The Yukon River Intertribal Watershed Council

Safe Drinking Water Practices Manual

725 Christensen Drive, Suite 3♦ Anchorage, Alaska 99501 ♦ P: (907) 258-3337 ♦ Fax: (907) 258-3339

Is this manual for YOU?

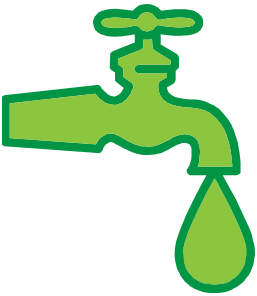
If you drink water or provide water for others, this simple manual is designed to give you a basic understanding of the need for safe drinking water and ways to ensure that water used for common domestic purposes is safe drinking water.

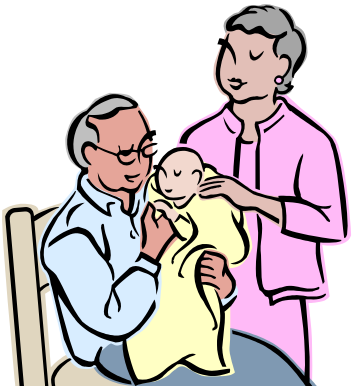
You need safe drinking water for health and life.

Water is essential for life. An adequate supply of safe drinking water must be accessible as needed to maintain health and sustain life.

Safe drinking-water is required for all common domestic purposes including drinking, food preparation and personal hygiene. Water of higher quality may be required for some special purposes, such as food processing, cleaning of contact lenses, dialysis and other pharmaceutical uses.

Improving the quantity and quality of available safe drinking-water can result in many health benefits. Every effort should be made to achieve drinking-water that is as safe as practicable at all times.





Infants, children, elders and anyone experiencing an illness are at the greatest risk of harm from waterborne diseases and/or contaminants. Risk is further elevated by the unclean and/or unsanitary conditions frequently found in any living area lacking running water and piped wastewater service. Anyone at risk of waterborne illness may need to take additional steps (boiling drinking-water, etc.) to protect themselves against exposure to waterborne pathogens.

Proper Hygiene for Safe Drinking Water

Using water involves many steps. Collection, transportation, storage and use are all stages of using safe drinking water.

Many people obtain community monitored and treated safe drinking water from a faucet in their home. Others may obtain water from an alternate source and transport (self-haul) it to their home for use. In any case, proper water hygiene will keep safe drinking water safely useable and promote the health and quality of life for each individual using the water.

The best way to ensure you use safe drinking water is to prevent contamination once safe drinking water quality has been established. Proper water hygiene is the key to maintaining safe drinking water quality.

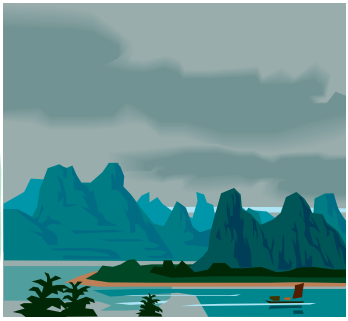
Contaminates may be **naturally present** at the source or collection point of water. They may also be **introduced** by a **contaminated utensil** (hands, dipper, pail, etc.), **container** (bottle, jug, barrel, etc.), **transportation device** (pipe, gutter, roof, vehicle,

etc.) or **any other item** (pet, falling debris, etc.) coming into **contact with the water** being collected.

Surprisingly often, safe drinking water becomes contaminated through contact with utensils, containers or transportation devices that contain contaminates. All items coming into contact with or in close proximity to safe drinking water should be clean inside and out to prevent possible contamination.

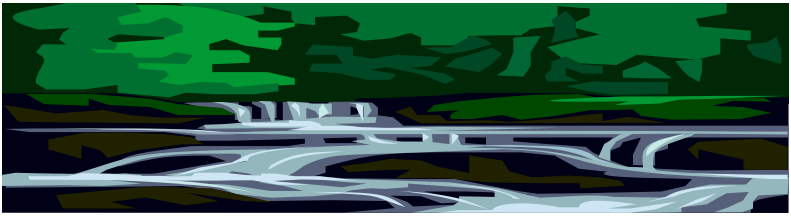
Even when collecting water from a treated source (community well, school, Washeteria, etc.) it is very important to keep your containers clean inside and out to prevent contamination of the collection point. **Contamination of a common collection point or water source is the surest path to rapidly spreading disease throughout a community, significantly impacting the health and safety of infants, children, elders, family and friends.**





Water Source Alternatives

Alternative water sources include water collected from precipitation (falling rain or snow, etc.), surface water (lake, stream, rain or snow roof runoff, post-exit spring, etc.) or ground water (well, pre-exit spring, etc.). These sources may already provide safe drinking water or the water collected may need to be transformed into safe drinking water. **Keeping utensils, containers and transportation devices free of contaminants will also ensure safe drinking water does not become contaminated and spread diseases that may severely affect the health and safety of infants, children, elders, family, friends and visitors in the household.**



Adequate Safe Drinking Water

What is adequate safe drinking water? Adequate safe drinking water is potable, palatable and available water.

Potable

Potable means the water is free from microorganisms, harmful chemicals and other pollutants that can make you sick. It promotes individual and group health when appropriately used for common domestic functions.

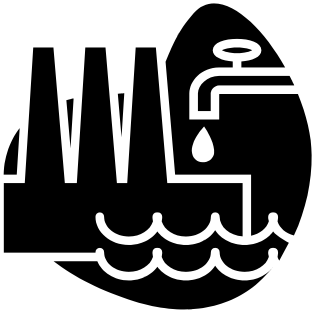
Palatable

Palatable water has a clean, clear appearance with no bad taste or odor. Palatable water has the appearance and presentation of purity, is appealing and desirable to an individual and provides a pleasant, satisfying experience when used.

People have a tendency to use potentially non-potable water in their effort to avoid using unpalatable water. This creates an obvious health risk. Therefore, palatability becomes an important health concern.

Available

Water is considered available if it is readily accessible when needed in the quantity required for all common domestic uses.


Ensuring Safe Drinking Water

How does one ensure safe drinking water? Testing, treatment and hygiene are the keys to safe drinking water. This is not as difficult as it may sound.

Testing

Your water supply should be tested on a periodic basis.

If you collect water from a known safe drinking water source (home faucet, community well, school, Washeteria, etc.) testing and treatment should be performed by the system operator on a regular basis and is required by law.

Nonetheless, you may still wish to **test your drinking water at the point of use** to ensure no contaminants have been introduced between the monitored point of treatment and your point of use. Even water from a monitored, treated source delivered by pipe to your faucet may become contaminated by the pipes (lead, etc.) or fixtures (microorganisms, etc.) in your building.

If you collect water from an unmonitored source you must test the water yourself. This need not be a difficult, complex or expensive process and many different home water testing kits are available. Specific detailed directions for accurate testing are included with these kits and should be closely followed to obtain valid results.

Treatment

Once you have the test results, you will know if there are any contaminants that must be removed from your water to have an adequate safe drinking water supply. These contaminants may be broadly grouped as microorganisms, chemicals and particulate matter.

Microorganisms (viruses, bacteria, parasites, etc.)
Contaminants in this category may cause relatively well known illnesses, such as Beaver Fever (*giardia lamblia*), Legionnaire's Disease (*legionella*), E. coli (*Escherichia coli*) viral infections and various parasitic worm infestations. Symptoms may originate in the gastrointestinal system beginning with nausea, cramps, vomiting, diarrhea, dehydration, anemia, etc. and usually require medical treatment. However, some microorganisms will quickly migrate to the blood stream, liver or lungs and initial symptoms may be associated with those areas.

Because microorganisms are generally too small to be seen by the unaided human eye, water that appears clean and clear may still pose a significant health risk.

The general approach to eliminating microorganisms is to disinfect the water. Common disinfectants include boiling the water (at least 1 minute at sea level and at least 3 minutes at altitudes over 3000') or adding chemical additives (chlorine (bleach), iodine, etc.) that are readily removed. Most of the chemicals used to treat water for microorganisms will evaporate with simple

aeration but, some require special processing. When using a chemical disinfectant process it is very important to follow the specific directions provided by the manufacturer for that particular product to avoid subsequent chemical contamination.

Chemicals (organic and inorganic)

Organic chemicals (petroleum, benzene, dioxin, acrylamide, benzo(a)pyrene , etc.) may appear from many sources including refuse and waste disposal, community activities, water systems, waste water processing, farming, construction and industrial activities, etc.

Inorganic chemicals (minerals and metals, lead, mercury, fluoride, copper, etc.) may result from erosion of natural deposits, corrosion of water handling/processing systems, refuse and waste disposal, industrial and community activities, farming, mining, refining, construction, etc.

Some of these chemicals (lead, mercury, etc.) may contaminate the water after it reaches your location. Older buildings are especially “at risk” for containing hazardous

chemicals that can potentially contaminate your safe drinking water and pose significant health risks.

Not all organic and/or inorganic chemicals need to be removed from water to make it potable. Iron, calcium and sulfur in water may not harm an individual that drinks it but, they can affect the palatability of the water. Iron may give the water a reddish-orange appearance; calcium adds to the "hardness" of water creating deposits where evaporation occurs and sulfur causes water to possess an "old, over-boiled egg" odor. Chloride used to treat water for microorganisms may give the water the scent of bleach.

Many chemicals are very dangerous and should never be ingested. Petroleum or its distillates may give the water an oily sheen, feel or taste and a fuel-like scent but, some chemicals are completely undetectable by any of the human senses. Ingestion of these chemicals usually affects an individual's organs and/or systems, resulting in permanent damage, insanity, disability or death.

If you find undesirable levels of a chemical in your water, the treatment process must be tailored to meet the chemical found and the result desired. While you gather the proper

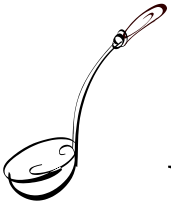
information and take the appropriate action to create safe drinking water at your source of water, you should use an alternate proven source for safe drinking water.

Whether you are removing chemicals to make your water potable or palatable; filtration is the primary process available. Distillation may remove some chemicals that filtration cannot but, it also usually requires a greater investment. Some chemicals are very difficult to remove from water and require refraction. Refraction is usually cost prohibitive for most individuals to accomplish at a sustainably useful level.

Particulate matter (organic and inorganic)

Many inactive ingredients may be found suspended in water. They will generally be visible as cloudiness (turbidity) that can usually be settled or filtered out of the water. The suspension may consist of vegetation, glacial silt or other matter that may not be harmful to consume but, usually affects the palatability of the water. Elevated levels of turbidity are also often associated with higher levels of disease causing microorganisms.

Particulate matter suspended in water will separate rather easily with time. Some of the suspended particulate matter (glacial silt, etc.) will sink to the bottom and other suspended particulate matter (cellulose fibers, etc.) will rise to the surface, depending upon the density of the matter. One may then isolate the clear water for use and dispose of the unwanted material. A quicker method is filtration. Many filtration methods are available that will readily clear water.



Water Tools

Collection, transportation, treatment, storage or use of water generally requires the assistance of tools generally classified as containers. The type of container to be used will be determined by the function it must perform. The function, size, material and even shape of the container can affect its ability to maintain safe water quality. It need not be complex; simple common sense can guide proper container selection.

Barrels, bottles, jugs, etc. are all examples of long-term holding devices. If safe drinking water will be held for an extended period of time, it should be a complete container that includes a cover that will prevent airborne or falling contaminants from entering the water. These devices and covers should be constructed of material that will not leak or leach into the water with time. Glass, stainless steel, porcelain, ceramic and some plastics are good materials for this purpose.

If water is to be extracted in single use quantities, an outlet at the bottom should be available to control the release of water without exposing the remaining water to possible contaminants. **This avoids the need to dip another item into the water which can easily introduce unseen contaminants into safe drinking water.**

If you must use a container that requires dipping to obtain water, keep it covered when the water is not being accessed and always keep the dipping tool far away from any possible contaminates at all times. This includes contact with other items such as insects, animals, hands, used towels, counters, walls, etc. that may harbor contaminates.

The Cost of Water

There seems to be a cost associated with everything, water is no exception. The question is, **"What will it cost?"**

Safe Drinking Water Costs

Safe drinking water may take time, effort and even some money. Many times, it may seem to be a boring, inconvenient or troublesome process. In reality, the cost of ensuring safe drinking water quality is quite small and usually need only occur at periodic intervals. When put in perspective, the investment is minimal and the return can be quite substantial. Your health and the health of your family and friends requires adequate safe drinking water.

Contaminated Drinking Water Costs

The cost of safe drinking water is easily calculated in measurements of time, effort and money. The cost of contaminated drinking water may be much higher and more difficult to calculate. How much is your health and safety worth?

For example, one encounter with Beaver Fever may require emergency transportation to a medical facility, treatment with antibiotics and rehydration therapy, days in the hospital, more time at home in bed for recovery, loss of income and productivity, misery, pain, suffering, etc. The list could go on. Now, multiply that "cost" by the number of people served by that water.

Different contaminants affect one's health differently. Many health effects are permanent. Potential effects of contaminated drinking water include cancer, permanent damage to organs (brain, skin, eyes, liver, kidneys, heart, lungs, thyroid gland, stomach, etc.), permanent systemic damage (reproductive system, immune system, nervous system, circulatory system, digestive system, etc.), hair loss and fingernail loss.

Some pay the ultimate price for using contaminated drinking water, life itself. **Infants, children, elders and anyone with a compromised immune system (those suffering from illness) are at the greatest risk of damage from contaminated water.** It becomes quite clear that the cost of safe drinking water is much lower than the eventual cost of unsafe drinking water.

Now, Pass it on!

Tell your family, friends, neighbors and community.

Adequate safe drinking water is for everyone.

Save our future, preserve our past, protect the infirm and live well.

More Information

If you desire more information regarding adequate safe drinking water, here are a few of the many good web sites available to begin your quest for knowledge.

Alaska Department of Environmental Conservation
http://www.dec.state.ak.us/

Environmental Protection Agency
http://www.epa.gov/

World Health Organization (English language)
http://www.who.int/en/