ALABAMA COOPERATIVE Extension SYSTEM

TIMELY INFORMATION

Agriculture & Natural Resources

AGRONOMY AND SOILS, AUBURN UNIVERSITY, AL 36849-5633

WQ-02-99 **February, 1999**

DISINFECTING DRINKING WATER FOR EMERGENCY USE OR STORAGE

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Humans are very superstitious creatures, and throughout recorded history these superstitions have heightened every time we go into another century, and especially when we go into another millennium.

Even today, many people are very apprehensive as we approach the year 2000. They are fearful that all sorts of bad things are going to happen. The concern for computers not being able to recognize the year 2000 is very real, and a number of people fear that even their drinking water will no longer be suitable due to some computer glitch at the drinking water utility. Many citizens are asking questions on how to store water for emergency uses. That is why we prepared this article.

There are many computer controlled processes in the modern drinking water industry today. However, the American Water Works Association has been working closely with both wastewater and drinking water industries to make sure their computers are year 2000 (Y2K) literate. The most likely problem to occur in reference to your drinking water is an error on your bill due to a computer's inability to recognize the year 2000.

This Y2K issue brings back memories of the days right after the former Soviet Union launched Sputnik in 1957. Almost immediately afterward, public bomb shelters were either built or appropriate bomb shelter areas were established in many schools, public buildings and private factories or other places of work. Many citizens also built their own private bomb shelters and stocked them with emergency food and water supplies.

In reality, people have been storing water for emergency uses for thousands of years, and there is nothing wrong with this. Civil Defense organizations began providing information on the long-term storage of food and water during World War II, and on throughout the cold war era that ended with the economic collapse of the former Soviet Union. Most of this information is still applicable today.

One primary difference is that most water was stored in metal containers during the 1940's, and even into the 1970's. That is no longer the case. We now have a number of plastics that are better. These plastics do not corrode as the metals did, but most will degrade faster than metal in open sunlight. Therefore, the old Civil Defense recommendation of storing in a cool, dry environment away from sunlight still applies.

One of the simplest ways to store water for emergency use today is to buy it already purified and sealed in your choice of a variety of plastic containers. Look for either an NSF International or Water Quality Association seal on the label for certification that the water is equal in quality to national drinking water standards.

Large plastic containers are available for emergency storage today. When you fill your own containers for emergency use, the primary concern is disinfection, regardless of whether the container is wood, metal, plastic, glass or concrete.

DISINFECTION OF STORED WATER

There are two times when you would normally disinfect water for storage: during emergency situations or when preparing for future emergency situations. For example, when you expect some future problem, you might simply wish to store a supply of water for times of emergency from either a tap which is provided by a public utility or you might wish to store water from a private water supply such as a well. Or, you might need to store water for emergency uses just after or during severe weather or other conditions which have destroyed or contaminated your normal water supply. In the latter case, you may be able to obtain limited amounts of water by draining your hot water tank or melting ice cubes. In most cases, well water is the preferred source of emergency drinking water. If it is not available and river or lake water must be used, avoid sources containing floating material and water with a dark color or an odor.

When you store water for a long-term basis, even that from a public utility, it is still a safe bet to disinfect it so no organisms grow in the container during storage. Chemical concentrations will not change over time in storage, but microbial organisms can change and affect both the taste and purity of stored water.

There are two methods by which small quantities of water can be effectively disinfected for short or long-term storage. One method is boiling. It is the most positive

method by which water can be made bacterially safe to drink. Another method is chemical treatment. If applied with care, certain chemicals will make most water free from harmful or pathogenic organisms. Make sure you wash out storage containers with boiling water if you do not intend to use a chemical disinfectant.

When emergency disinfection is necessary, examine the physical condition of the water and container. Disinfectants are less effective in cloudy water. Filter murky or colored water through clean cloth or allow it to settle, and draw off the clean water for disinfection. Water prepared for disinfection should be stored in clean, tightly covered, containers which are not subject to corrosion.

METHODS OF EMERGENCY DISINFECTION

Boiling

Vigorous boiling for just one minute will kill any disease-causing microorganisms present in water. The flat taste of boiled water can be improved by pouring it back and forth from one container to another (called aeration), by allowing it to stand for a few hours, or by adding a small pinch of salt for each quart of water boiled (salt really improves the taste of distilled water where all the dissolved solids were removed during distillation). Use caution not to re-contaminate the water during cooling.

Chemical treatment

When boiling is not practical, chemical disinfection should be used. The two chemicals commonly used are chlorine and iodine.

Chlorine Methods: Chlorine is a very effective means of disinfecting water, however it may not be effective for killing the ocysts and oocysts forms of Giardia and Cryptosporidium, respectively, for short-term storage. And, it is not known exactly how long it takes a certain chlorine concentration to kill these cysts forms in long-term storage, but chlorine is much more effective than iodine.

1) Chlorine Bleach: Common household bleach contains a chlorine compound (sodium hypochlorite) that will disinfect water. The procedure to be followed may be written on the label of the bleach. When the necessary procedure is not given, find the percentage of available chlorine on the label and use the information in the following table as a guide.

Available Chlorine	Drops Added to Clean Water Per Quart	Per Gallon
1%	10	40
4-6%	2	8
7-10%	1	4

(If strength is unknown, add ten drops per quart of water. Double amount for cloudy or colored water. One teaspoon is equal to about 20 drops.)

The treated water should be mixed thoroughly and allowed to stand for 30 minutes. The water should have a slight chlorine odor; if not, repeat the dosage and allow the water to stand for an additional 15 minutes. If the treated water has too strong a chlorine taste, it can be made more pleasing by allowing the water to stand exposed to the air for a few hours or by pouring it from one clean container to another several times.

2) Granular Calcium Hypochlorite: This is the most common chemical used to treat water in swimming pools. Add and dissolve one heaping teaspoon of high-test granular calcium hypochlorite (approximately 1/4 ounce) for each two gallons of water. The mixture will produce a stock chlorine solution of approximately 500 mg/L, since the calcium hypochlorite has an available chlorine content equal to about 50 percent of its weight. To disinfect water, add the

stock chlorine solution in the ratio of one part of chlorine solution to each 100 parts of water to be treated. This is roughly equal to adding 1 pint (16 oz.) of stock chlorine solution to each 12.5 gallons of water to be disinfected. To remove any objectionable chlorine odor, aerate the water as described above.

3) Chlorine Tablets: Chlorine tablets containing the necessary dosage for drinking water disinfection can be purchased in a commercially prepared form. These tablets are available from many drug and sporting goods stores and should be used as stated in the instructions. When instructions are not available, use one tablet for each quart of water to be purified.

Iodine Methods: Iodine has been used to disinfect water since the early 1900's, but it is not effective in guarding against exposure to Giardia or Cryptosporidium. Nor is iodine an effective algicide. Therefore, iodine should be limited to short-term disinfection of well water (as opposed to surface water sources such as rivers, lakes, and springs), because well water is unlikely to contain these disease-causing organisms or algae.

1) Tincture of Iodine: Common household iodine from the medicine chest or first aid kit may be used to disinfect water. Add five drops of 2 percent United States Pharmacopeia (U.S.P.) tincture of iodine to each quart of clear water. For cloudy water add ten drops and let the solution stand for at least 30 minutes.

2) Iodine Tablets: Commercially prepared iodine tablets containing the necessary dosage for drinking water disinfection can be purchased at drug and sporting goods stores. These were developed for emergency military use during World War II and are popular with campers. They should be used as stated. When instructions are not available, use one tablet for each quart of water to be purified. If the water is cloudy add two tablets.

WATER TO BE USED FOR DRINKING, COOKING, MAKING ANY PREPARED DRINK OR FOOD, OR BRUSHING THE TEETH SHOULD BE PROPERLY DISINFECTED.

REFERENCES:

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