Understanding Chemical Quality

This booklet series describes what private well owners can do to maintain clean, safe drinking water from their well to protect their health. This is booklet 3 in a series of 6.

Your Well Water series titles:

1 Is It Safe to Drink?
2 Fixing Bacterial Quality
3 Understanding Chemical Quality
4 Water Treatment Options
5 Maintaining Your Water Treatment
6 Real Estate Transactions

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Chemical quality refers to general water characteristics and dissolved mineral levels in the water. It reflects the type of material in the ground and how long the water has been in contact with the material. The technical term for the things you can test for is parameters.

What should I test for?

We recommend that everyone test for the following parameters that may cause health problems:

- Arsenic
- Fluoride
- Lead
- Nitrate/nitrite
- Uranium

We recommend that you also test for the following parameters:

- Ammonia-Nitrogen
- Barium
- Calcium
- Chloride
- Copper
- Dissolved Organic Carbon
- Iron
- Magnesium
- Manganese
- Orthophosphate
- Potassium
- Silica
- Sodium
- Sulphate
- Zinc

We recommend that you test for the following characteristics of water that can alert you to potential problems with your water or water system:

- Alkalinity
- Colour
- Hardness
- pH
- Specific Conductance
- Turbidity

Some of the things we recommend you test for do not pose a health risk. However, you should test for them for two reasons:

- Their presence may interfere with the removal of other health-related parameters.
- They may affect the type of treatment you select for your water supply.

If you suspect that your water may be contaminated from local human activity, such as farming, waste disposal, or underground gas tanks, then test for the presence of volatile organic compounds (VOCs), pesticides, or other trace organic chemicals.

Where can I get water tested?

We recommend that you use an accredited laboratory when testing your water. For a list of accredited laboratories, see our website at <**www.gov.ns.ca/nse/water/waterlabs.asp**>.

Many laboratories offer packages that are usually more cost-effective than analysis of individual parameters. These packages provide more information to better interpret water quality results and assess water treatment requirements.

What will I need to know to interpret the water quality results?

You will need to understand two technical terms to be able to interpret the results:

- **Maximum acceptable concentration** (MAC) is a level that has been established for certain substances that are known or suspected to cause adverse health effects.

- **Aesthetic objective** (AO) is established for parameters that may impair the taste, odour, or colour of water or which may interfere with supplying good quality water.

How do I interpret the water quality results?

Compare the results of your water quality analysis to the *Guidelines for Canadian Drinking Water Quality*. Table 1 at the end of this booklet lists the MAC or AO. Some parameters have no guideline value, but it is important to know their levels for the reasons listed at the top of page 2.

Some labs will identify the parameters that exceed the guidelines for you.

Table 2 at the end of this booklet summarizes some of the common water quality problems and their causes.

A summary of the *Guidelines for Canadian Drinking Water Quality* can also be found at the following web address: **www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/sum_guide-res_recom/index-eng.php**

What do I do next?

If your water exceeds a MAC, take action to eliminate the problem or install treatment.

If your water exceeds an AO, you may choose to treat your water for two reasons:

- to prevent staining, scaling, or corrosion of plumbing fixtures and appliances
- to make it more pleasing to consume

My water quality results are above the maximum acceptable concentration for a chemical parameter. What should I do now?
Treat your water or find another source that meets the guidelines. If you ingest water that has high concentrations of a chemical over a short period of time, you may get sick. Over the long term, exposure to some chemicals may cause chronic problems such as certain types of cancer and other adverse health effects. For further information contact Nova Scotia Environment.

See *Your Well Water 4 – Water Treatment Options* for more information.

Table 1 – Summary of Guidelines for Drinking Water Parameters from Health Canada[1]

Chemical/Physical Quality – Items in grey have no guideline

Parameter (substance or quality being tested)	Maximum Acceptable Concentration (for health and safety)	Aesthetic Objective (for taste, colour, odour)
Alkalinity		
Ammonia-Nitrogen		
Arsenic	0.01 mg/L	
Barium	1 mg/L	
Calcium		
Chloride		250 mg/L
Colour (total colour units)		15 TCU
Copper		1.0 mg/L
Dissolved Organic Carbon		
Fluoride	1.5 mg/L	
Hardness		
Iron		0.3 mg/L
Lead	0.01 mg/L	
Magnesium		
Manganese		0.05 mg/L
Nitrate – Nitrogen	10 mg/L	
Nitrite – Nitrogen	1 mg/L	
Orthophosphate		
pH (no units)		6.5 – 8.5
Potassium		
Silica		
Sodium[3]		200 mg/L
Specific Conductance		
Sulphate		500 mg/L
Turbidity	Varies[2]	5 NTU
Uranium	0.02 mg/L	
Zinc		5.0 mg/L

1. Source – Health Canada <www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/sum_guide-res_recom/index-eng.php>
2. For treated surface water sources and groundwater under the direct influence of surface water, turbidity is a health-related parameter. It must be removed to levels specified by the filtration technology used.
3. For people on sodium-restricted diets, the level should not exceed 20 mg/L.

Table 2 – Common Water Quality Problems

Substance	Potential Effects
Arsenic	Health problems – ingestion of drinking water that has high concentrations of arsenic over a short period of time can cause sickness including nausea, diarrhea, and muscle pain; over the long term, exposure to low levels may cause certain types of cancer.
Chloride	Salty taste, corrosive.
Coliform bacteria (total coliform and *E. coli*)	Indicates that disease-causing organisms may be present and that the supply may be susceptible to surface water contamination.
Fluoride	Dental fluorosis in children.
Gasoline and/or oil	Objectionable taste and odour and possible health effects.
Hardness	Hard scaly deposits in kettles and piping, bathtub ring, soap scum, high soap consumption.
Hydrogen sulphide and/or sulphate-reducing bacteria	Rotten egg odour and taste, silverware may turn black; worse in hot water.
Iron	Red or orange stains on laundry or fixtures, metallic taste, rust particles after water sits.
Iron bacteria	Red to brown slime in toilet tank, iron staining, unpleasant taste or odour.
Lead	Health problems – cancer and neurological effects in infants and children. Usually caused by leaching of lead present in some piping components, brass fixtures, and pump parts; often associated with corrosive or low pH water.
Low pH	May cause corrosion of piping (green stains due to copper corrosion) and may cause lead to leach from lead pipes or brass fixtures and pump parts.
Manganese	Black stains on laundry or fixtures, metallic/bitter taste in coffee and tea.
Nitrate/Nitrite	Health problems – blue baby syndrome in formula-fed infants.
Sodium	High blood pressure.
Sulphate	Laxative effects.
Tannins and humic acids	May cause brown or reddish water colour at high levels, and objectionable taste/odour.
Turbidity	Cloudy, dirty, or muddy appearance. May have health-related implications if supply is surface water or if well is under the influence of surface water.
Uranium	Health problems – kidney damage.

This information has been prepared by Nova Scotia Environment.
For further information about protecting your well water, please contact us at

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