



## Virginia Household Water Quality Program: Emergency Supplies of Water for Drinking and Food Preparation

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During a disaster, such as a flood, hurricane, earthquake, or act of terrorism, regular drinking water supplies may suddenly become unavailable. It is essential to have access to an adequate and safe supply of water for drinking and cooking. In natural or man-made disasters, municipal water supplies are likely to be disrupted and private water supplies (e.g., wells and springs) could be contaminated. Emergencies can also cause a loss of electrical power, leaving well pumps unable to function. It is in your best interest to take steps now to properly store water (and food) supplies in case of an emergency.

### Planning for emergency water supplies

Each person in a household needs an adequate amount of clean water each day for drinking, cooking, and hygiene.

- Store at least one gallon of water per day for each person and pet in the household.
- Plan on drinking at least 2 quarts of water per day (possibly more if pregnant, sick, or for a young child).
- Store a minimum of a three-day supply.

In addition to drinking, potable (safe to drink) water is needed for brushing teeth, cooking, and washing dishes. Keep in mind that dehydrated food is a good choice for emergency stores (to avoid spoilage), but additional potable water is needed to prepare it. Be prepared. Plan ahead so you can drink what you need as you need it and continue to look for other supplies.

### Possible planned water sources

In planning for an emergency water supply, there are usually three possible sources of water:

- With some advance preparation, the water in the household plumbing system can be protected and used.
- Water can be stored in containers or bottled water purchased to be available for immediate use.
- As a last resort, water that may be contaminated with bacteria can be treated and made safe for use.

### Water in the household plumbing

The hot water tank may hold many gallons of potable water for use in an emergency. If there is advance warning of the emergency, assure the freshest water supply by flushing the tank. Follow the manufacturer's directions when flushing the tank. To use water stored in the hot water heater:

- Turn off the gas or electricity to the hot water tank, so there is no risk that the heating unit could come on while the tank is being emptied.
- Close the water shut-off valve located at the top of the tank.
- Open a hot water faucet in the house to allow air into the tank. This will allow water in the tank to drain out once the valve at the bottom of the tank is opened.

- Rinse the drain valve at the bottom of the tank by allowing a small amount of water to run out of it and into a container. This will rinse all inside surfaces of the valve. Dispose of rinse water. Draw water as needed from valve.
- Use caution when drinking if this water is still hot.
- Always refill the tank before turning on the gas or electricity.

Water stored in the plumbing system is safe for a limited time. Most experts agree that this water will stay safe for only a few days. After a longer time, it must be purified before using it for drinking or cooking. Depending on the nature of the emergency, one may need to flush and disinfect the household plumbing system before returning it to normal use.

### Short-term water storage:

- If there is advance warning of an emergency, water can be stored for short-term use in clean, sanitized containers such as pots or pans, with covers or lids. Clean each container with hot water and dish detergent. Rinse containers with a dilute solution of unscented chlorine bleach (1 tablespoon bleach per gallon of water). Fill the clean containers with water. Water stored this way (in containers with loose fitting lids) is usually safe for a few days. Always store water in a cool, dark place. If you can keep the water cold, it will be safe for about a week.
- Bathtubs and sinks can be filled with water for emergency use. However, due to the difficulty in sanitizing tubs and sinks, this water is not recommended for drinking and cooking unless treated first. Water stored in tubs or sinks is typically suitable for bathing/washing and pets. Do not use water from toilet tanks or bowls or swimming pools for drinking or cooking.
- Water can also be stored in the freezer in bottles, and if there is a loss of power, the frozen water will help keep frozen items colder longer.

### Long-term water storage:

- Purchase bottled water: Bottled water is prepared under controlled conditions and is available in sealed containers. If unopened, bottled water is safe to store until the labeled expiration date (usually one or two years). Once a year, check stored bottled water to make sure it has not expired. Store in a cool, dark place such

as a basement, and keep away from gasoline, pesticides, kerosene, or other hazardous materials.

- Use containers prepared at home: Water can be stored in food-grade, BPA free, airtight plastic containers for up to 6-12 months. Clean each container with hot water and dish detergent. Rinse containers with a dilute solution of chlorine bleach (1 tablespoon bleach per gallon of water). Add two drops of chlorine bleach to each gallon and close container tightly without touching and contaminating the inside of the cap or container lip. Store in a cool, dark place such as a basement, away from gasoline, pesticides, kerosene, and other hazardous materials. Before drinking this stored water, pour from one container to another a few times to allow air to mix back into it. This will improve the taste. Containers that do not have a tight seal, that are easily broken, or that have ever held a toxic substance should never be used for long-term storage of emergency water. This includes plastic milk cartons.



Figure 1. Purchase bottled water for long-term storage. ([www.canva.com](http://www.canva.com))

### Water from “natural” sources

In some emergencies, household or stored water may not be available. One may need to get water from other “natural” sources, such as a stream, creek, or melted snow. The primary issue to address when using a natural water source in an emergency is disinfection. Avoid a stagnant water source or one that could possibly be contaminated with sewage. Water from natural sources that appears dirty (a large number of suspended solids)

Table 1. A summary of water disinfection methods is provided.

Water Disinfection Methods		
Method	Description	Instructions
<b>BOILING</b>	Boiling is the preferred way to disinfect "natural" sources of water. It is the most effective way to kill illness-causing pathogens such as protozoa, bacteria, and viruses.	If you have access to a heat source, boiling water vigorously for 1 full minute (3 minutes at elevations above 6500 feet) will make it safe to drink. A full, rolling boil is required. Store any leftover, cooled, boiled water in a safe container in a cool, dark place for continued use.
<b>CHEMICAL DISINFECTION</b>	Disinfection with chlorine requires one to use pure <b>plain</b> chlorine bleach. Household bleach (4-6% sodium hypochlorite) is acceptable, as long as it contains as the only active ingredient but does not contain additives such as soap, detergent, or perfumes.	Using a medicine dropper, add 8 drops of chlorine to each gallon of water. If water is cloudy, always filter out sediment with a clean cloth, coffee filter or paper towels prior to disinfecting. Add 16 drops of chlorine per gallon to cloudy water. Mix the bleach and water thoroughly. Let it stand for 30 minutes. The water should still have a slight chlorine odor. If it does not, add another dose of chlorine and let stand another 15 minutes.
	Disinfection with iodine requires one to use household tincture of iodine (2% USP or United States Pharmacopeia) or tetraglycine hydroperiodide tablets.	Use 20 drops of 2% iodine tincture per gallon for clear water. If the water is cloudy, double the amount of iodine. Let the water stand for 20 to 30 minutes. If the water is cold (below 50 degrees Fahrenheit), wait at least an hour before using. Iodine can cause the water to have an odd taste.  Stores catering to hikers and backpackers, usually carry iodine in tablet or drop form to use for disinfecting water. Follow product directions carefully.  Water treated with iodine should not be given to those under 14 years of age. If you suffer from thyroid, kidney, or liver disease, consult a doctor before using water treated with iodine.
	Disinfection with chlorine dioxide, is most easily accomplished using pre-packaged treatment kits.	Stores catering to hikers and backpackers, usually carry chlorine dioxide treatment kits. Follow product directions carefully
<b>Filtration</b>	Portable filters are available at most outdoor retail stores. Unfiltered water is pumped by hand through the filter medium to remove contaminants. Different filter types and sizes remove different contaminants.	Follow directions included with filter and change filters as directed. It is important to know that filters remove contaminants common in the remote backcountry, not those found near populated, industrialized areas. If using one is using a filter in an area other than the backcountry, filtration should be followed by either chemical disinfection or boiling. A 0.3-micron filter or smaller is recommended to effectively remove bacteria and protozoa. Filtration is not effective for removing viruses.

may need to be pre-filtered to remove sediment prior to disinfection. Pre-filtration can often be accomplished using a coffee filter, or clean paper towels. Once pre-filtered, it is recommended to treat the water in one of two ways:

1. Disinfect water the way a hiker or backpacker might, using filtration or chemical treatment (e.g., iodine, chlorine, or chlorine dioxide). Filtration effectiveness depends on the pore size of the filter being used. Pore size is expressed in microns (millionth of an inch). A 0.3-micron filter or smaller is recommended to effectively remove bacteria and protozoa (*Cryptosporidium* and *Giardia lamblia*) often found in surface water. Filtration is not effective for removing viruses. Both iodine and chlorine treatment can effectively treat water for bacteria and viruses, but they are not effective for treating *Cryptosporidium* and *Giardia*. Chlorine dioxide treatment is effective for bacteria, viruses and *Giardia*, but is less effective for removing *Cryptosporidium*. A combination of filtration (less than or equal to 0.3 microns) and chemical disinfection with chlorine dioxide is highly effective for bacteria, viruses, and *Cryptosporidium* and *Giardia*. Having a way to purify water is good addition to any home emergency kit.
2. Disinfect by boiling. Bring the water to a rolling boil for at least one full minute (3 minutes at altitudes above 6,500ft) prior to drinking, cooking, or cleaning with it. Boiling effectively kills bacteria, viruses, and *Cryptosporidium* and *Giardia*.

## Summary

During a disaster, such as a flood, hurricane, earthquake, or act of terrorism, regular drinking water supplies may suddenly become unavailable. It is essential to have access to an adequate and safe supply of water for drinking, cooking and other household uses. Store at least one gallon of water per day for each person and pet in the household. Store a minimum of a three-day supply. Unless you are certain the available water supply is safe to consume, treat the water before drinking it or using it to prepare food. It is in your best interest to take steps now to properly store water (and food) supplies in case of an emergency.

## Additional Information

For more information, visit:

Virginia Cooperative Extension

Centers for Disease Control: When the Power Goes Out: Natural Disasters and Severe Weather: <https://www.cdc.gov/disasters/poweroutage/index.html>

Federal Emergency Management Agency/Red Cross: <https://www.fema.gov/pdf/library/f&web.pdf>

Virginia Department of Health website: <https://www.vdh.virginia.gov>

Virginia Household Water Quality Program website: <http://www.wellwater.bse.vt.edu/resources.php>

Virginia Cooperative Extension website: <http://www.pubs.ext.vt.edu/category/home-water-quality.html>

## Acknowledgements

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