



# WATER QUALITY TESTING

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## INTRODUCTION

In rural Canada, most people rely on private water supplies such as wells and dugouts. Quality water is vital to the social, health, and economic well-being of the prairies and its people.

Testing your water quality on a regular basis is an important part of maintaining a safe and reliable source. The test results allow you to properly address the specific problems of a water supply. This will help ensure that the water source is being properly protected from potential contamination, and that appropriate treatment is selected and operating properly.

It is important to test the suitability of your water quality for its intended use, whether it be livestock watering, chemical spraying, or drinking water. This will assist you in making informed decisions about your water and how you use it.

The purpose of this **Water Quality Matters** publication is to provide water quality testing information that will assist rural residents who use a private water supply. It provides information on the importance of water quality monitoring and how you can get your water tested.

## IMPORTANCE OF WATER TESTING

Regular testing is important to:

- identify existing problems
- ensure water is suitable for the intended use
- ensure safe drinking water
- determine the effectiveness of a treatment system



Water quality is important for agriculture in rural Canada

The quality of a water source may change over time, even suddenly. Changes can go unnoticed as the water may look, smell, and taste the same.

## IS MY WATER SAFE TO DRINK?

The only way to tell if your drinking water is safe is by having it tested at a commercial laboratory.

Harmful bacteria, parasites, and viruses are invisible to the naked eye, so water which looks and tastes good may not necessarily be safe to drink. These microbes can exist in surface and groundwater supplies, and can cause immediate sickness in humans if not properly treated.

Certain chemical contaminants that are sometimes found in a water source can cause long term health problems that take years to develop. Frequent water testing will identify unsafe water and ensure that the treatment system is treating the water to a satisfactory level.

## WHAT TESTS SHOULD I HAVE DONE?

Useful tests are available to help determine the health and safety of a water supply, and the performance of a water treatment system. Your local health department can assist in selecting tests important for assessing your drinking water. A number of commercial laboratories offer water quality packages that include a variety of tests to assess water potability.

**Basic Water Potability Test** packages include tests for coliform bacteria, nitrates, pH, sodium, chloride, fluoride, sulphate, iron, manganese, total dissolved solids, and hardness.

- Coliform bacteria tests indicate the presence of microorganisms in the water that are potentially harmful to human health.
- Nitrate is a common contaminant found mainly in groundwater. High nitrate concentrations can be particularly dangerous for babies under six months, since nitrate interferes with the ability of blood to carry oxygen.
- Ions such as sodium, chloride, sulphate, iron, and manganese can impart objectionable taste or odour to water.
- Excessive amounts of sulfate can have a laxative effect or cause gastrointestinal irritation.
- Fluoride is an essential micro-nutrient, but excessive amounts can cause dental problems.
- Total dissolved solids represent the amount of inorganic substances (i.e. sodium, chloride, sulphate) that are dissolved in the water. High total dissolved solids (TDS) can reduce the palatability of water.

Other tests may be appropriate if a particular contaminant is suspected in the water. For instance, groundwater sources are sometimes tested for arsenic, selenium, and uranium. Both surface and groundwater sources may also be tested for pesticide contamination.

Domestic water supplies should be tested a minimum of once per year. Drinking water supplies obtained from shallow wells and surface water sources should be tested more frequently (i.e. seasonally), as they are more susceptible to contamination.

It is important to test your drinking water at the tap and at the source. Testing both will help you determine if your treatment system is performing correctly, and if the quality of your source water has changed.

## TESTING FOR AGRICULTURAL PURPOSES

Water quality is important for many agricultural uses including livestock watering, irrigation, and spraying. Reference materials, manuals, and booklets, along with federal and provincial water quality guidelines can provide information on the water quality required for specific agricultural uses. These guidelines provide a list of important water quality parameters and their associated tolerance levels for specific uses.

Many commercial laboratories offer test packages that are tailored to a particular agricultural application, such as irrigation or livestock suitability. These packages can be convenient when ordering tests suitable for your particular water quality application.

**Basic Irrigation Suitability** packages include tests for pH, conductivity, calcium, magnesium, sodium, potassium, chloride, sulphate, TDS, bicarbonate, and the Sodium Adsorption Ratio (SAR).

**Basic Livestock Suitability** packages include tests for pH, conductivity, calcium, magnesium, sodium, potassium, chloride, sulphate, iron, nitrate, TDS, and hardness.

**Spray Water Suitability** packages include tests for pH, conductivity, calcium, magnesium, hardness, bicarbonate, and alkalinity.



Water quality testing is important for irrigation applications



**Livestock can benefit greatly from regular water quality testing**

Additional tests may be required depending on the application. Livestock type, plant species, or crop variety are considerations that may require additional tests.

## HOW DO I GET MY WATER TESTED?

Test parameters must be determined before a laboratory can test your water. Many laboratories will help you select the appropriate tests.

The provincial water/environmental agency, or your local health department can also provide water testing advice. Information regarding agricultural water quality is available from both federal and provincial departments of agriculture. Some provincial agencies have water quality programs which may provide funding for analysis, and can provide advice about commercial laboratories. Most telephone books list 'Laboratories, Analytical' in the Yellow Pages™. Many laboratories can also be found on the Internet.

Before selecting a laboratory to test your water, ask them about their qualifications, quality control program, and costs to perform the analysis. Upon request, the lab will send sample bottles and sampling instructions. The instructions identify tests that require special sampling and storage procedures. For example, tests for coliform bacteria require that samples are shipped at a cool temperature, and arrive at the lab within 24 hours of being collected.

## TEST RESULTS

The test results may be accompanied with information to help you understand what the test results mean. For example, if the samples were tested for drinking water quality, the results may be accompanied by the "**Guidelines for Canadian Drinking Water Quality**", which explain the health problems of those parameters that exceeded the recommended maximum allowable concentration (MAC).

Information contained in manuals, booklets, and guideline publications can also be used to interpret the results. The results may indicate problems with your water source or the performance of your treatment system.

Technical advice can be sought from various water, health, and agricultural agencies about water quality analysis and interpretation.

If the results show that a potential health hazard exists, stop using the water immediately. This source should not be used until properly treated, and additional tests confirm that a health hazard no longer exists.



**Following sampling instructions carefully is important for accurate test results**

## COMMON TERMS

The following terms are commonly used test parameters:

**pH** - represents the intensity of the acid or alkaline condition of a solution. A pH of 7 indicates neutral conditions on a scale of 0 (acidic) to 14 (alkaline).

**Conductivity** - measures the ability of water to conduct an electrical current, and is directly related to the total dissolved salts (ions) in the water.

**Coliforms (Total)** - bacteria found in faeces, soil, and vegetation, which is used to indicate the bacteriological quality of water. Coliforms indicate the possible presence of pathogenic bacteria and viruses.

**Nitrate (NO<sub>3</sub>)** - the most completely oxidized state of nitrogen found in water. High nitrate levels can occur naturally, but may indicate biological wastes in the water, or run-off from heavily fertilized fields. High nitrate levels reduce the ability of blood to transport oxygen to body tissues.

**Total Hardness** - mainly caused by the presence of calcium and magnesium in water, and is expressed as the equivalent quantity of calcium carbonate. Scale formation and excessive soap consumption are the main problems associated with hardness.

**Total Dissolved Solids (TDS)** - the total dissolved substances (i.e. salts and minerals) in water remaining after evaporating the water and weighing the residue.

**Turbidity** - represents the clarity of water. It is measured by the degree to which light is blocked because the water is muddy or cloudy.

## WHO'S RESPONSIBLE FOR MY WATER?

Privately owned water systems for individuals are not regulated by either the provincial or federal governments. It is the responsibility of the individual to ensure their water is of good quality. PFRA, provincial agencies, and your local

health department can provide information, advice, treatment options, and interpretation of water quality analyses. Ultimately, protection and treatment of your water is your responsibility.

Individuals accessing or purchasing water from a source other than their own private supply, such as from a pipeline or tankloader, should understand the quality of the water and their agreement with the supplier. Once again, it is the responsibility of the individual to ensure that the proper treatment and safety measures are in place, unless the water supplier guarantees potable drinking water.

## THE BIG PICTURE

PFRA's approach to water quality issues focuses on protection, enhancement, and treatment of rural water supplies. PFRA's expertise in land and water management provides an integrated approach to address agricultural water quality issues.

Testing your water regularly is important. Commercial laboratories and government agencies can provide technical advice about water quality testing.

Always ensure that water is safe before drinking it.

For further information on rural Prairie water quality and treatment technology:

- read the other publications in PFRA's **Water Quality Matters** series;
- visit our website at [www.agr.gc.ca](http://www.agr.gc.ca)
- visit the Health Canada website at [www.hc-sc.gc.ca](http://www.hc-sc.gc.ca)
- **contact your local Prairie Farm Rehabilitation Administration Office** (PFRA is a branch of Agriculture and Agri-Food Canada).

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