WATER TREATMENT AND FILTERS

**WATER** is an essential need to keep the human body functioning. Without regular water intake, humans cease to function properly and within an average of three days could die. Any physical activity, from breathing to vigorous exercise, requires drinking water to replace the body’s loss of water. The body requires at least 6 glasses of water a day. Backpacking is a strenuous activity requiring strength, stamina, and water. Drinking untreated water from streams, springs, lakes, well water, and artesian wells carry certain risks. The safest way is to bring water from a safe source like tap water or bottled water. But at 8 pounds per gallon and more, if staying overnight, the added weight becomes a burden for backpackers and hikers. The alternative to bringing lots of water is knowledge of water sources and then treating the liquid to render harmless and potable for drinking. Ways of making water risk free abound but first we need to know the reasons behind the treatment of water in the wilderness. “Don’t catch the traveler’s disease!”

**HARMFUL MICROORGANISMS**

Protozoans, bacteria and viruses are our number one concern.

Protozoans measure about 1-300 microns and are better identified through a microscope. By comparison, the diameter of a hair is about 50 – 120 microns. Cryptosporidium and Giardia can be filtered with most water filters.

Viruses like hepatitis A are even smaller and present the bigger threat. Traveling outside the United States necessitate carrying water filters capable of separating or destroying the pathogens. Viruses can be destroyed or excluded by boiling, using a special filter, chemicals, and ultraviolet light.

Boiling is always the safest way to treat water. However, more fuel is needed for this process and is time consuming. “The Environmental Protection Agency recommends a one – minute rolling boil for elevations less than 6,500 feet and three minutes for higher elevations.”

**WATER FILTERS VS WATER PURIFIERS**

- **Water filters** will trap, strain, and remove protozoans and bacteria from wilderness water.

- **Water purifiers** aside from removing protozoans and bacteria include viruses. Water purifiers are not expensive.

**TYPES OF WATER FILTERS**

* **Pump filters** are very common. They filter water through an inner element or cartridges. The output of filtered water is fast and at a bigger volume depending on its capacity. Pumping requires sitting, kneeling, and sometimes two people.
* **No-pump or gravity filters** are lighter than the pump style. It is the no work method of water filtration. The output is controlled by gravity. Sometimes the output trickles down due to silt, sediment, or residue and must be back flushed to maintain the regular flow. You can do other chores while waiting for the water.

**TYPES OF WATER PURIFICATION MEDIA**

* **Ultraviolet light**: Duplicated from the sun’s quality to kill organisms by irradiation; SteriPEN employs this method. The water is rendered sterile or neutralizes all pathogens including viruses. Once SteriPEN is applied to the water, it only takes less than a minute to do its job. The equipment alerts you when it is ready. Bummer, it can only treat up to one liter at a time and cannot work on silty or murky water. Some operate using battery CR123 or four (4) AA battery.
* **Structured matrix**: Uses proprietary, chemical free virus-removal technology from First Need.

**TYPES OF WATER FILTER MEDIA** (From REI brochure)

* **Ceramic**: Can be brushed clean repeatedly. Its longevity makes it economical over time. Requires a light hand when cleaning as an exposed ceramic filter can be fragile.
* **Glass** **fiber**: Similar effectiveness to ceramic. Though not cleanable. It is replaceable. Pleated models’ large surface area extends their clog-free lifespan, reduces pump force, and improves flow rate.
* **Hollow fiber**: Hundreds of clustered, U-shaped tubes produce a rapid flow rate. Cleanable. Do not allow this type of filter to freeze.
* **Silica depth matrix**: A proprietary blend of microscopic fibers within a binder resin. This type of filter has a replacement indicator.
* **Carbon**: Included in the main filter or added on, it removes many chemicals, herbicides, pesticides, tastes and odors. It can cut iodine or chlorine taste. Carbon alone does not kill harmful microorganisms.

**TYPES OF WATER PURIFIERS** (From REI brochure)

* **Pump filters:** These are similar to a regular water pump filter. Some contain an additional purification solution that is added to filtered water to deactivate viruses.
* **No-pump purifiers:** These rely on suction rather than manual pumping.

**CHEMICAL TREATMENT**

Tablets like chlorine dioxide and sodium dichloroisocyanurate are effective against Giardia lamblia. Tablets are light, small, effective, affordable, and occupy little space. There is a waiting time of at least 30 minutes prior to drinking. Other viable chemicals found in bottles like iodine (comes in tablet form too) and chlorine bleach are handy. Iodine imparts a taste, but Potable Aqua Iodine comes with “Taste-Neutralizer Tablets”.

From the County of Los Angeles – Department of Health Services Environmental Health Advisory

“Disinfect water with a 5.25% sodium hypochlorite solution (liquid household chlorine bleach). DO NOT use scented liquid bleach. DO NOT use the granular form of household bleach. It is poisonous. If liquid chlorine bleach is older than one year, the amount used should be doubled as it loses strength over time. To disinfect use the following formula.”

|  |  |  |
| --- | --- | --- |
| Amount of Water | Clear Water | Cloudy Water |
| 1 quart | 2 drops | 4 drops |
| 1 gallon | 8 drops | 18 drops |
| 5 gallons | ½ teaspoon  | One teaspoon |

“Mix well by stirring in container. Let stand for 30 minutes. A slight chlorine odor should be detectable in the water. If not, repeat the dosage and let stand for an additional 15 minutes before using.”

**TECHNIQUES TO COLLECTING WATER**

Do not collect water near human activities or near grazing farm animals. Choose a calm pool of water. Organisms tend to sink or settle down. Agitated waters and cascading waterfalls keep particulates suspended. Greenish water contains algae and protozoans that can clog your water filter. If using ultraviolet light for treating water, use coffee filter or cheese cloth to separate sediment and other objects. SteriPEN sells accessories to filter out small tidbits. According to Jacobson brownish water contain organic tree tannins that are typically safe to drink. He also said beavers are the favored host of Giardia. So don’t take water from beaver streams or near beaver lodges. Have a collecting bucket where you can filter the water from the top after it settled down.

Before starting your adventure, stop by the Rangers office and ask about water sources and any potential hazard in the water. That flowing spring at the top possibly has trickled down. Remember the accidental discharge in Colorado about unintended release of chemicals into the river system. Well….

**OTHER CONSIDERATIONS**

Take care of your water filter by selecting non-silty or non-muddy water. The filter will last longer. There is no need to bring backups or additional replacement parts when backpacking in a group. I suggest one filter per three people. If four are backpacking, another water filter or water purifier must be carried. All function checks on water filters **must** be done at home. Read the instruction manual if you bought a new one. Even similar models might contain improvements or changes that might affect the operations of the equipment.

Do not interchange the tubes for *input* and *output*. Always evacuate as much water from the filter. Wash your hands after cleaning the filter. Using the above mixture, run the filter with treated water mixed with Clorox or other chemicals approved for sanitizing the filter system.