

## KNW-150

### Water Storage and Purification

Modified for Houston from original Mecklenburg County ARES©

In 2014 a chemical plant near Charleston, West Virginia spilled chemicals into the Elk River and contaminated the municipal water for 300,000 people. Citizens were advised not to drink, bathe with or use this water for anything except flushing toilets. The water was contaminated for weeks. This is an example of the vulnerability of municipal water supplies. Although chemical spills contaminating water supplies are fairly rare, biological contamination is a much more frequent issue. Automatic municipal water treatment systems do sometimes fail resulting in mandates to boil municipal water before use. Also during wide spread disasters water plants may lose power and that could cut off the drinking water supply.

The Red Cross, FEMA and other sources recommend that we have an emergency water supply of at least 3 days - that would be one gallon per person per day. The actual amount of water we need varies depending on the outside temperature, the humidity and our activity level. During hot weather and when our level of activity is high, the human body may require up to two gallons of water per day to avoid dehydration. Bottled water is the usual choice for ensuring that you and your family have an emergency drinking water supply.

It is estimated that the average American uses about 50 gallons of water per day. This includes not only water for food preparation and drinking, but all other uses including showering, laundry, flushing the toilet, etc. During an emergency, if our municipal water is cut off then we are obviously going to have to make do with much less! During extended water outages we may be forced to collect water from nontraditional sources such as rivers, streams, ponds, rain water, etc. Water taken from these alternate sources will require treatment to make it safe for human consumption.

There are Four basic ways to purify water:

1. Mechanical Filtration
2. Heat Sterilization
3. Chemical Treatment
4. UV Treatment

For some situations you may choose to use a combination of these methods.

**Mechanical Filtration** involves running your water through some type of filter to trap particulate matter and/or remove biological contaminants. The most popular types of mechanical filters that will produce clean drinking water are made for the outdoor recreation market. Ceramic and Membrane filters are the most popular models available today. Ceramic or membrane filters have openings (sometimes called pores) small enough to allow water through but will trap contaminants such as dust, dirt, bacteria, protozoa and viruses.

There are several styles of ceramic and membrane filters – Pump filters and Gravity filters. Pump filters require the user to pump the water through the filter using a pump handle on the filter body. Gravity filters use gravity to push water through the filter. If your ceramic or

membrane filter does not have pores small enough to remove viruses then you must also chemically or heat treat the water to make it safe to drink.

Other less effective methods of mechanical filtration include simple cloth or paper filters that will remove large contaminants such as dust, dirt, algae and other sediment. Cloth or paper filters will not make water safe to drink without additional chemical or heat treatment to kill bacteria and viruses.

**Heat Sterilization** involves boiling your water and allowing it to boil for at least 10 minutes. The 10 minute boil will kill all bacteria, protozoa and viruses making it safe to drink. Boiling alone does not remove dust or dirt from the water. Pre-filtering the water with a simple mechanical filter before boiling it will remove much of this debris. A popular way to pre-filter water before boiling is to run the water through a coffee filter.

**Chemical Treatment** involves adding chlorine or iodine to water then mixing it and allowing it to stand for 30 to 60 minutes before use. Many different brands of water purification tablets are available on the market. These tablets are effective in killing bacteria, protozoa and viruses making the water safe to drink. Most camping and sporting goods stores carry these tablets and they are available online.

Unscented chlorine bleach may be used to treat water, and the proper amount to use is between 8-16 drops per gallon then stir it and let it sit for 30 minutes before use. None of these chemical treatments will remove dust, dirt or other sediment from your water. Pre-filtering the water will remove those contaminants.

**UV Treatment** involves subjecting the water to intense ultraviolet light. Ultraviolet light will kill bacteria, protozoa and viruses making the water safe to drink. There are several UV water treatment devices on the market today. They are primarily marketed to the camping and hiking community. The one drawback in using UV water treatment is that all of these units run on batteries so when you run out of batteries then the unit is useless.

Regardless of which type of water treatment you choose to use, you should try to collect the cleanest water available. Large quantities of debris or dirt in the water will make all of the purification methods less effective.

Beware that **none** of the methods of water purification presented here will remove chemical contamination. Water contaminated with industrial chemicals, gasoline or oil is always unfit for human consumption and should be avoided.

Home water filters used to remove chlorine from tap water will not remove bacteria, protozoa and viruses. These filters are designed to remove flavors and odors from safe water and cannot be used to make contaminated water safe.