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G1536

Drinking Water: Storing an Emergency Supply

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Taking a little time now to store an emergency water supply can prepare for all types of disasters. If your water supply is disrupted, you will be able to provide for your entire family and possibly others. Effective methods of preparing water for storage include disinfection with chlorine and storing at room temperature, disinfection with chlorine and freezing, or canning.

Why have an emergency water supply?

Many people take clean, safe and readily available drinking water for granted. However, there are many situations when a water supply may be temporarily interrupted due to natural or human causes. Such interruptions may last a few hours up to several days or weeks. Because water is the most important nutrient for the human body, availability of adequate drinking water is critical. In these situations, an emergency stored water supply can be desirable. One option is to purchase bottled drinking or distilled water at the time of need or for storage and future use. Refer to NebGuide G1448 *Drinking Water: Bottled or Tap* for additional information on bottled water. Another option is to follow the directions for either method in this publication to safely prepare and store water from your daily drinking and cooking supply. For information on treatment of alternative water sources in emergency situations, refer to NebGuide G1494 *Drinking Water Treatment: Emergency Procedures.*

How much water should I store?

In an emergency, an ample water supply is a priority. Needs will differ, depending on age, physical condition, activity, diet and climate, but most people need to drink at least two quarts (8 cups) of water each day. Hot weather can increase the amount needed. Children, nursing women and ill people also will need more. In addition to drinking water, supplies for food preparation and hygiene are needed. In general, store at least one gallon of water per person per day. The U.S. Department of Homeland Security's Emergencies and Disasters Web site recommends storing at least a three-day supply. The Federal Emergency Management Agency and American Red Cross publication "Food and Water in an Emergency" recommends storing at least a two-week supply of water for each member of your family. Never ration drinking water, even when supplies run low. Drink the amount you need today and try to find more for tomorrow. You can, however, minimize the amount of water your body needs by reducing activity and staying cool.

What water should I use?

In most cases, your current supply of drinking and cooking water should be suitable for storage. The water should be bacteria and pathogen free. However, the heat treatment described in the "canning water" section should inactivate most pathogens (disease-causing organisms) in the event the water is not potable.

A public water supply is defined as one that provides piped water for human consumption to at least 15 service connections or regularly serves at least 25 individuals. Water from a public water supply is regulated by the Environmental Protection Agency (EPA) and Nebraska Health and Human Services System (HHSS). EPA and HHSS require all public water suppliers to regularly test for bacteria and other contaminants and deliver water that meets EPA drinking water standards. While you can expect water from a public water supply to be potable, inadequate cleaning of the container used to collect and store the water or other actions could inadvertently result in bacterial contamination. Follow instructions later in this guide for preparation of containers.

Private water supplies are not subject to any regulation. Therefore, contamination is more likely to go undetected in a private water supply. Testing is the only way to determine if water from a private water supply is potable. Knowledge of what contaminants may be present in a private water supply should guide the testing, because it is not economically feasible to test for all possible contaminants. It is generally recommended that private water supplies be tested for bacteria and nitrate at least once a year. Refer to NebGuide G907 *Testing*

for Drinking Water Quality for testing information. Again, inadequate cleaning and disinfection of the container used to collect and store the water or other actions could result in bacterial contamination of the emergency water supply.

Water vending machines are systems plumbed into the public water supply where customers fill their own containers with treated water. Vended water is regulated by the Food and Drug Administration (FDA). Since FDA requires 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 treatment above that done by the municipality. Inadequate cleaning and disinfection of the water vending machine or the container used to collect and store the water could result in bacterial contamination.

Since bacteria can be inadvertently introduced into the water during the collection and storage process, water collected for storage must be treated to inactivate pathogens. Two very different approaches to treating water for storage will be discussed below; one using chemical treatment and one using heat. Either method will result in safely stored water if directions are followed carefully.

Storage Method 1: Chlorination followed by shelf storage or freezing

What containers should I use?

Many types of containers are available for water storage including those made of glass and plastic. Glass provides an effective container for water storage but is easily broken and heavier than plastic. Containers manufactured and advertised for food storage will be safe. There are many types of plastic containers manufactured; some are not recommended for water storage because harmful chemicals could leach into the water. Plastic containers which have been manufactured and used for food or beverage storage or which are being advertised as food quality containers will be safe. Plastic jugs with tight fitting, secure lids which have contained juice, punch, or other edible substances are safe for emergency water storage. However, these containers can degrade over time and should not be used repeatedly for every day water supply needs. In addition, avoid using plastic milk containers if possible, as fat traces may remain; if used, wash thoroughly giving special attention to hard-to-reach areas such as handles. New containers can be purchased in most housewares and sporting goods departments, as well as at some water vending locations. New containers should be labeled for storage of food or beverages. Some containers deemed safe for water storage may affect the taste of stored water.

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.

How should I treat the water for storage?

While the water being stored should be free of disease causing organisms, bacteria can be inadvertently introduced into the water during the collection and storage process. Therefore, treating the water with chlorine (a disinfectant) is recommended to inactivate organisms that might be present in the storage containers, or that might be introduced as the water is collected.

Some, but not all, public water supplies are disinfected with chlorine or chloramines. These water supplies may contain enough residual disinfectant to deactivate pathogens that might be introduced during the water storage process, making additional treatment prior to storage unnecessary. For water supplies that are not disinfected with chlorine or chloramines, or for an additional safety margin, follow the directions below.

To treat unchlorinated or unchloraminated potable water for storage, use liquid household chlorine bleach that contains 5 to 6 percent sodium hypochlorite. Chemical treatment provided by the bleach will inactivate pathogens that may be introduced through unsterile containers or when filling the containers. Standard household bleaches are 5.25% soldium hypochlorite; those labeled "Ultra" are generally 6% sodium hypochlorite. Bleaches with labels such as "Fresh Wildflowers," "Rain Clean," "Advantage," or labeled as scented may contain fragrances, soaps, surfactants, or other additives and should not be used for drinking water disinfection. Use the freshest container of liquid chlorine bleach available, preferably not more than three months old. Add the bleach according to the following recommended doses, using a clean, uncontaminated medicine dropper.

Four drops bleach per quart or liter container of water.
Eight drops bleach per two-quart, two-liter or half gallon container of water.
Sixteen drops bleach per gallon or four-liter container of water.

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

15 drops = 1/4 teaspoon
30 drops = 1/2 teaspoon
60 drops = 1 teaspoon
180 drops = 1 Tablespoon
360 drops = 1/8 cup which is equal to 2 Tablespoons

(Conversion from Glover, Thomas. *Pocket Ref*, Sequoia Publishing, Inc. Littleton, Colorado, 1999.)

Stir the water, cover, and allow it to stand for 30 minutes. You should be able to smell chlorine after the 30-minute waiting period. If you cannot, add another dose and let the water stand covered another 15 minutes. Cap containers and label each, describing the contents and preparation date.

Where should I store the water and for how long?

Water treated as above can be stored in one of two ways, shelf storage at room temperature, or frozen.

For shelf-storage of water, 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. Store water in plastic containers

away from gasoline, kerosene, pesticides or similar substances because vapors from these products can penetrate plastic. Glass is non-permeable to vapors and gases. Remember, water weighs over 8 pounds per gallon, so make sure the shelf or storage area is strong enough to support the weight. For best quality, use or replace shelf-stored water every six months.

Water prepared in this manner can also be stored in a freezer. If you lose electricity, the frozen water provides the added benefit of keeping foods frozen until power is restored. Leave 2 to 3 inches of air space in the top of containers before freezing to prevent the container from bursting as water expands during freezing. Some thin-walled containers may break regardless of the air space provided. Avoid freezing water stored in glass containers.

Storage Method 2: Canning followed by shelf storage

What containers should I use?

You can store water in food-grade glass fruit jars with flat metal lids and metal screw bands. Jars should be manufactured and rated for canning of food.

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.

How should I treat the water for storage?

Fill clean quart fruit jars with water, leaving 1 inch of head space (air space) at the top of each jar. Place a flat metal lid and a metal screw band on each jar.

Fill a canner half full with water. Preheat the water to 140 degrees F. Place the filled jars into the canner rack and use the handles to lower the rack into the water — or fill the canner one jar at a time with a jar lifter. Add more boiling water, if needed, so the water level is at least 1 inch above the jar tops. Bring the water to a vigorous boil. Cover the canner with a lid and lower the heat to maintain a gentle boil. Boil for 20 minutes adding more boiling water, if needed, to keep water level above the jars. When jars have been boiled for 20 minutes, turn off the heat and remove the canner lid. Using a jar lifter, remove the jars and place them on a towel, leaving at least a 1-inch space between jars during cooling. Do not retighten lids.

As jars cool, the contents contract, pulling the self-sealing lid firmly against the jar to form a high vacuum seal. Cool the jars at room temperature for 12 to 24 hours. Check for sealed lids by pressing the middle of the lid with a finger or thumb. If the lid springs up when you release your finger, the lid is not sealed. Screw bands can be removed after jars are cooled.

NebGuide G1494 *Drinking Water Treatment: Emergency Procedures* provides instructions to bring water to a vigorous boil for disinfection purposes. The process of bringing water to a boil disinfects the water, inactivating harmful bacteria and making it bacteriologically safe for consumption in the short term. The process of boiling water for 20 minutes sterilizes the water. Sterilization kills all organisms ensuring no regrowth can occur and making water bacteriologically safe for long term storage.

Where should I store the water and for how long?

Store containers in a cool, dry place away from direct sunlight. Canned water can be stored for an indefinite period of time.

Steps to take when using your emergency water supply

For best quality, stored water should be used within six months. However, water can be safely stored for longer periods of time as noted above. To improve the taste of water stored for a long time, pour it back and forth between two clean containers several times to aerate it.

Regardless of how water was treated and stored, measures should be taken to control exposure to bacteria once containers are opened. To reduce the chance of water contamination, open only the containers you will use immediately. If electricity is available, store opened containers in a refrigerator at or below 40 degrees Fahrenheit. Avoid introducing bacterial contamination into the stored water:

- don't put dippers or spoons into containers
- don't drink directly out of a container
- keep container openings and lids clean

Use water in opened containers within one or two days.

Summary

There are numerous situations in which a water supply may be temporarily interrupted due to natural or human causes. In these situations, an emergency water supply can be desirable. In general, store at least one gallon of water per person per day of expected need. In most cases, your drinking and cooking water should be suitable for storage. Water can be stored at room temperature or frozen after disinfection with chlorine; or water can be stored at room temperature after canning. Either method requires following the methods described above.

Related Drinking Water Treatment Publications

NebGuides may also be obtained online at: http://www.ianr.unl.edu/pubs/water/

EC703	Drinking Water Treatment: An Overview
G1488	Drinking Water Treatment: What You Need To Know When Selecting Water Treatment Equipment
G1489	Drinking Water Treatment: Activated Carbon Filtration
G1490	Drinking Water Treatment: Reverse Osmosis
G1491	Drinking Water Treatment: Water Softening (Ion Exchange)
G1492	Drinking Water Treatment: Sediment Filtration
G1493	Drinking Water Treatment: Distillation
G1494	Drinking Water Treatment: Emergency Procedures

G1496 Drinking Water Treatment: Continuous Chlorination
G1255 Shock Chlorination of Domestic Water Supplies

Related Drinking Water Contaminant Publications

G907 Testing for Drinking Water Quality
G989 Drinking Water: Bacteria
G1274 Drinking Water: Hard Water
G1275 Drinking Water: Sulfates and Hydrogen Sulfide
G1279 Drinking Water: Nitrate-Nitrogen
G1280 Drinking Water: Iron and Manganese
G1282 Drinking Water: Man-made Chemicals
G1333 Drinking Water: Lead
G1360 Drinking Water: Copper
G1376 Drinking Water: Fluoride
G1369 Drinking Water: Nitrate and Methemoglobinemia
G1448 Drinking Water: Bottled or Tap?
NF505 Drinking Water: Chloramines Water Disinfection in Omaha Metropolitan Utilities District

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Index: Foods & Nutrition
Storage
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