

# What is in the water besides water?

BY DR. HANS PETERSON  
EXECUTIVE DIRECTOR, SAFE DRINKING WATER FOUNDATION (CANADA)

The notion that only pure water is good for us is wrong. Most water contains basic elements, such as minerals, which are actually good for us.

Pure water is simply H<sub>2</sub>O, which is the chemical symbol for water and nothing else. Rainwater is close to being simply H<sub>2</sub>O, but as it comes in contact with rocks, soil and vegetation, it slowly extracts whatever material it comes into contact with. When water dissolves minerals, such as calcium and magnesium, it will change from being "soft" to "hard". When many minerals are dissolved in the water, it can become very hard.

This often happens in ground water, which may have been in contact with minerals for many years. Washing

clothes and dishes in hard water requires more soap and may leave white spots when things dry. Sometimes we overcome hard water by water softening. In this process, calcium and magnesium are exchanged for sodium in the water.

While very hard water can be a concern for washing, moderately hard water is better to drink than softened water. This is because both calcium and magnesium are needed in our diet. Water softening will add sodium to the water, which is not desirable. Sodium can cause several problems, especially for people on a sodium-restricted diet. Some people will buy "environmentally friendly" softening salts, which are made with potassium instead of sodium. But there are people who are

***An ideal water treatment for drinking water would leave most minerals intact, remove most dissolved organic matter, and all microbes.***

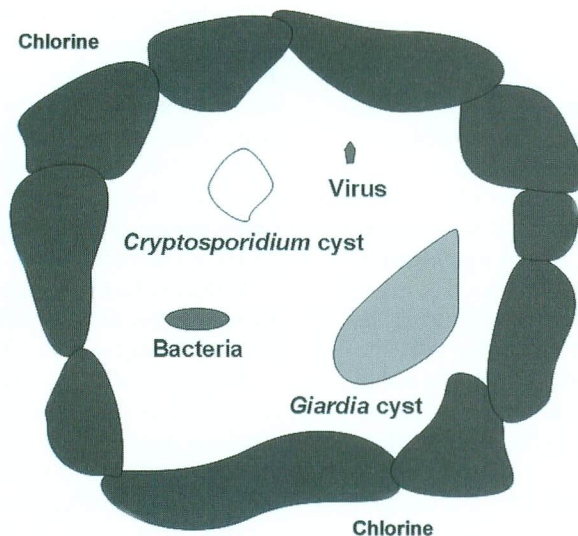
sensitive to excess potassium. Our recommendation is, therefore, not to drink water that is softened. If you use a water softener, only hook-up the hot water system to it.

Unfortunately, water can pick up unhealthy organic material and microbes as easily as it picks up healthy minerals. This organic material can make the water coloured and give it an unpleasant taste and the microbes can be disease-causing. Man-made chemicals, such as pesticides, can also become part of the water. This is why we must keep farm chemicals, manure and other contaminants away from areas which drain into our water supplies (surface or ground water).

It is easy to contaminate your own well, your own dugout, or a river or lake which many people rely on. Chances are, if you contaminate your own well, you will also share that contamination with some of your neighbors. It can be as simple as allowing your septic tank, cesspool, or water from your livestock operation to drain into any water source. Abandoned wells, improper well construction and poorly cased wells spread contamination quickly.

Even if you try to keep all water supplies free of contaminants, it is still impossible to keep them "pure". You will have the healthy minerals, the not-so-healthy dissolved organics, and the unhealthy microbes to fend off.

An ideal water treatment for drinking water would leave most



In water there is often large numbers of particles. These particles can be non-living material (like clumps of clay or decaying vegetation) or they can be microbes. The microbes are small and will become part of larger particles. This is shown in this illustration where clumps of particles surround different types of microbes. Three kinds of microbes are shown, viruses, bacteria and parasites (*Giardia* causing Beaver fever, and *Cryptosporidium*). If one tries to kill the microbes using chlorine, then it can be seen that microbes that are inside the particle clump will not be killed because the chlorine cannot reach them. Chlorine can therefore not substitute for a water treatment system that is effective in removing particles (which includes microbes).

minerals intact, remove most dissolved organic matter, and all microbes. In highly mineralized water, typically ground water, it may be necessary to remove some minerals also. The dissolved organic matter and the microbes should therefore be removed from the water in a sustainable way from year to year. And if the dealer selling these devices has the same mark-up as a farmer selling wheat, it would cost less than \$100.

While typical farm water treatment systems will deal with minerals causing hard water (water softening), few deal effectively with dissolved organic matter and microbes. Some systems including rapid sand filters and granular activated carbon filters remove some, but problems with sustainable and effective removals often occur with time.

One treatment process that could do a much better job of tackling the problems we have on the prairie is biological filtration. In this process, "friendly microbes" sit on a support material (sand or granular activated carbon) and remove contaminants as they pass by. These microbes even use the contaminants for food. Biological

processes need time to work, so the amount of water that can be pushed through a filter is typically much less than what a "rapid filter" would allow. But the result can be sustainable, and good quality water that can be produced not only for weeks or months, but for years.

Biological treatment will provide water suitable for household uses, but for drinking we recommend a membrane system after the biological unit. This membrane system could then feed one or two taps in the house. The membrane system can be a reverse osmosis unit, although a membrane system that takes out less of the minerals may be more suitable. Membrane systems that remove dissolved organic matter and microbes, but not all minerals, are called nanofiltration membranes. These types of membranes are starting to become available from water treatment companies in Saskatchewan.

A research project aimed at optimizing biological filtration for the treatment of prairie surface and ground water sources is now underway. This Safe Drinking Water Foundation project

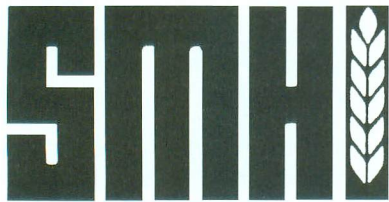
has been made possible through the support of the Farm Credit Corporation, the EJLB Foundation, the Royal Bank of Canada, Environment Canada, University of Saskatchewan, and WateResearch Corp.

**The Safe Drinking Water Foundation of Canada (SDWF) is a registered charitable organization committed to finding treatment and preventative solutions to make surface and ground water safe for human consumption in rural areas. Your tax-deductible contribution will enable SDWF to carry out vital research on solutions to rural drinking water problems. In carrying out its work, SDWF will ensure that every penny and every drop counts.**

**Please send tax-deductible contributions to:  
Safe Drinking Water Foundation  
(Canada)**

**11 Innovation Blvd.  
Saskatoon, SK S7N 3H5**

**For more information on the Safe Drinking Water Foundation, please contact Dr. Hans Peterson at 934-0389 (email: [water@sk.sympatico.ca](mailto:water@sk.sympatico.ca)). ■**



## **SASKATCHEWAN MUNICIPAL HAIL INSURANCE ASSOCIATION**

2100 Cornwall St., Regina, Saskatchewan S4P 2K7  
(306)569-1852

**RATES OF INDEMNITY - \$20, \$40, \$60, \$80 OR \$100 PER ACRE**

**ADVANTAGES - PREMIUMS COLLECTED AS TAXES - STATUTORY DISCOUNTS APPLY**

- HAIL COVERAGE TO OCTOBER 15
- FIRE COVERAGE TO OCTOBER 31
- INSURANCE ON FODDER CROPS
- ADJUSTMENTS OF 85% OR OVER PAID AS 100%

### **ADDITIONAL MUNICIPAL HAIL LIMITED (SUBSIDIARY OF SMHI)**

- COVERAGE FOR OWNERS AND TENANTS UP TO \$100.00 PER ACRE
- CASH PREMIUMS - DIVIDENDS PAID IN FAVOURABLE YEARS
- FULL AND DEDUCTIBLE COVERAGE - APPLICATION DEADLINE AUGUST 1

*SEE YOUR RURAL MUNICIPAL ADMINISTRATOR*