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# **EMERGENCY DRINKING WATER SUPPLIES**

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## **Why have an emergency water supply?**

We often take our household water supply for granted. However, when safe drinking water is unavailable, it is more than just an inconvenience - it can become a health emergency. Hurricanes, tornadoes, floods, and winter storms are examples of natural disasters that can interrupt the supply of safe drinking water. Interruptions may be for only a short period of time, or for days. Every household should have an emergency water supply to meet its members' needs during these situations. You may be able to purchase bottled drinking or distilled water at the time of need, but stores may quickly sell out.

## **How much water should I store?**

Having an ample supply of water is a top priority in an emergency. Everyone's needs will differ, depending upon age, physical condition, activity, diet and climate. Most people need to drink at least two quarts (64 ounces), which is equal to eight cups, of water each day. Hot environments can double the amount needed as the body uses water for cooling. The amount of water you need will also depend on the total amount of juices, soups, other drinks, and high moisture foods that are available. Children, nursing women, and ill people will need more. You can minimize the amount of water your body needs by reducing your activity level. Additional water will be needed for food preparation and hygiene. In general, store at least one gallon of water per person, per day of expected need. If you have pets, allow 1 quart per day for each dog or cat.

Storing at least a three-day supply is recommended, but consider storing a two-week supply if your home has enough space for it.

### **What containers should I use?**

You can store water in food grade plastic or glass containers with tight fitting screw-on caps. Food-grade containers include those that previously held beverages, such as 2-liter soda bottles and other water, juice, or punch containers. Plastic milk bottles should be avoided, because it is difficult to remove protein and fat residues, which may allow bacteria to grow during storage.

You can buy new plastic containers for water storage in most housewares and sporting goods departments, and clean food-grade containers may be available for purchase at water vending machines. Only purchase containers labeled for storage of food or beverages.

Containers not labeled for food or beverage storage could release harmful chemicals into the water. Never use a container that has held toxic substances, because tiny amounts may remain in the container's pores. Some plastic containers may affect the taste of stored water. Chlorine bleach bottles may be a food approved plastic, but contain an anti-static agent which prevents accumulation of dust during storage and are thus not recommended. Most plastics used in waterbeds are not approved food storage plastics. Avoid using containers that will decompose or break, such as milk cartons or glass bottles. Also, some old glass jars were made with glass that contains lead, and unacceptable amounts of lead can leach into water stored in them even for short periods.

### **How should I prepare the containers?**

Wash the containers and lids thoroughly with hot tap water and dish detergent. Rinse thoroughly with hot tap water.

### **Can I store my tap water?**

#### Municipal Water Supply

If you are on a municipal water supply, the water you are currently using for drinking and cooking should also be suitable for storing for emergencies. Municipal water supplies include public water supplies such as "city water", or "county water". Water from a public water supply is regulated by the Environmental Protection Agency (EPA) and the North Carolina Division of Environment and Natural Resources (DENR). EPA and the State of North Carolina require that all public water suppliers regularly test for bacteria and deliver water that meets EPA drinking water standards. While you can expect that water from a public water supply will be safe, remember that the container used to collect and store the water must also be clean.

#### Private Water Supply

Private water supplies include individual wells and springs. If you are on a private water supply, it is recommended that you buy bottled water to store. Be sure the bottled water label has the

IBWA (International Bottled Water Association) or NSF (National Sanitation Foundation) seal, or an NYSDH certification number. These organizations require periodic water testing and inspections of the bottling facility . Only sealed, unopened bottles should be stored.

The quality of the well construction and of the water in private water supplies varies greatly in North Carolina. Wells and springs are not subject to any regulation, except that in some counties they are inspected when they are installed. There are no requirements for testing the water. Even if the water has been tested for coliform bacteria, there are other microorganisms that could cause problems during storage. Organic matter, which may not be visible in the water, can make chlorine ineffective. For these reasons, it is risky to store water from private wells and springs.

If you are on a private water supply, a generator will allow you to continue pumping water when there is a power outage. Contact your local Extension center for information about safe use of a generator.

### Community Water Systems

If you are on a community water system, this water should be tested regularly by the operator. The EPA requires regular testing of any system that has at least 15 service connections or regularly serves at least 25 individuals. This testing is more extensive than just bacterial testing, and should be conducted at least quarterly. Water quality can vary with weather and other conditions, so test results should show a pattern of meeting EPA standards year-round. The owner or operator should be able to show you documentation of these test results. Water from a system which meets these requirements should be safe to store, with the same treatment as municipal water.

If your community water system owner or operator cannot provide documentation that EPA requirements have been met year-round, this water should be considered the same as water from a private well. Storing bottled water (see private water supplies, above) is probably much less risky than storing water from such a supply.

### Vended Water Supply

Water vending machines are systems where customers fill their own containers with water that has been treated in some way. Vended water is regulated by the Food and Drug Administration (FDA). Since FDA requires that water for vending machines come from an approved public water supply, the assumption is that the water meets EPA drinking water standards. The vending machine normally provides additional treatment to that done by the municipality. However, the machine must be kept clean, and the treatment equipment must be properly maintained, in order for the vended water to be good quality. Additionally, the container used to collect and store the water must be clean, as anything remaining in the container after cleaning could result in bacterial contamination.

**Should I boil the water before storing it?**

Boiling the water before storage is not recommended. It will not prevent all problems that may occur during storage. In addition, boiling may concentrate other contaminants as the water evaporates away.

### **What if I have a water treatment device?**

If you are on a municipal water system, water from a properly installed and maintained treatment system may be stored for emergency use. It should be treated the same as untreated tap water from a municipal supply.

If you are on a private water system, you should still consider purchasing bottled water for storage. Most water treatment systems and purification pitchers are effective for treating some types of contaminants, but may not remove other types of contaminants at all. Most improve water for day-to-day use, but do not remove the contaminants we are concerned about during storage.

An improperly maintained water treatment system may actually make the water quality worse, by adding contaminants back into it instead of removing them.

If a person on a private water supply has a whole-house treatment system that includes a process such as reverse osmosis or distillation, the water could be safe to store if the system was installed correctly, and if the owner has properly maintained the system.

### **How should I treat the water for storage?**

Be sure that the water you are treating is drinking-quality water to begin with. To treat water for storage, use liquid household chlorine bleach that contains 5.25 percent sodium hypochlorite. Do not use bleach with soaps or scents added. Add the bleach according to the table below, using a clean, uncontaminated medicine dropper.

4 drops bleach per quart or liter container of water  
8 drops bleach per 2-quart, 2-liter, or ½ gallon container of water  
16 drops bleach, or 1/4 teaspoon, per gallon or 4-liter container of water

When treating larger quantities of water, use the following table to convert drops to standard measuring units.

8 drops = 1/8 teaspoon  
16 drops = 1/4 teaspoon  
32 drops = ½ teaspoon  
64 drops = 1 teaspoon  
192 drops = 1 Tablespoon

384 drops = 1/8 cup which is equal to 2  
Tablespoons

Stir the water and allow it to stand for 30 minutes. Chlorine should be detectable by odor after the 30 minute waiting period. If the water does not smell like chlorine at that point, repeat the dose and let it stand another 15 minutes. Place caps on containers and attach labels describing the contents and when each was prepared.

Water stored in metal containers should not be treated, prior to storage, with chlorine since the chlorine compound is corrosive to most metals. Therefore, only very pure water should be stored in metal containers.

### **Where should I store the water and for how long?**

Store containers in a cool, dry place away from direct sunlight. Because most plastic beverage containers degrade over time, store them away from heat and light to prevent leakage. Because hydrocarbon vapors can penetrate polyethylene plastics, store water in plastic containers away from gasoline, kerosene, pesticides, or similar substances.

Water weighs over 8 pounds per gallon. Make sure the shelves or area in which you store the water is strong enough to support the weight. For best quality, replace water stored from a public, or vended water supply every six months. For commercially bottled distilled or drinking water, check the label for an expiration date. If none is given, bottled water with the IBWA or NSF seal should have a shelf-life of at least one year. To improve the taste of water stored for a long time, pour it from one clean container to another clean container several times, to put air back into it.

You can also store water for an extended period of time in the freezer. If you lose electricity, the frozen water will help keep foods in the freezer frozen until power is restored. Leave 2 to 3 inches of air space in the top of containers before freezing, to keep the container from breaking as water expands during freezing. Some glass containers may break regardless of the air space provided.

### **How do I keep water in opened containers safe?**

Do not use water that is cloudy, or water that has any odor other than the chlorine you added. Once opened, sanitary measures are important when using the water to keep it safe and to control exposure to bacteria. To reduce the chance of water contamination, do not open more containers than are needed at the time. If electrical power is available, store opened containers in a refrigerator at or below 40 degrees Fahrenheit. If refrigeration is not available and containers are stored at room temperature, be extra careful to avoid introducing bacterial contamination into the bottled water. Use water in opened containers within one or two days.

### **What if I don't have enough stored water, and run out when I need it?**

If supplies run low, never ration drinking water. Drink the amount you need today, and try to find more for tomorrow. You can minimize the amount of water your body needs by reducing your activity level.

### Hidden Water Sources in Your Home:

If a disaster catches you without a big enough stored supply of clean water, you can use the water in your hot-water tank, pipes, and ice cubes. As a last resort, you can use water in the reservoir tank of your toilet (not the bowl).

Do you know the location of your incoming water valve? You'll need to shut it off to stop contaminated water from entering your home if you hear reports of broken water or sewage lines, or a failure at the water treatment plant.

To use the water in your pipes, shut off the incoming water valve. Let air into the plumbing by turning on the faucet in your house at the highest level. A small amount of water will trickle out. Then obtain water from the lowest faucet in the house.

To use the water in your hot-water tank, be sure that plumbing fixtures and the water heater are not submerged by flood. Turn the electricity or gas off, and turn off the water intake valve. Start the water flowing by opening the drain at the bottom of the tank and turning on a hot-water faucet. Do not turn on the gas or electricity when the tank is empty.

Waterbeds hold up to 400 gallons of water, but some water beds contain toxic chemicals that are not fully removed by purifiers. If used as an emergency water resource, drain it yearly and refill it with fresh water containing two (2) ounces (1/4 cup) of bleach per 120 gallons of water. Do not add algicides or other additives (with the exception of chlorine bleach) if this water is to be used as a water reserve. Before use, water should be boiled.

### Other Sources of Water

If you need to find water outside your home, the only sources may contain harmful bacteria. Be sure to purify the water according to the instructions listed below before drinking it.

Some possible sources are: collected rainwater; streams, rivers and other moving bodies of water; ponds and lakes; and natural springs. Avoid water with floating material, an odor or dark color. Use saltwater only if you distill it first. *You should not drink floodwater.*

### Three Ways to Purify Water:

In addition to having a bad odor and taste, contaminated water can contain microorganisms that cause diseases such as dysentery, typhoid and hepatitis. You should purify all water of uncertain purity before using it for drinking, food preparation or hygiene.

There are many ways to purify water. None is perfect. Often the best solution is a combination of methods. Two easy purification methods are outlined below. These measures will kill most

microbes but will not remove other contaminants such as heavy metals, salts and most other chemicals. Before purifying, let any suspended particles settle to the bottom, or strain them through layers of paper towel, coffee filter, or clean cloth.

1. **Boiling** Boiling is the safest method of purifying water. Bring water to a rolling boil for 3-5 minutes, keeping in mind that some water will evaporate. Let the water cool before drinking.

Boiled water will taste better if you put oxygen back into it by pouring the water back and forth between two clean containers. This will also improve the taste of stored water.

2. **Disinfection** You can use household liquid bleach to kill microorganisms. Use only regular household liquid bleach that contains 5.25 percent sodium hypochlorite. Do not use scented bleaches, color-safe bleaches, or bleaches with added cleaners.

Add 16 drops of bleach per gallon of water, stir and let stand for 30 minutes. If the water does not have a slight bleach odor, repeat the dosage and let stand another 15 minutes.

The only agent used to purify water should be household liquid bleach. Iodine, water treatment products sold in camping or surplus stores, and other chemicals that do not contain 5.25 percent sodium hypochlorite as the only active ingredient, are not recommended and should not be used.

While the two methods described above will kill most microbes in water, distillation will remove microbes that resist these methods, and heavy metals, salts and most other chemicals.

3. **Distillation:** Distillation involves boiling water and then collecting the vapor that condenses back to water. The condensed vapor will not include salt and other impurities. To distill, use a clean pot with a lid that has a knob-type handle in the center. Fill the pot halfway with water. Turn the pot's lid upside-down and tie a cup under the handle, so that the cup will hang right-side-up (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.

## **Summary**

Every home should have a supply of water stored for at least three days of emergency use. Store one gallon per person per day, and one quart per small pet. The water should be either municipal or bottled water, because these sources are inspected and tested regularly for many different contaminants. The container used for storing water must be clean, and made for food and water use. Household bleach is the only disinfectant needed in the water for storage. Rotate or use the stored water supply every six months.

With only a small amount of effort and money, your family can be prepared with this most important necessity: a safe, adequate supply of drinking water during any natural disaster or power outage.

<http://www.bae.ncsu.edu/programs/extension/publicat/wqwm/emergwatersuppl.html>