

# Posse+Plus

## Wood County, Texas

# Water Storage and Purification

## 1. Potable (drinkable) Water Storage

The easiest way to supply water during an emergency is to store potable water before the emergency strikes. You must consider the cost per gallon to store the water, location of the water storage, and keeping the water safe to drink.

(Ready.gov) You should store at least one gallon of water per person per day. A normally active person needs about three quarters of a gallon of fluid daily, from water and other beverages. However, individual needs vary, depending on age, health, physical condition, activity, diet and climate.

To determine your water needs, take the following into account. One gallon of water is normally needed per person per day, for drinking and sanitation. Children, nursing mothers and sick people may need more water. A medical emergency might require additional water. If you live in a warm weather climate more water may be necessary. **In very hot temperatures, water needs can double.** Store in a cool dark place.

It is recommended you purchase food grade water storage containers from surplus or camping supplies stores to use for water storage. Before filling with water, thoroughly clean the containers with dishwashing soap and water and rinse completely so there is no residual soap.

If you chose to use your own storage containers, choose two-liter plastic soft drink bottles – not plastic jugs or cardboard containers that have had milk or fruit juice in them. Milk protein and fruit sugars cannot be adequately removed from these containers and provide an environment for bacterial growth when water is stored in them. Cardboard containers also leak easily and are not designed for long-term storage of liquids.

Follow these steps for storing water in plastic soda bottles.

Thoroughly clean the bottles with dishwashing soap and water, and rinse completely so there is no residual soap.

**Sanitize the bottles by adding a solution of 1 teaspoon of non-scented liquid household chlorine bleach to a quart of water.** Mix the sanitizing solution in the bottle so that it touches all surfaces. After sanitizing the bottle, thoroughly rinse out the sanitizing solution with clean water. (The sanitizing solution can be used on multiple bottles.)

Fill the bottle to the top with regular tap water. If the tap water has been commercially treated from a water utility with chlorine, you do not need to add anything else to the water to keep it clean. **If the water you are using comes from a well or water source that is not treated with chlorine, add two drops of non-scented liquid household chlorine bleach to disinfect the water (two liter bottle). Let the water stand for 30 minutes before using. (8 drops per gallon)**

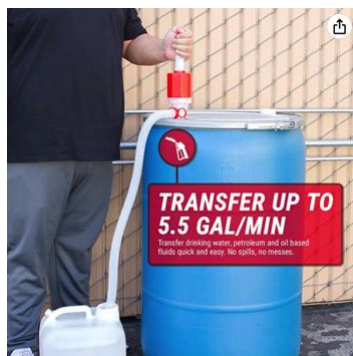
A slight chlorine odor should be noticeable in the water, if not, add another dose of bleach and allow the water to stand another 15 minutes. Tightly close the container using the original cap. Be careful not to contaminate the cap by touching the inside of it with your finger. Place a date on the outside of the container so you can know when you filled it. Store in a cool, dark place (*not subject to freezing*). Water that has not been commercially bottled should be replaced every six months. (End Ready.gov)

Water can also be stored in larger containers. Sizes include 1 gallon, 5 gallons, 15 gallons, 20 gallons, 30 gallons, 55 gallons and larger. Larger containers must include convenient ways to fill and empty them. This usually requires the use of spigots, bulkhead fittings, and hand pumps.

New 5 gallon buckets with lids can be purchased for \$8-\$10 apiece plus the cost of the lids. New 55 gallon food grade plastic drums can cost \$140-\$180 apiece. Used 55 gallon food grade plastic drums can be purchased for as low as \$20-\$25 apiece. Select blue or black drums over white drums for long term storage. White drums allow sunlight to enter which hastens algae growth. When using a larger drum, a drum wrench may be required. Consider the cost per gallon when selecting water storage containers. **Use 8 drops (1/8 teaspoon) bleach/gallon of water (1/8 cup/55 gallons) for disinfection.**

## 2. 55 Gallon Food Grade Plastic Drums-Tools

**TERA PUMP TRDRUM4 \$40.    NACHEE Drum Wrench \$12    Rain Barrell Spigot \$17**



A used 55 gallon food grade plastic drum with a rain barrel spigot would cost around \$40. The storage cost would be close to \$0.75 per gallon. This is probably the cheapest alternative for storing large quantities of water. A drum wrench would also be needed but it would be used on multiple drums. The drums should be elevated to make it easier to use the spigot. A transfer pump is another option replacing the need for rain barrel spigots.



### 3. Hidden Water Sources in Your Home

(Red Cross) Safe water sources in your home include the water in your hot water tank, pipes, and ice cubes. You should not use water from toilet flush tanks or bowls, radiators, waterbeds, or swimming pools/spas.

You will need to protect the water sources already in your home from contamination if you hear reports of broken water or sewage lines or if local officials advise you of a problem. To shut off incoming water, locate the main valve and turn it to the closed position. Be sure you and other family members know beforehand how to perform this important procedure.

To use the water in your pipes, let air into the plumbing by turning on the faucet in your home at the highest level. A small amount of water will trickle out. Then obtain water from the lowest faucet in the home.

To use the water in your hot-water tank, be sure the electricity or gas is off, and open the drain at the bottom of the tank. Start the water flowing by turning off the water intake valve at the tank and turning on a hot-water faucet. Refill the tank before turning the gas or electricity back on. If the gas is turned off, a professional will be needed to turn it back on. (Red Cross ends)

### 4. Water Filters for Non-Potable Rain, Lake, and River Water

Most water filters will not remove chemicals and should not be used on pool or salt water.

Water filters can be broken into three different categories.

**Straw type water filters** rely on one's ability to draw water up a straw through a membrane. They are suitable for small amounts of drinking water but not for water to use for cooking or sanitation.

**Pressure/push through type water filters** work by manually pushing water through a membrane. They are suitable for small amounts of drinking water, water for cooking, and water for sanitation.

**Gravity type water filters** work by allowing water to drip through a membrane by the force of gravity. It is a effortless way to filter larger amounts of water for drinking, cooking, and sanitation.

### **LifeStraw Personal Water Filter-Straw Type-\$18**



(LifeStraw) The microfiltration membrane removes 99.999999% Of waterborne bacteria (including E. coli and salmonella), and 99.999% of waterborne parasites (including giardia and cryptosporidium).

It removes the smallest microplastics found in the environment (down to 1 micron), and reduces turbidity down to 0.2 microns.

The microbiological filter will provide 4,000 liters (1,000 gallons) of clean and safe drinking water with proper use and maintenance.

### **LifeStraw Go Water Filter Bottle-Straw Type-\$40**



(LifeStraw) The LifeStraw Go Water Bottle personal water filter has been updated with 2-stage filtration to improve the taste of filtered water and provide even better protection from contamination. In addition to the award-winning LifeStraw hollow fiber membrane filter, the next-generation Go Bottle incorporates a carbon capsule that reduces bad taste, odor, chlorine, and organic chemical matter.

The convenient, reusable LifeStraw Go personal water filter bottle is ideal for hiking, camping, or traveling to areas with poor water quality, and is a critical addition to any disaster survival kit or bugout bag. Easy to fill by scooping water from any pond, stream, or river, filtration happens while drinking through the mouthpiece. When the filter has reached capacity (1,000 liters / 264 gallons) it will stop taking in water. The activated carbon capsule is effective for up to 100 liters (26 gallons), or the equivalent of 3 months of continuous use.

Replacement filters are available for sale separately. Made of BPA-free Tritan, the LifeStraw Go bottle is extremely durable. The food-grade silicone mouthpiece is flexible which prevents it from chipping or cracking, and is removable for easy cleaning. Use the carabiner to attach to

your backpack, or store in your preparedness kit to ensure access to safe, clean drinking water in an emergency. Capacity is approximately 22-ounces.

### **GRAYL UltraPress 16.9 oz Water Purifier & Filter Bottle-Push Through Type-\$90**



(Grayl) Empowers international travelers and outdoor adventurers to make the world's sketchiest water sources clean to drink. Ideal for global travel and outdoor adventures (hiking, camping, backpacking, fishing, hunting) and survival. REMOVES ALL PATHOGENS. 99.9% of viruses (e.g. rotavirus, norovirus, hepatitis A), 99.9999% of bacteria (e.g. E. Coli, salmonella, dysentery), and 99.9% of protozoan cysts. (e.g. giardia, cryptosporidium, amoebae)

Filters particulates (e.g. sediment, microplastics) and adsorbs volatile organic compounds (VOCs), PFAS, chemicals, pesticides, herbicides, heavy metals, flavors and odors. Effortlessly purifies 16.9 oz (500ml) of water in as quick as 10 seconds. Requires no setup time, pumps, hoses, sucking straws, batteries, chemicals, or prolonged waiting. Simply – Fill. Press. Drink! 'Fill' water filter bottle from any river, faucet or fountain, 'press' on a low surface (e.g. ground), then 'drink' clean water anywhere in the world.

### **LifeStraw Family 1.0 Portable Gravity Powered Water Purifier-Gravity Type-\$70**



Surpasses EPA standards for water purifiers. Removes 99.99% viruses, 99.9999% bacteria and 99.9% protozoan cysts to 0.02 microns. Purifies 18,000 liters/4755 gallons WITHOUT iodine, chlorine, or other chemicals.

Clean drinking water for a family of four for 3 years. Uses a gravity filter. Pour water in the top and clean water comes out the bottom.

Comes in a sealed bag, perfect for storing for emergencies. Flow rate of 9 -12 liters per hour.

### **Big Berkey Water Filter-Gravity-\$384**



#### **2.25 Gallon Capacity**

(Berkey) The Big Berkey is our most popular water filter system here at BerkeyFilters.com, and for good reasons. It's the perfect size! The functionality of the Big Berkey makes it so versatile that it works for several situations. It's 2.25 gallon capacity can provide plenty of water for medium-sized families of one to four people, without taking up precious counter or fridge space.

This unit fits easily in the kitchen, RV, tiny house or off-grid cabin! The size of the Big Berkey is 21 inches tall and eight and half inches wide.

With the addition of an extra pair of black Berkey elements for a total of 4, and the Big Berkey unit can supply up to 16 people with clean drinking water in emergency situations.

Berkey water filters provide the ultimate in waterborne contamination removal. They are used worldwide to set the international standard for water filters used in clean or hostile filtration environments. Owning a Berkey Water Filter gives you the ability to utilize almost any outside natural water source and transform it into the best tasting, purest drinking water possible. All while using a natural method without the use of chemicals or complicated processes.

The Berkey water filter system is so powerful it is classified as a purifier. This classification shows that we far exceed the abilities of the standard water filter. The portable Berkey can be used to filter non-potable or unhealthy water in situations where electricity and pressure are not available. For normal every day water from your faucet or for challenging environments like wells, rivers and lakes, Berkey is the most flexible and adaptable filtering system available.

Berkey water costs just 1.7 cents per gallon to produce. The cleanable black Berkey replacement filters provide an economical, reliable and powerful long-term solution to poor water quality issues that cannot be equaled. Our most popular model, the Big Berkey has a long-standing reputation for quality and service. Prices range from \$380-\$510 depending on whether you choose the model with two or four filter elements.

### **Gravity Water Filter Kit for Do-It-Yourself Water Purifier-Gravity Type-\$26 SHTFandGo Brand, Made in the USA**



(SHTFandGo) Build your own 1000+ gallon, emergency gravity water filter system including 10 micron pre-filter, 0.2 micron ceramic candle filter, dispenser, and scrubby to clean the element. We include in the shipment detailed instructions for assembly and care of a survival water filter. Comes with prescreen filter and scrubby to clean the filter.

Removes up to 100% giardia lamblia, 100% Cyclospora, 100% removal of live Cryptosporidium, (WRc Standard) 100% removal of cryptosporidium, 100% removal of E. coli, vibrio cholerae 99.999%, removal of salmonella typhil, shigella, dysentaria, kiebsiella, terrigena, 99% arsenic 5 and 99% arsenic 3, 99% hydrogen sulfide, 95% chlorine and chloramines, 99% of foul taste and odor, 98% aluminum, 96% iron, 98% lead, 90% pesticides, 95% floride, 85% herbicides, 85% insecticides, 90% rodenticides, 85% phenols, 85% MTBE, 85% perchlorate, 80% trihalomethanes, 95% poly aromatic hydrocarbons, 99.999% of particles larger than 0.5 micron, 99.999 anthrax 99.7% of particles larger than 0.3 micron, (Staffordshire University Labs) 98% of particles larger than 0.2 micron (Staffordshire University Labs).

Dispenser style can vary depending on availability. Ceramic filters do not reduce total dissolved salts (TDS). (end SHTFandGo)

“Just Water” is another reliable brand of do-it-yourself water filters but has become difficult to find. Instructions for the “Just Water” brand are below and can be applied to other brands.

(Just Water) Good flow rate / Up to 1 gallon of clean water per hour (gravity flow). Filter will accept water from floods, lake, rain, well, tap, river or stream.

Before using the filter system, the bottom bucket should be cleaned with a bleach-water solution (1 teaspoon bleach to 1 cup water.) Using filtered water and bleach wipe down the inside of the bottom bucket and let air dry for 30 minutes. Rinse with additional filtered water.



**Spigot Installation:** Remove the spigot from packaging. Insert the spigot into spigot hole in the lower bucket from the outside, using the washer. In the interior of the unit screw on wing nut. Hand tighten. Turn spigot by hand, clockwise, one full rotation (hand tighten only). Fill the unit with water and check for leaks.

**Filter Installation:** Remove the filter from packaging. Wash the filter with cold water and cloth or 3M Scotchbrite pad. Put the washer on stem of filter. Insert the filter stem through the filter hole with the filter upright in the plastic reservoir. Tighten the wing nut on the filter stem.

**Filling Instructions:** To retain a constant capacity always add the same amount of water to the upper bucket that you will be dispensing from the lower bucket.

**Cleaning Instructions:** Remove the filter and clean the filter and upper bucket every two weeks with hot water and soap. Clean the filter with a soft tooth brush or 3M pad and cold water. (Never use hot water and soap on filter.) Re-install filter and proceed as normal.

**Flow Rate:** It usually takes several days for the flow rate to increase to 1 gallon per hour. The flow rate will increase as the interior and mixed media becomes completely saturated. If flow rate is slow, clean filter and keep filter sleeve full.

**Shelf Life:** Once you start using the filter, the activated carbon is only good for 1 year. The anti-bacterial ceramic wall will work indefinitely. The shelf life of the unit is indefinite, as well as that of the sock. Replacement during use will depend on filthiness of the water source.

Just Water Filter frequently asked questions.

**What is the purpose of the sock?** The sock is a pre-filter. It will filter the large particles of dirt and debris, which in turn will extend the life of the filter.

**I can't find 5 gallon buckets. What can I use?** You may use any type of container as long it is water tight and has not been contaminated.

**Can I use more than one filter in a bucket?** Yes, by adding more filters you will increase the amount of water that is filtered in a specific period of time.

Why do I have to attach the filter to the lid of the bottom bucket? By attaching the lid to the top bucket, you are preventing the filtered water from being contaminated by any spills that occur when the top bucket is filled with water.

What is the purpose of the small hole at the top of each bucket? This is a vent hole. It will allow air to be pulled into the buckets as water is being drained out the buckets. A vacuum would be formed if the holes were not there, which would stop the filtering action and you would not be able to drain the bottom bucket.

How long will the filter last? The 4×4 carbon will last 6-8 months and the ceramic shell is good for at least one year or at least 100 cleanings.

How do I know when to change the filter? There will be a change in the taste of the water or, even after cleaning the filter, the production rate of the filter does not increase.

The first time I used the filter I saw small specks of black in the filtered water? The first time the filter is used there will be some carbon dust or very tiny particles that will be in the filtered water. This is normal and the water is safe to drink. These will disappear after the filter has been used for the first time.

Can I hold onto the ceramic shell when I am tightening the filter and the wing nut? NO. You can stress the ceramic shell and it can break or crack. If this happens then the filter is no longer doing its job correctly. Bacteria can pass through the crack and into the lower bucket. Hold the filter by its base when tightening the wing nut.

How do I clean the filter? Use any type of abrasive pad (not metal) and gently wipe the surface of the filter. Then rinse with water. \*\*\* DO NOT USE SOAP OF ANY KIND TO WASH THE FILTER \*\*\*

How often should I clean the buckets? Clean the buckets before the first use. Use a bleach solution of 8 drops to one gallon of water. Be sure to NOT use any bleach that is scented. After you have begun to use the buckets, they should be cleaned at least once a month. Use filtered water when making the cleaning solution.

How do I clean the sock? Rinse with water. \*\*\*DO NOT USE SOAP \*\*\*

Are there any precautions I should take when cleaning or changing the filter? If possible, wear gloves. The surface of the filter might be contaminated with the bacteria that have been filtered out of the water. If you are not able to wear gloves, wash your hands with warm water and soap and use hand sanitizer.

## **5. Pasteurizing and Boiling Water**

Water can simply be boiled for one minute using any fuel source to make it safe to drink. You may prefer to filter the water first with a strainer or coffee filter to improve the drinkability.

Water Boiling Versus Pasteurization: What's the Difference? (Weekend Prepper website)



One technique used to sterilize water is to boil it. It is a simple and effective way to kill all the living organisms in the water.

But what about pasteurization? It is used for milk and juice but is it OK for water? And does it offer any advantages over just letting the water boil?

Pasteurization is a gentle heating process designed to reduce the number of viable microorganisms in a liquid to the point where they are rendered harmless. It is a technique that has been used for decades to lengthen the shelf life of milk and more recently is used to treat a wide variety of liquids – including juices.

The technique is really simple. All you do is gently heat the liquid (in this case water) to just over 149 degrees Fahrenheit and then maintain that temperature for at least one minute. If you do that, the water is considered pasteurized and has been rendered safe from any microorganisms that may be lurking in the unpasteurized water.

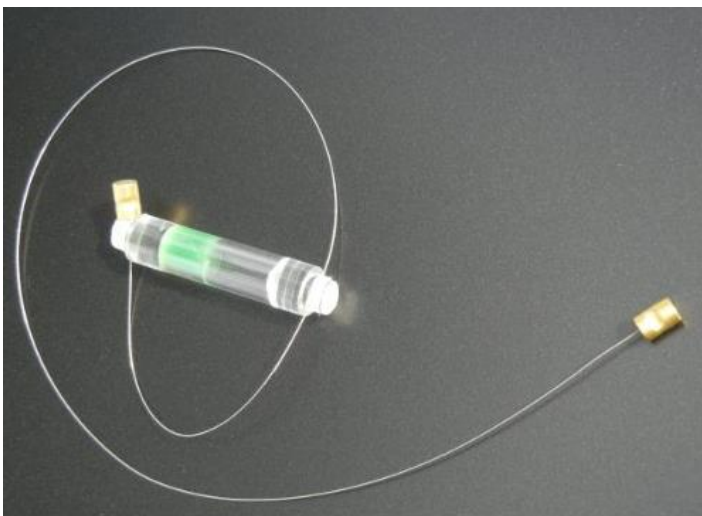
So if it only takes 150 degrees to make the water potable (safe to drink), why does everyone say to boil the water?

When water boils, we get a visual indicator that it is at a certain temperature (212 degrees Fahrenheit.) Unless you have a temperature measurement device such as a thermometer or a water pasteurization indicator (WAPI) – the bubbles generated by boiling water are the only visual indicator. People then boil water (for one minute) to be sure it is safe.

Since we know boiled water is safe, what is the benefit of pasteurization?

It all comes down to energy. It takes a lot less energy to reach 150 degrees than it does to reach 212 degrees. So if you can pasteurize your water instead of boil it, you can dramatically stretch how long your cooking fuel will last you.

And testing it is simple to do. All you need is a cooking thermometer. Any sort of candy thermometer will do the trick. (end Weekend Prepper website)



The WAPI - Water Pasteurization Indicator (\$15) is small polycarbonate tube containing a wax that melts when water is heated enough to be pasteurized (65°C/149°F). The wax changes to a liquid state and falls to the bottom of the tube, indicating that pasteurization temperature has been reached.

The WAPI is an extremely useful, pocket sized, reusable device that should be in every camper's kit and every home emergency kit. It is just 1.5 inches long and about the diameter of a pencil, and weighs about 5 grams.

Disease-causing microorganisms in water are killed by exposure to heat in a process known as pasteurization. Water heated to 65°C/149°F for a short period of time is free from microbes, including E. coli, rotaviruses, giardia and the hepatitis A virus. (Milk and other foods require 71°C/160°F).

The WAPI provides you with an effective technique to assure safe drinking water without boiling.

Not having to bring the water to a full boil saves precious fuel, expense, resources, and time. The WAPI can pay for itself on fuel cost savings in just a few uses. The WAPI also supports alternative methods like solar pasteurization of water.

What heat temperatures are required for killing microbes and viruses in water?

- \* Worms, Protozoa cysts (giardia, cryptosporidium, entamoeba) are killed rapidly at 131°F
- \* V. cholerae, E. coli, shigella, salmonella typhi and rotavirus are killed rapidly at 140°F
- \* Hepatitis A virus is killed rapidly at 149°F
- \* Water boils at 212°F

## 6. Iodine Treatment of Water (Disinfectant)

Iodine treatment is considered a temporary emergency solution for potable water. When iodine is used the taste may be very objectionable and a taste neutralizer may be included as a separate tablet.

There is a difference between chemical water disinfectants and chemical water preservers. A chemical water disinfectant is to be used with non-potable water to make water safe to drink, and a water preserver like ordinary bleach is used for the long-term storage of potable water.

### Potable Aqua Water Purification Tablets with PA Plus-\$9



Potable Aqua is an example of an iodine disinfectant water treatment.

Potable Aqua® Drinking Water Germicidal Tablets are intended for emergency disinfection of drinking water. When used as directed, they make most water bacteriologically suitable to drink. Used worldwide by campers, hikers, militaries, emergency organizations and anyone needing to drink water of questionable bacteriological quality. Potable Aqua® is for use only when drinking water is suspected or known to be bacteriologically substandard.

Potable Aqua® Plus are neutralizing tablets for use after water has been treated with Potable Aqua®. P.A. Plus neutralizes the iodine after-taste and color in the water.

Potable Aqua® drinking water germicidal and neutralizing tablets are:

- Ready in just 35 minutes. Easy to use.
- Makes questionable water bacteriologically suitable to drink.
- Potable Aqua Plus tablets neutralize the iodine taste and color in the water.
- Proven effective against Giardia Lamblia when used as directed.
- Ideal for camping, hiking and travel.
- For use only when drinking water is of questionable quality.
- Is not for use on a continuous basis.
- Read the complete product label and follow all directions for use.

## 7. Water Distillation

*There are a number of electric and stove top water distilling appliances on the market but they are generally designed to distill potable drinking water only and cannot be used with unsanitary sources of water such as rain, rivers or lakes. They convert potable water into distilled water.*

The biggest drawback to distilling rain, river, or lake water to provide potable water is that it requires a great deal of energy when compared to pasteurization and boiling. Distillation will remove microorganisms, as well as heavy metals, salts, and most other chemicals. It can even be used with sea water.

The following illustration is for a makeshift distillation setup from the American Red Cross.

Distillation involves boiling water and then collecting the vapor that condenses back to water. The condensed vapor will not include salt or most other impurities. To distill, fill a pot halfway with water. Tie a cup to the handle on the pot's lid so that the cup will hang right-side-up when the lid is upside down (make sure the cup is not dangling into the water), and boil the water for 20 minutes. The water that drips from the lid into the cup is distilled. (See illustration.)

