type: none"> <li>• Importance of high quality water</li> <li>• Causes and control (treatment) of water quality problems</li> <li>• Sources of water pollution</li> <li>• Physical, chemical, microbiological and radiological characteristics of water</li> <li>• Coliform bacteria</li> <li>• Customer relations</li> </ul>