Horse Council BC's
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Series

A joint project between Back Country Horsemen and HCBC

WATER TREATMENT IN THE BACK COUNTRY

HORSE COUNCIL BRITISH COLUMBIA

Back Country Horsemen of BC

Introduction

- While travelling in the outdoors it is highly recommended that some form of treatment be done on all water you drink from natural sources.

- What type of water treatment you use will depend on the size of group you commonly travel in, the length of time you commonly travel for, what time of year and the research you do before buying.

- A good rule of thumb is to purchase the best quality device you can afford, that will cover the volumes you might need with the least amount of effort. As well, ease of repair "in the field" and maintenance to your device are very important considerations to look at.

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Why should we treat our drinking water?

- Bacteria, protozoans and viruses from both animal and human contaminants, usually fecal in origin, are commonly found in water sources both in the Back and Front country. These **pathogens** can cause great discomfort and/or serious disease if not removed or killed before drinking.

MSR Autoflow Gravity filter

Pristine ClO2 treatment drops

MSR Miniworks EX filter

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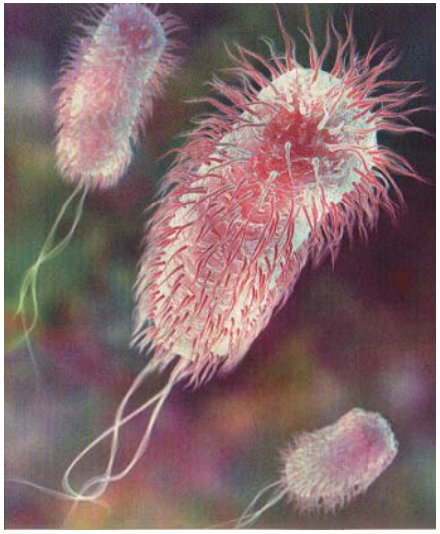
Bacteria



E,Coli Bacteria (artist's concept)

- **Bacteria** – This is our #1 concern. Organisms such as E.coli, Salmonella, Campylobacter and less commonly Typhus and Cholera can all be found in water sources that have been contaminated by human or animal feces, either directly or through run-off. This highlights why it is so important to practice proper waste disposal such as described in Leave No Trace ethics.
- Even wilderness water sources are not immune from bacterial contaminants. Averaging 0.1 to 1 microns in size, bacteria can be killed by boiling, using iodine or chlorine based compounds, or removed by straining through filters with pore size of 0.2 microns or less. (A micron is 1/1000 of a millimeter. The period at the end of this sentence is about 500 microns in size.)

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Protazoans

- **Protozoans** – These are single-celled, parasitic cysts, 1-20 microns in size, of which the 2 most commonly found in water are, Giardia (Beaver fever) and Cryptosporidium, plus occasionally, Amoebas.

- All cause severe cramping, diarrhea and sometimes nausea, usually within days after ingestion of only a few cysts. Amoebic dysentery symptoms occur usually from a week to a month after ingestion, making it hard to pinpoint the source of infection.

- Boiling, chlorine and iodine compounds and filtration are effective against most protozoans except for Cryptosporidium which can withstand chlorine and iodine exposure.

Giardia lamblia

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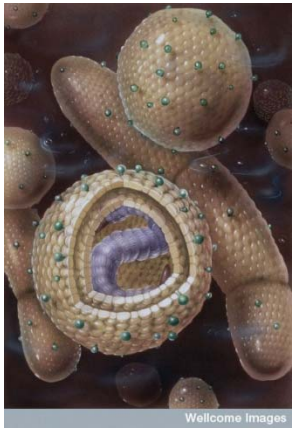
Viruses and Chemicals

Chemicals – Herbicides and pesticides can make their way into our water sources. These are usually found in areas next to agricultural or industrial activity. These are definitely areas to avoid collecting water from. Filters with Carbon cores can only remove some traces of herbicides and pesticides. Always look for clean, clear sources of water.

- **Viruses**- Are not usually of concern in North America. But Hepatitis, Polio and the Noro viruses can be found in our environment. Filtration does not remove viruses due to their very small size (0.005 – 0.1 microns), so questionable water must be purified after filtration with the use of iodine or chlorine compounds or boiling.



Hepatitus viruses (artist's concept)

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Water Treatment Methods

- Before treating, always collect the cleanest, clearest water possible; ideally from a moving source such as a stream or river. Silty water, such as found in muddy or glacial streams, should be allowed to settle out first. This will prevent premature clogging of filters or decreasing the effect of chemical treatments.

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Heat

- Boiling is the simplest, most effective method of water treatment. It kills all the pathogens including viruses.
- Water should be allowed to boil for 1-3 minutes to be effective. At high altitudes, 3-10 minutes is recommended.
- Drawbacks to boiling is the need to transport extra fuel; boiled water tastes flat, warm water is less thirst quenching.

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Chemical Methods

- **Household Bleach – 5% Sodium Hypochlorite.**
- Because of its long reaction time, it can kill good bacteria in your digestive tract as well, if not given enough time to treat the water before drinking, causing possible intestinal upsets.
- Treatment using Bleach requires:
- 1drop/litre of clear water or 3drops/litre of murky water
- Then let the treated water stand for about ½ hour to take effect.
- Chlorine treatment does not kill Cryptosporidium, but is effective against bacteria and viruses.
- Passing this treated water through a filter with a carbon core element will reduce the chlorine taste.

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Iodine Compounds

- Are available in most outdoor sport outlets. Directions for use must be followed carefully. They have a distinctive flavor that can be removed if treated water is passed through a carbon core filter after treatment.
- Iodine treated water must sit for ½ hour or more before use. It is effective against bacteria and viruses but not all protozoans such as cryptosporidium.
- Pregnant women or persons with thyroid problems should avoid using this product.

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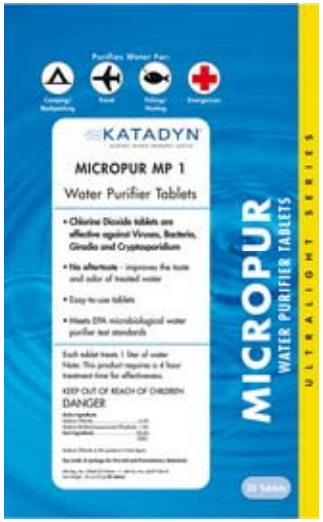
Chlorine Dioxide

- Is available as drops or tablets, under several proprietary names such as Pristine® or MicroPur® to name only a few.
- Chlorine dioxide is less stable than Bleach or Iodine and breaks down quickly. That is why you make up the compound just before use, meaning there is less chance of digestive upset. There is no detectable flavor and it is effective against all pathogens including viruses!



Micropur tablets

Pristine's 2 part system

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Mechanical Method

- Filters are essentially micro-pored strainers that allow water to either flow through by gravity or to be pumped through under pressure. Pore size in your average filter runs typically from 0.2 – 0.4 microns. This allows most filters to strain out bacteria and protozoans but not the very tiny viruses which must be eliminated by heat or chemical treatments.

Components of a Hand held Water filter

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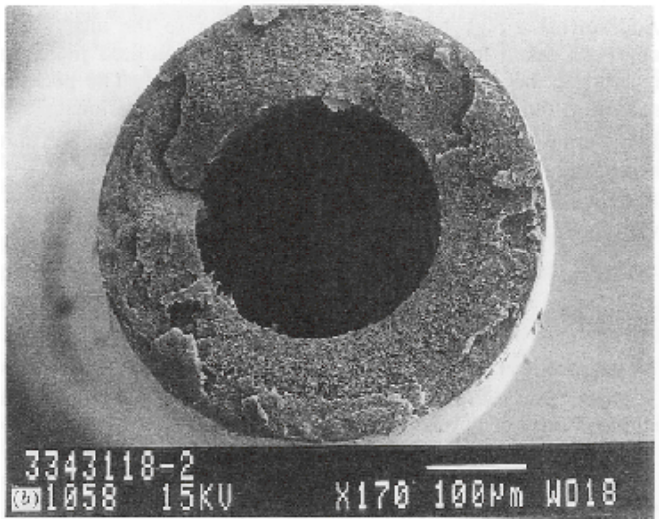
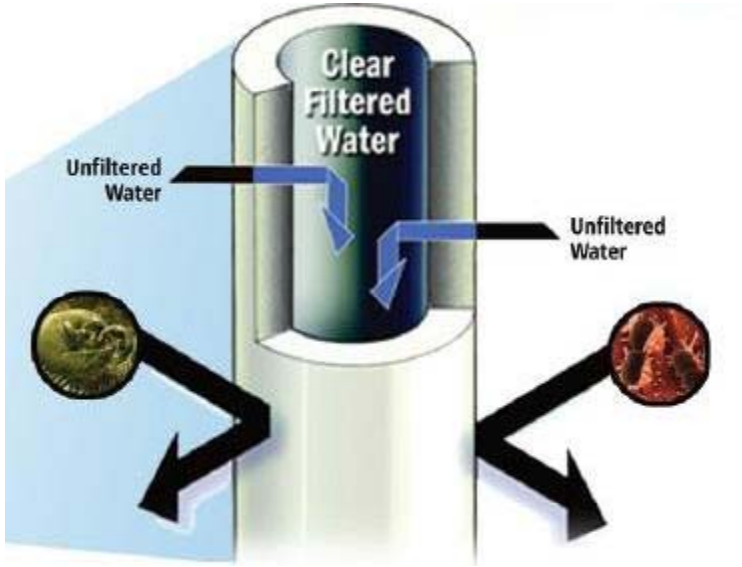
Mechanical Methods

- Most common filter units today use either ceramic filters with a carbon core or silver impregnation; or hollow- fibre technology to strain the water as it passes through the unit.



A single hollow fibre.

Note 100 micron scale.



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Mechanical Methods

- As the water moves through the “strainer”, depending on the size of the pores, pathogens such as protozoans and bacteria are trapped and effectively removed.
- Only clean, sanitary water is delivered into your drinking containers for further consumption.
- When using your hand-held filter, the end of your intake hose, should have a pre-filter attachment to reduce particle contaminants from entering the filter. This attachment should have a float that will allow the intake to be suspended just below the surface of the water and several inches above the bottom. When starting to pump and prime the filter, inverting it so the bottom is up, will move air bubbles more quickly through the filter unit and into the water outlet preventing a reduced water flow caused by trapped air in the filter housing. Once the bubbles have moved through, turn your filter right-side up and continue pumping your water.
- There are many styles and makes of filters on the market. Your own research and assistance by a knowledgeable outdoor equipment provider can greatly help you in your final choice.

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When purchasing a filter, keep in mind

- How many people you are supplying with water.
- How quickly can the filter supply water. (measured in Litres/minute.)
- How reliable is the filter. Get feedback from your sales assistant or review customer testimonials.
- How easily can the filter be cleaned and repaired while on your trip. Does it backwash.
- What kind of maintenance does the filter require after use and before storage to prevent the growth of mold and bacteria on the filter unit.
- Does the filter have pre-filter units that will clean out larger particles before actual filtration and prolong your filters life.
- Do you need to protect the filter from freezing or impact.
- Does the filter have a purifying unit to kill viruses if needed or do you have to use chemical anti-virals. This is referred to as purifying the water.

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Water Treatment in the Back Country

- So there it is in a nutshell. Filtration or a trip cut short because of the extreme discomfort of an intestinal upset.
- We hope this will assist you with your choices and a safer, more enjoyable experience when out riding in the back country.

- Submitted by Gabriele Wesle, Back Country Horsemen, North Okanagan chapter.
- Edited by Mary Huntington, Back Country Horsemen of BC, Education Chair.

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About Horse Council BC

- Horse Council BC is a non-profit organization, governed by an independent Board of Directors, committed to representing the interests of our members and the equine industry. As one of the most successful multi-breed, multi-discipline provincial equine organizations in Canada we represent the equine community in BC, by collaborating with individuals, businesses and industry professionals to strengthen communication, education, and safety.

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Thank you to the Back Country Horsemen of BC

- For providing the information and photographs contained in this course. For more information about the Back Country Horsemen of BC go to http://www.bchorsemen.org/
- For more information about Horse Council BC go to www.hcbc.ca

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