



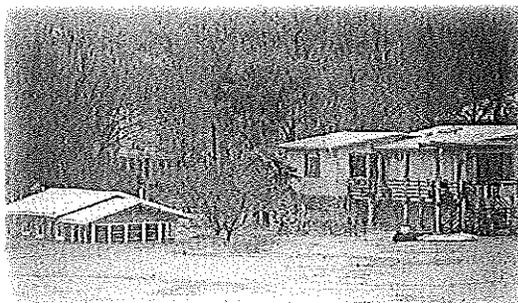
# FOOD FACTS

From the U.S. Food and Drug Administration

## Food and Water Safety During Hurricanes, Power Outages, and Floods

### What Consumers Need to Know

Emergencies can happen. When they do, the best strategy is to already have a plan in place. This includes knowing the proper food and water safety precautions to take if hurricanes — or other flooding/power outages — do occur.



### Be Prepared for Emergencies

1. Make sure you have appliance thermometers in your refrigerator and freezer.
  - Check to ensure that the freezer temperature is at or below 0 °F, and the refrigerator is at or below 40 °F.
  - In case of a power outage, the appliance thermometers will indicate the temperatures in the refrigerator and freezer to help you determine if the food is safe.
2. Freeze containers of water for ice to help keep food cold in the freezer, refrigerator, or coolers in case the power goes out. If your normal water supply is contaminated or unavailable, the melting ice will also supply drinking water.
3. Freeze refrigerated items such as leftovers, milk, and fresh meat and poultry that you may not need immediately. This helps keep them at a safe temperature longer.
4. Group food together in the freezer. This helps the food stay cold longer.
5. Have coolers on hand to keep refrigerated food cold if the power will be out for more than 4 hours.
6. Purchase or make ice cubes in advance and store in the freezer for use in the refrigerator or in a cooler. Freeze gel packs ahead of time for use in coolers.
7. Check out local sources to know where dry ice and block ice can be purchased, just in case.
8. Store food on shelves that will be safely out of the way of contaminated water in case of flooding.
9. Make sure to have a supply of bottled water stored where it will be as safe as possible from flooding.



### Power Outages: During and After

#### When the Power Goes Out . . .

Here are basic tips for keeping food safe:

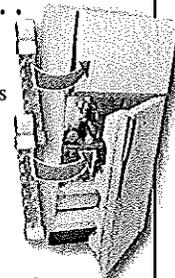
- Keep the refrigerator and freezer doors closed as much as possible to maintain the cold temperature.
  - The refrigerator will keep food cold for about 4 hours if it is unopened.
  - A full freezer will keep the temperature for approximately 48 hours (24 hours if it is half full) if the door remains closed.
  - Buy dry or block ice to keep the refrigerator as cold as possible if the power is going to be out for a prolonged period of time. Fifty pounds of dry ice should hold an 18 cubic foot, fully-stocked freezer cold for two days.
- If you plan to eat refrigerated or frozen meat, poultry, fish or eggs while it is still at safe temperatures, it's important that each item is thoroughly cooked to its proper temperature to assure that any foodborne bacteria that may be present are destroyed. However, if at any point the food was above 40 °F for 2 hours or more — discard it.
- Wash fruits and vegetables with water from a safe source before eating.
- For infants, try to use prepared, canned baby formula that requires no added water. When using concentrated or powdered formulas, prepare with bottled water if the local water source is potentially contaminated.



#### Once Power Is Restored . . .

You'll need to determine the safety of your food. Here's how:

- If an appliance thermometer was kept in the freezer, check the temperature when the power comes back on. If the freezer thermometer reads 40 °F or below, the food is safe and may be refrozen.
- If a thermometer has not been kept in the freezer, check each package of food to determine its safety. You can't rely on appearance or odor. If the food still contains ice crystals or is 40 °F or below, it is safe to refreeze or cook.
- Refrigerated food should be safe as long as the power was out for no more than 4 hours and the refrigerator door was kept shut. Discard any perishable food (such as meat, poultry, fish, eggs or leftovers) that has been above 40 °F for two hours or more.



Keep in mind that perishable food such as meat, poultry, seafood, milk, and eggs that are not kept adequately refrigerated or frozen may cause illness if consumed, even when they are thoroughly cooked.

**When Flooding Occurs — Keep Water Safe**

Follow these steps to keep your WATER SAFE during — and after — flood conditions.

1. Use bottled water that has not been exposed to flood waters if it is available.
2. If you don't have bottled water, you should boil water to make it safe. Boiling water will kill most types of disease-causing organisms that may be present.
  - If the water is cloudy, filter it through clean cloths, or allow it to settle and then draw off the clear water for boiling.
  - Boil the water for one minute, let it cool, and store it in clean containers with covers.
3. If you can't boil water, you can disinfect it using household bleach. Bleach will kill some, but not all, types of disease-causing organisms that may be in the water.
4. If you have a well that has been flooded, the water should be tested and disinfected after flood waters recede. If you suspect that your well may be contaminated, contact your local or state health department or agricultural extension agent for specific advice.



**When Flooding Occurs — Keep Food Safe**

Follow these steps to keep your FOOD SAFE during — and after — flood conditions.

1. Do not eat any food that may have come into contact with flood water.
2. Discard any food that is not in a waterproof container if there is any chance that it has come into contact with flood water.
  - Food containers that are not waterproof include those with screw-caps, snap lids, pull tops, and crimped caps.
  - Also discard cardboard juice/milk/baby formula boxes and home canned foods if they have come in contact with flood water, because they cannot be effectively cleaned and sanitized.
3. Inspect canned foods and discard any food in damaged cans. Can damage is shown by swelling, leakage, punctures, holes, fractures, extensive deep rusting, or crushing/denting severe enough to prevent normal stacking or opening with a manual, wheel-type can opener.
4. Undamaged, commercially prepared foods in all-metal cans and "retort pouches" (like flexible, shelf-stable juice or seafood pouches) can be saved if you follow this procedure:
  - Remove the labels, if they are the removable kind, since they can harbor dirt and bacteria.
  - Brush or wipe away any dirt or silt.
  - Thoroughly wash the cans or retort pouches with soap and water, using hot water if it is available. Rinse the cans or retort pouches with water that is safe for drinking, if available, since dirt or residual soap will reduce the effectiveness of chlorine sanitation.
5. Thoroughly wash metal pans, ceramic dishes, and utensils (including can openers) with soap and water, using hot water if available. Rinse, and then sanitize them by boiling in clean water or immersing them for 15 minutes in a solution of 1 tablespoon of unscented, liquid chlorine bleach per gallon of drinking water (or the cleanest, clearest water available).
6. Thoroughly wash countertops with soap and water, using hot water if available. Rinse, and then sanitize by applying a solution of 1 tablespoon of unscented, liquid chlorine bleach per gallon of drinking water (or the cleanest, clearest water available). Allow to air dry.



Everyone can practice safe food handling by following these four simple steps:





Central Office: 505 Silas Deane Highway, Wethersfield, CT 06109 Phone (860) 721-2822 Fax (860) 721-2823  
 Berlin: 240 Kensington Road, Berlin, CT 06037 Phone (860) 828-7017 Fax (860) 828-9248  
 Newington: 131 Cedar Street, Newington, CT 06111 Phone (860) 665-8586 Fax (860) 665-8533  
 Rocky Hill: 761 Old Main Street, Rocky Hill, CT 06067 Phone (860) 258-2770 Fax (860) 258-2767  
[www.ccthd.org](http://www.ccthd.org)

## Guidelines for Food Safety During Temporary Power Outages

Appropriate decision-making before, during, and immediately after power outages is necessary to protect consumers from unsafe food and minimize product loss. The food items of concern are those that are considered as potentially hazardous foods (PHF) such as meat, fish, poultry and several others. Generally, PHF's are moist, perishable foods in and on which bacteria can grow most easily during the time when the food is held in the temperature danger zone of 46°F to 139°F.

### WHEN THERE IS A POWER OUTAGE...

- Note the time at which the power outage begins.
- Discard food products that are in the process of being cooked, but which have not yet reached the final temperature.

### ACTIONS THAT CAN KEEP FOOD SAFE FOR SEVERAL HOURS

Cold Potentially Hazardous Foods	Hot Potentially Hazardous Foods
<ul style="list-style-type: none"> <li>• Keep refrigerator and freezer doors closed as much as possible</li> </ul>	<ul style="list-style-type: none"> <li>• Do not place hot foods in refrigerators or freezers</li> </ul>
<ul style="list-style-type: none"> <li>• If practical, group packages of cold food together to reduce heat gain</li> </ul>	<ul style="list-style-type: none"> <li>• Use "canned heat" under foods on electric steam tables to help maintain PHF at 140°F</li> </ul>
<ul style="list-style-type: none"> <li>• Cover open refrigerated and frozen food cases, especially vertical displays</li> </ul>	<ul style="list-style-type: none"> <li>• Use ice and/or ice baths to rapidly cool small batches of hot food</li> </ul>
<ul style="list-style-type: none"> <li>• <i>Caution: The use of dry ice may result in unsafe build-up of CO<sub>2</sub> (Carbon Dioxide).</i></li> </ul>	

DISCONTINUE FOOD PREPARATION IF ANY OF THE FOLLOWING CONDITIONS EXIST

- Inability to properly wash, rinse and sanitize utensils
- Inoperative hood ventilation and make-up air supply systems in conjunction with gas or solid fuel heating and cooking equipment (*Danger: Toxic fumes may cause injury or death*)
- Lack of sufficient light in food preparation areas to allow for safe food preparation and cleaning and sanitizing of food contact surfaces.
- No hot water, inadequate water pressure
- Unsafe food temperatures

**WHEN THE POWER IS RESTORED**

- Identify PHF that may have been in the temperature danger zone
- Check the internal food temperature
- If practical, separate packages of food in refrigeration units and freezers to allow for faster re-cooling

REFRIGERATED PHF

Use the table below for handling PHF stored in refrigeration units:

Duration of Power Outage (hours)	Food Temperature		
	45 F or below	46 F to 50 F	50 F or above
0-2	PHF can be sold	Immediately cool PHF To 45 F or below within 2 hours	<i>PHF cannot be sold</i>
2-3	PHF can be sold	Immediately cool PHF to 45 F or below within 1 hour	<i>PHF cannot be sold</i>
4+	PHF can be sold	<i>PHF cannot be sold</i>	<i>PHF cannot be sold</i>

### PHF IN HOT HOLDING UNITS

Use the table below for handling PHF that is in hot holding units and is below 140°F at the time the power is restored:

Duration of Power Outage	Food below 140 F in Hot Holding Units When Power is Restored
2 hours or less	1. May be sold if reheated to 165° F and then held at 140° F or above; or 2. May be sold if rapidly cooled to 45 ° F or below within 2 hours following restoration of power.
More than 2 hours	<b><i>PHF cannot be sold</i></b>

### REOPENING

If you voluntarily closed your facility, the following conditions should be verified prior to resuming food preparation and/or sale of potentially hazardous foods:

1. All unsafe potentially hazardous food has been discarded
2. Electricity and gas services have been restored
3. All circuit breakers have been properly reset as needed
4. All equipment and facilities are operating properly, including:
  - Lighting
  - Refrigeration
  - Hot holding
  - Ventilation
  - Toilet facilities
5. Hot and cold potable water, under pressure for:
  - Hand washing
  - Proper dishwashing

If your facility was closed by the Central CT Health District, it must remain closed until you obtain official approval to reopen.

## DISPOSAL OF FOOD

- **PHF that has been subjected to temperature abuse prior to the power outage might not be safe to eat even if the procedures in the tables on the previous page are followed. WHEN IN DOUBT, THROW IT OUT!**
- If it is determined that food must be discarded, document the type and amount of food and the reason for disposal for insurance and regulatory purposes.
- Small volumes of food to be discarded can be denatured with a cleaning product (such as bleach) and placed in the outside refuse bin.
- To discard large volumes of food, contact your refuse disposal company or your local landfill operator for disposal instructions.
- If there are any questions regarding the safety of specific foods, contact the Central CT Health District.



# FACT SHEET

Connecticut Department of Public Health  
 Environmental Health Section  
 410 Capitol Avenue, MS # 51EHS, PO Box 340308  
 Hartford, CT 06134-0308  
 Telephone: (860) 509-7293 Fax: (860) 509-7295  
<http://www.ct.gov/dph/>

November 2008

## Sewage Back-Ups: Information for Residents

### Background:

Severe rainstorms, floods, and even spring thaws can put a strain on sanitary sewers and septic systems. Large volumes of storm water and ground water entering sewage systems can inundate them, causing back-ups into basements and on to private property. Blockages in sewer systems can also cause back-ups. Your health may be impacted if a sewage back-up occurs in your home. Sewage back-ups can contaminate your private drinking well water. It can also pollute surface water (lakes, ponds, rivers, and streams, and reservoirs used for drinking water).

### Can I Get Sick From A Sewage Back-Up In My House?

Sewage contains bacteria, viruses, and other germs that can cause disease and make a contaminated house unfit for living. The health risks around sewage are dependant upon the amount of sewage, the types of germs that are in it, the amount of time it has been in contact with materials in the home, and how much and how long an occupant was exposed. Generally, the more solids (human waste) present in the water, the greater the need for prompt and proper clean-up of materials that came into direct contact with it. The most common illnesses one might acquire are generally gastrointestinal (GI) distress and/or skin rashes/infections. Respiratory infections are uncommon, because fecal microorganisms rarely become airborne when everything is wet, and these bacteria and viruses generally die off after things dry out. If you experience any GI symptoms (nausea, diarrhea, vomiting) after exposure to sewage, contact your doctor.



### Potential Health Effects from Contact With Raw Sewage

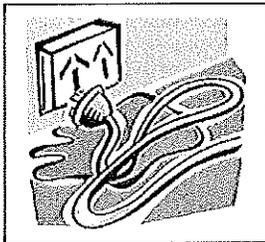
Disease	Cause
Gastrointestinal illnesses	Accidental ingestion via improperly cleaned hands or food preparation surfaces
Skin infections and rashes	Handling contaminated materials

## **WHAT TO DO AFTER A SEWAGE BACK-UP**

### **First Things First! Do These Things Right Away.**

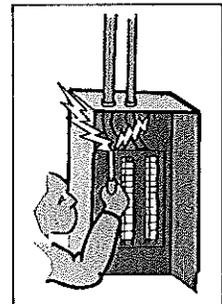
- ◆ If you have a back-up, do not flush the toilets.
- ◆ Keep all children and pets away from the sewage.
- ◆ Wear rubber gloves when handling anything contaminated with sewage. Wash hands immediately afterwards. Never touch raw sewage with bare hands.
- ◆ If your home is served by a municipal sewer system, call your local sewer dept (town public works dept or water pollution control authority) or go to their website. See the reference section of this document.
- ◆ If your home has a septic system, call your local health department for advice about how to dispose of the water/sewage. Then proceed to the next step.
- ◆ Call your homeowner's insurance provider. They may have clean-up companies\* on contract who know how to deal with property damage from sewage back-ups.
- ◆ Call a professional water damage restoration company\* if your insurance company does not have one.

\* See Hiring A Professional vs. Cleaning Up an Overflow Yourself (below)



### ***BE SAFE! Prevent Electrocution***

Turn off the power if there is standing water or the possibility of electrical wires coming into contact with water or soggy materials.



### **Clean-Up of Building Interiors**

The potential for developing illness increases the longer sewage remains in contact with building interiors. Therefore, it is important to dry out the space promptly and discard contaminated porous materials. Other factors that influence the ability of disease causing germs, or pathogens, to survive include: the types of materials or substrates that have become contaminated; high humidity and mild temperatures; whether disinfectants are used; if sunlight is present. Many germs exposed to sunlight die off at a faster rate than those not exposed.

## Hiring A Professional vs. Cleaning Up a Sewage Back-Up Yourself

Cleaning up after a sewage back-up is not a pleasant job. The decision whether to hire a professional remediation company or do your own clean-up often comes down to time and money. If your homeowner's insurance policy will pay for a professional to do the clean-up, most people will choose that path. If you do not have insurance, or if your policy does not cover sewage back-ups, you may be faced with hiring a professional on your own for the clean-up, or doing your own clean-up. You may also choose to hire a professional to perform an initial assessment to identify the extent of the damage and develop a scope of work for you to follow when performing the clean-up yourself. This scope of work should include replacement criteria for contaminated floor coverings and wallboard.

The State of Connecticut does not certify clean-up companies. However, there is an organization called the *Institute of Inspection Cleaning and Restoration Certification (IICRC)* that provides education and credentials to contractors performing this work. They also publish a standard called *Standard and Reference Guide for Professional Water Damage Restoration (IICRC S500)*. You may wish to ask your contractor to follow these guidelines. The IICRC offers a list of professional clean-up companies organized by zip code and other useful information on their website: <http://www.iicrc.org/>.

Several scenarios would favor hiring a professional instead of doing the work yourself:

- ◆ When insurance will pay for it
- ◆ When ductwork becomes contaminated with sewage in homes with forced hot air and/or central air conditioning
- ◆ When sewage remains indoors for over 24 hours in a finished living space
- ◆ When the job is just too large or complex for you to do it yourself

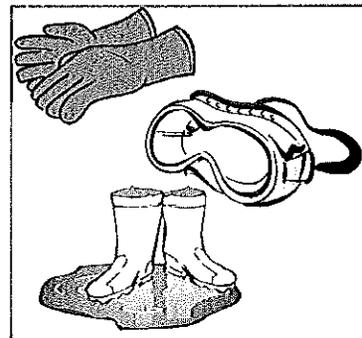
If you decide to hire a contractor, you may wish to contact the Connecticut Department of Consumer Protection (DCP). Ask if the contractor has a complaint history file at DCP. Also, if your home has a septic system, your contractor might need a subsurface sewage disposal system installer's or cleaner's license from DPH, depending upon whether or not the septic system needs to be pumped out or repaired.

## Doing It Yourself

If you plan on doing any of the clean-up yourself, be sure to protect yourself.

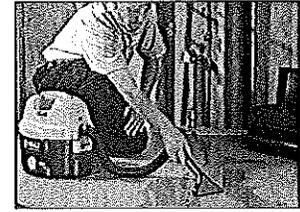
### Always Do The Following:

- ◆ Wear protective eyewear, gloves, and boots
- ◆ Wear goggles when hosing off items to prevent eye splash
- ◆ Avoid direct contact with sewage material
- ◆ Wash your hands after cleaning
- ◆ Protect all cuts and scrapes. Immediately wash and disinfect any wound that comes into contact with sewage
- ◆ *Never mix bleach with ammonia – it makes a deadly gas!*



It's also a good idea to take pictures and make a list of discarded items for insurance purposes.

## Follow These Steps To Clean Up Sewage Indoors



### 1. Dry the space out

- ◆ All standing water needs to be removed. A sump pump, wet vac, or bucket may be used. For municipal sewer systems, call your local water pollution control authority or public works department for advice about pumping out after a back-up.
- ◆ If you have a septic system, call your local health department for advice about possible causes and solutions.
- ◆ Much of the equipment for cleaning and drying out can be rented locally.
- ◆ Establish temperature control to enhance the evaporation rate and effectiveness of ventilation or dehumidification systems in use.
- ◆ All solid waste must be collected and discarded.
- ◆ Use dehumidifiers, fans, window air conditioners and open windows to aid in the drying process when available. Exchange humid air in the area with less humid air from other sources. **Whole house air conditioners or furnace blowers should be used only if standing wastewater did not get into the air ducts.**
- ◆ Remove vinyl covered wallpaper in affected areas, as it slows the drying process.

### 2. Discard and Disinfect

- ◆ Contaminated carpets, rugs, and upholstered furniture should be discarded.\*
- ◆ If you can see a water line or stain on wallboard or paneling from the sewage back-up, the material should be cut out up to several inches above the water line and replaced.
- ◆ Wash the affected area with detergent solution to remove surface dirt and contamination. **Don't skip this step, or the disinfection step will be ineffective!** Allow it to air-dry.
- ◆ Apply a disinfectant labeled as being bactericidal (kills bacteria) or a solution of 1 part bleach + 9 parts water. Disinfectants and/or bleach should remain in contact with the items for 15-20 minutes to be effective. Allow it to air-dry.

\*Sort through the remaining contents and determine which items can be salvaged, and which must be discarded.

- ◆ The general rule of thumb is to discard all porous materials that have become contaminated by sewage, especially cardboard boxes, paper items, books and magazines, carpets and rugs, unfinished wood, wallboard, upholstered items, and anything else that is difficult to clean.
- ◆ Sometimes, certain items like clothing may be salvageable if they can be adequately laundered. Consult with a professional water damage restorer or cleaning professional for specifics.

### Be Sure To Discard All Contaminated:

- ◆ Cardboard
- ◆ Carpets & carpet pads
- ◆ Cosmetics
- ◆ Food
- ◆ Mattresses & pillows
- ◆ Medicines & medical supplies
- ◆ Stuffed animals & toys
- ◆ Unfinished furniture
- ◆ Upholstered furniture



## If Sewage Back-Ups Happen Routinely

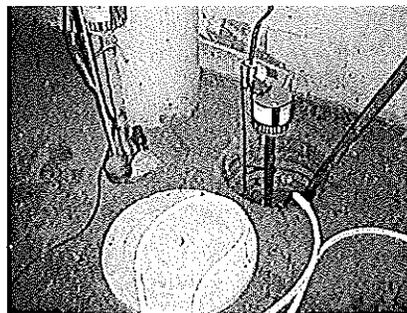
If the home is subject to periodic sewage back-ups, pro-active, preventive measures should be taken to reduce the risk of illness from contact with sewage. Also, contact your local municipal sewer authority or local health department to make sure that they are aware of these periodic back-up.

### \*Preventive actions include:

1. Waterproofing the building foundation and/or sealing cracks in foundation floor or walls;
2. Installation of a check valve or shut-off valve on the building sewer close to where it enters the structure, which will protect your home from sewage back-ups due to surcharging conditions in the municipal sewerage system (*you must check with the proper sewer authority prior to taking this action!!*); and
3. Raising or removing any sink, toilet, washing machine, etc. in the basement that may be subject to overflows when the sewer system backs up.

### \*Pro-active measures include the following:

1. Ensure that roof gutters and downspouts and sump pumps are not connected to the house sanitary sewer line. They carry clean ground or rain water that can easily overload the capacity of your sanitary sewer pipe.
2. Ensure that gutter downspouts and drains are directed away from the foundation and toward low points away from the home
3. Consider cutting down large trees or bushes near or over your sewer line before the roots plug the lines.
4. Do not use carpet flooring in basements. Carpet must be discarded after a sewage backup. Hard surfaces (tiles, ceramic, wood) can usually be dried out, disinfected and saved..
5. Purchase or install a pump (e.g. sump pump) to pump out water that collects in the low point of the basement or structure;
6. To the extent possible, keep furniture and valuables above flood levels where flooding has previously occurred; and
7. If minor flooding occurs, follow the water to its point-of-entry and seal cracks or defects to the extent possible.



Remember, an ounce of prevention is worth more than a pound of cure. Flood insurance is also vitally important where properties are known to be in floodplains or flood prone areas.

\*Information in this section is taken from the Massachusetts Department of Environmental Protection's *Flooding and Sewage Back-ups: Home Care Guide*. <http://www.mass.gov/dep/water/laws/flooding.htm>

## Resources for Further Information

### *First determine whether you have sewers or a septic system*

#### **Municipal (Sanitary) Sewer Questions:**

- ◆ Call Your Municipal Water Pollution Control Authority
- ◆ CT Department of Environmental Protection, Municipal Facilities Section: 860-424-3704

#### **Subsurface Sewage Disposal System (Septic System) Questions:**

- ◆ **Your Local Health Department** (contact information may be found in the blue pages of the telephone book, or on the web at [https://www.han.ct.gov/local\\_health/](https://www.han.ct.gov/local_health/))
- ◆ CT Department of Public Health, Environmental Engineering Program: 860-509-7296

#### **Hiring Clean-Up Companies and Clean-Up Procedures:**

- ◆ Institute of Inspection, Cleaning and Restoration (IICRC)  
<http://www.iicrc.org>  
Phone: (360) 693-5675  
Fax: (360) 693-4858  
IICRC Toll-Free Referral Line  
(800) 835-4624
- ◆ Connecticut Department of Consumer Protection:  
1-800-842-2649
- ◆ Connecticut Department of Public Health, Environmental and Occupational Health Assessment Program: 860-509-7742



#### **Health-Related Questions:**

If you develop diarrhea, nausea, vomiting, or other gastrointestinal symptoms, call your doctor. If you have additional health related questions, contact your private physician, your local health department, or:

- ◆ Connecticut Department of Public Health, Epidemiology Program: 860-509-7994.

#### **Additional Information:**

- ◆ Local Government Environmental Assistance Network  
<http://lgean.org/html/whatsnew.cfm?id=1331>
- ◆ The Metropolitan District Water Supply & Pollution Control  
<http://www.themdc.com/emergencies.htm>



## Water: Emergency Preparedness

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# Emergency Disinfection of Drinking Water

### USE ONLY WATER THAT HAS BEEN PROPERLY DISINFECTED FOR DRINKING, COOKING, MAKING ANY PREPARED DRINK, OR FOR BRUSHING TEETH

1. Use bottled water that has not been exposed to flood waters if it is available.
2. If you don't have bottled water, you should boil water to make it safe. Boiling water will kill most types of disease-causing organisms that may be present. If the water is cloudy, filter it through clean cloths or allow it to settle, and draw off the clear water for boiling. Boil the water for one minute, let it cool, and store it in clean containers with covers.
3. If you can't boil water, you can disinfect it using household bleach. Bleach will kill some, but not all, types of disease-causing organisms that may be in the water. If the water is cloudy, filter it through clean cloths or allow it to settle, and draw off the clear water for disinfection. Add 1/8 teaspoon (or 8 drops) of regular, unscented, liquid household bleach for each gallon of water, stir it well and let it stand for 30 minutes before you use it. Store disinfected water in clean containers with covers.
4. If you have a well that has been flooded, the water should be tested and disinfected after flood waters recede. If you suspect that your well may be contaminated, contact your local or state health department or agriculture extension agent for specific advice.

*(U.S. federal agencies and the Red Cross recommend these same four steps to disinfect drinking water in an emergency. Please, read the text below for important details about disinfection.)*

## More information about disinfection

In times of crisis, follow advice from local officials. Local health departments or public water systems may urge consumers to use more caution or to follow additional measures than the information provided here.

### Look for other sources of potable water in and around your home.

When your home water supply is interrupted by natural or other forms of disaster, you can 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 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. Generally, flowing water is better quality than stagnant water.

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#### On this Page

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- [Choose a disinfection method](#)
- [Summary and illustration of key points](#)

**Examine the physical condition of the water.**

When emergency disinfection is necessary, disinfectants are less effective in cloudy, murky or colored water. Filter murky or colored water through clean cloths or allow it to settle. It is better to both settle *and* filter. After filtering until it is clear, or allowing all dirt and other particles to settle, draw off the clean and clear water for disinfection. Water prepared for disinfection should be stored only in clean, tightly covered, containers, not subject to corrosion.

**Choose a disinfection method.**

Boiling and chemical treatment are two general methods used to effectively disinfect small quantities of filtered and settled water.

**Boiling**

**Boiling is the surest method to make water safe to drink and kill disease-causing microorganisms like *Giardia lamblia* and *Cryptosporidium*, which are frequently found in rivers and lakes.**

These disease-causing organisms are less likely to occur in well water (as long as it has not been affected by flood waters). If not treated properly and neutralized, *Giardia* may cause diarrhea, fatigue, and cramps after ingestion.

*Cryptosporidium* is highly resistant to disinfection. It may cause diarrhea, nausea and/or stomach cramps. People with severely weakened immune systems are likely to have more severe and more persistent symptoms than healthy individuals. Boil filtered and settled water vigorously for one minute (at altitudes above one mile, boil for three minutes). To improve the flat taste of boiled water, aerate it by pouring it back and forth from one container to another and allow it to stand for a few hours, or add a pinch of salt for each quart or liter of water boiled.

*If boiling is not possible, chemical disinfection of filtered and settled water collected from a well, spring, river, or other surface water body will still provide some health benefits and is better than no treatment at all.*

**Chemical Treatment**

**When boiling is not practical, certain chemicals will kill most harmful or disease-causing organisms.**

For chemical disinfection to be effective, the water must be filtered and settled first. Chlorine and iodine are the two chemicals commonly used to treat water. They are somewhat effective in protecting against exposure to *Giardia*, but may not be effective in controlling more resistant organisms like *Cryptosporidium*. Chlorine is generally more effective than iodine in controlling *Giardia*, and both disinfectants work much better in warm water.

You can use a non-scented, household chlorine bleach that contains a chlorine compound to disinfect water. Do not use non-chlorine bleach to disinfect water. Typically, household chlorine bleaches will be 5.25% available chlorine. Follow the procedure written on the label. 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. (Remember, 1/8 teaspoon and 8 drops are about the same quantity.)

Available Chlorine	Drops per Quart/Gallon of Clear Water	Drops per Liter of Clear Water
1%	10 per Quart - 40 per Gallon	10 per Liter
4-6%	2 per Quart - 8 per Gallon (1/8 teaspoon)	2 per Liter
7-10%	1 per Quart - 4 per Gallon	1 per Liter

(If the strength of the bleach is unknown, add ten drops per quart or liter of filtered and settled water. Double the amount of chlorine for cloudy, murky or colored water or water that is extremely cold.)

Mix the treated water thoroughly and allow it to stand, preferably covered, 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, allow the water to stand exposed to the air for a few hours or pour it from one clean container to another several times.

**You can use granular calcium hypochlorite to disinfect water.**

Add and dissolve one heaping teaspoon of high-test granular calcium hypochlorite (approximately ¼ ounce) for each two gallons of water, or 5 milliliters (approximately 7 grams) per 7.5 liters of water. The mixture will produce a stock chlorine solution of approximately 500 milligrams per liter, since the calcium hypochlorite has available chlorine equal to 70 percent of its weight. To disinfect water, add the 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 ounces) of stock chlorine to each 12.5 gallons of water or (approximately ½ liter to 50 liters of water) to be disinfected. To remove any objectionable chlorine odor, aerate the disinfected water by pouring it back and forth from one clean container to another.

**You can use chlorine tablets to disinfect filtered and settled water.**

Chlorine tablets containing the necessary dosage for drinking water disinfection can be purchased in a commercially prepared form. These tablets are available from 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 or liter of water to be purified.

**You can use tincture of iodine to disinfect filtered and settled water.**

Common household iodine from the medicine chest or first aid kit may be used to disinfect water. Add five drops of 2 percent U.S. or your country's approved Pharmacopeia tincture of iodine to each quart or liter of clear water. For cloudy water add ten drops and let the solution stand for at least 30 minutes.

**You can use iodine tablets to disinfect filtered and settled water.**

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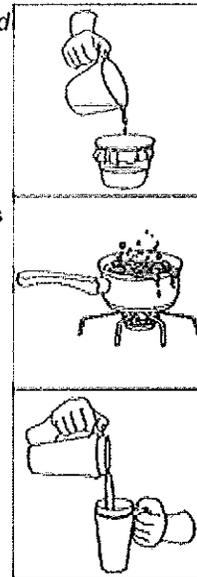
**ONLY USE WATER THAT HAS BEEN PROPERLY DISINFECTED FOR DRINKING, COOKING, MAKING ANY PREPARED DRINK, OR FOR BRUSHING TEETH.**

**Summary and illustration of key points**

Filter murky or colored water through clean cloths or allow it to settle. It is better to both settle *and* filter.

Boiling is the surest method to make water safe to drink and kill disease-causing microorganisms like *Giardia lamblia* and *Cryptosporidium*, which are frequently found in rivers and lakes.

To improve the flat taste of boiled water, aerate it by pouring it back and forth from one container to another and allow it to stand for a few hours, or add a pinch of salt for each quart or liter of water boiled.

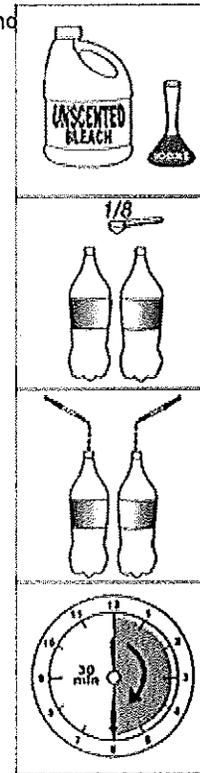


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You can use a non-scented, household chlorine bleach that contains a chlorine compound to disinfect water. (Remember, 1/8 teaspoon and 8 drops are about the same quantity.)

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Tincture of iodine. For cloudy water add ten drops and let the solution stand for at least 30 minutes.



Last updated on Wednesday, August 17, 2011